SKILL 1

TEACHER NOTES

Variables and Expressions

OBJECTIVE: Understand the uses of variables and expressions in algebra. Evaluate expressions. (Strand: Algebra)

USING THE TRANSPARENCY: Have students work in groups to determine the correct expression for the amount of money earned when working *h* hours in a week. Test out answers by evaluating the expressions with the hours worked shown in the table and compare answers for money earned.

USING THE STUDENT WORKBOOK: Encourage students to show all work clearly when evaluating expressions, including all steps in the order of operations process.

EXTENSION: Ask students to write an algebraic expression for the perimeter of a square.

Transparency, Skill 1

SKILL 1 WARM UP

Variables and Expressions

In algebra, letters called **variables** are used to represent unknown quantities. A combination of one or more variables, numbers, and at least one operation is called an **algebraic expression**. To **evaluate** an algebraic expression, replace the variable or variables with known values and then use the order of operations.

Nate works as a waiter at Angelo's Italian Restaurant. He earns $3 per hour worked plus a weekly tip amount of $35. The table shows several possibilities for number of hours worked during one week and the amount earned.

Number of Hours Worked in a Week	Money Earned
8	$3 \cdot 8 + 35$ or 59
12	$3 \cdot 12 + 35$ or 71
16	$3 \cdot 16 + 35$ or 83
20	$3 \cdot 20 + 35$ or 95
h	?

If *h* represents *any number of hours*, what expression could you write to represent the amount of money Nate would earn when working *h* hours in a week? Use that expression to determine how much money Nate would earn when working a 25-hour work week.

Words: The table shows the amount of money earned is calculated by multiplying Nate's hourly wage ($3) and the amount of hours worked and then adding the $35 weekly tip amount to that product.

Variable: Let *h* represent the number of hours Nate works in a week.

Expression: $3 \cdot h + 35$ or $3h + 35$

If Nate works 25 hours in one week, he would earn $3 \cdot 25 + 35$ or $110.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 1

SKILL 1 Name ______________________ Date ________

Variables and Expressions

Algebra is a language of symbols. In algebra, letters, called **variables**, are used to represent unknown quantities. A combination of one or more variables, numbers, and at least one operation is called an **algebraic expression**.

$x - 9$ means x minus 9.

$7m$ means 7 times m.

ab means a times b.

$\frac{h}{4}$ means h divided by 4.

To **evaluate** an algebraic expression, replace the variable or variables with known values and then use the order of operations.

EXAMPLE *Evaluate $2c - 7 + d$ if $c = 8$ and $d = 5$.*

$2c - 7 + d = 2(8) - 7 + 5$	*Replace c with 8 and d with 5.*
$= 16 - 7 + 5$	*Multiply.*
$= 9 - 5$	*Subtract.*
$= 14$	*Add.*

EXERCISES *Evaluate each expression if $x = 9$, $y = 5$, and $z = 2$.*

1. $x + 6$ **15**
2. $y - 3$ **2**
3. $z + 11$ **13**
4. $23 - x$ **14**
5. $6z$ **12**
6. $14 + y$ **19**
7. $4z + 5$ **13**
8. $24 - 2x$ **6**
9. $3y - 7$ **8**
10. $\frac{x}{3}$ **3**
11. $\frac{14}{z}$ **7**
12. $\frac{xy}{15}$ **3**

Glencoe/McGraw-Hill 1 Course 2 Intervention

Student Workbook, p. 2

13. $4x - 2y$ **26**
14. $6z - x$ **3**
15. $18 - 2x$ **0**
16. $6y - (x + z)$ **19**
17. $3x - z$ **25**
18. $5(y + 7)$ **60**
19. $2x + y - z$ **21**
20. $5z - y$ **5**
21. $4x - (z + 2y)$ **24**
22. $\frac{2x + 3z}{12}$ **2**
23. $\frac{7z - Y}{x}$ **1**
24. $\frac{5y - 7}{x}$ **2**
25. $(11 - 3z) + x + y$ **19**
26. $7(x - z)$ **49**
27. $6y - 9z$ **12**
28. $\frac{xy}{3} - z$ **13**
29. $\frac{40}{y} + x$ **17**
30. $\frac{4(x - y)}{z}$ **8**
31. $3x - 2(y - z)$ **21**
32. $(14 - 6z) + x$ **11**
33. $10z - (x + y)$ **6**

APPLICATIONS

34. The weekly production costs at Jessica's T-Shirt Shack are given by the algebraic expression $75 + 7s + 12t$ where s represents the number of short-sleeve shirts produced during the week and t represents the number of long-sleeve shirts produced during the week. Find the production cost for a week in which 30 short-sleeve and 24 long-sleeve shirts were produced. **$573**

35. The perimeter of a rectangle can be found by using the formula $2l + 2w$, where l represents the length of the rectangle and w represents the width of the rectangle. Find the perimeter of a rectangular swimming pool whose length is 32 feet and whose width is 20 feet. **104 feet**

Glencoe/McGraw-Hill 2 Course 2 Intervention

SKILL 2 TEACHER NOTES

Writing Expressions and Equations

OBJECTIVE: Translate verbal phrases and sentences into algebraic expressions and equations. (Strand: Algebra)

USING THE TRANSPARENCY: Use the same situation with varying numbers of friends, amounts spent on snacks, or total amounts spent and have students translate to the appropriate equation.

USING THE STUDENT WORKBOOK: Have students write their own verbal phrases and sentences and translate them together as a class.

EXTENSION: Have students find similar cell phone plans from different companies and write equations for each.

Transparency, Skill 2

SKILL 2 **WARM UP**

Writing Expressions and Equations

Brittany is going to the movies with two friends. They spend a total of \$22 on tickets and snacks, \$10 of which is spent on snacks. Write an equation which could be used to find the price of a movie ticket.

The first step in translating verbal phrases and sentences into algebraic expressions and equations is to choose a variable and a quantity for the variable to represent.

In this example, the unknown quantity to be represented by a variable is the price of a movie ticket. Let *p* represent the price of a movie ticket.

Words The amount spent on movie tickets plus the amount spent on snacks equals the total amount spent, \$22.

Variable Let *p* represent the price of a movie ticket.

	amount spent on tickets	plus	amount spent on snacks	equals	total amount
	↓	↓	↓	↓	↓
Expression	$3p$	$+$	10	$=$	22

So, the equation is $3p + 10 = 22$.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 3

SKILL 2 Name ______________ Date ______

Writing Expressions and Equations

Translating verbal phrases and sentences into algebraic expressions and equations is an important skill in algebra. Key words and phrases play an essential role in this skill.

The first step in translating a verbal phrase into an algebraic expression or a verbal sentence into an algebraic equation is to choose a variable and a quantity for the variable to represent. This is called **defining a variable**.

The following table lists some words and phrases that suggest addition, subtraction, multiplication, and division. Once a variable is defined, these words and phrases will be helpful in writing the complete expression or equation.

Addition	Subtraction	Multiplication	Division
plus	minus	times	divided
sum	difference	product	quotient
more than	less than	multiplied	per
increased by	subtract	each	rate
in all	decreased by	of	ratio
together	less	factors	separate

EXAMPLES ***Translate the phrase "three times the number of students per class" into an algebraic expression.***

Words three times the number of students per class

Variable Let *s* represent the number of students per class.

Expression $3s$

Translate the sentence "The weight of the apple increased by five is equal to twelve ounces." into an algebraic equation.

Words The weight of the apple increased by five is equal to twelve ounces.

Variable Let *w* represent the weight of the apple.

Equation $w + 5 = 12$

Glencoe/McGraw-Hill 3 Course 2 Intervention

Student Workbook, p. 4

EXERCISES ***Translate each phrase into an algebraic expression.***

1. seven points less than yesterday's score **$s - 7$**
2. the number of jelly beans divided into nine piles **$\frac{b}{9}$**
3. the morning temperature increased by sixteen degrees **$t + 16$**
4. six times the cost of the old book **$6b$**
5. two times the difference of a number and eight **$2(n - 8)$**

Translate each sentence into an algebraic equation.

6. The sum of four and a number is twenty. **$4 + n = 20$**
7. Fourteen is the product of two and a number. **$14 = 2n$**
8. Nine less than a number is three. **$n - 9 = 3$**
9. The quotient of a number and five is eleven. **$\frac{n}{5} = 11$**
10. Fifteen less than the product of a number and three is six. **$3n - 15 = 6$**

APPLICATIONS

11. Sierra purchased an ice cream cone for herself and three friends. The cost was \$8. Define a variable and then write an equation that can be used to find how much Sierra paid for each ice cream cone. **$4c = 8$**
12. Nicholas weighed 83 pounds at his most recent checkup. He had gained 9 pounds since his last checkup. Define a variable and then write an equation to find Nicholas' weight at the previous checkup. **$w + 9 = 83$**
13. There are three times as many people at the amusement park today than there were yesterday. Today's attendance is 12,000. Define a variable and then write an equation to find yesterday's attendance. **$3a = 12,000$**

Glencoe/McGraw-Hill 4 Course 2 Intervention

SKILL 3

TEACHER NOTES

Simplifying Expressions and Equations

OBJECTIVE: Write an algebraic expression or equation in simplest form by using the Distributive Property and combining like terms. (Strand: Algebra)

USING THE TRANSPARENCY: Have the students attempt to translate the word problem into an algebraic expression on their own before beginning the simplification process.

USING THE STUDENT WORKBOOK: Encourage students to check their solution for the problems involving the solution of an equation.

EXTENSION: Write terms involving similar variables on index cards and have students play a game by drawing several of the cards and creating an expression in simplest form with the terms on the cards drawn.

Transparency, Skill 3

SKILL 3 **WARM UP**

Simplifying Expressions and Equations

Sophie earned d dollars babysitting. Her friend, Lily, earned two dollars more than Sophie. A third friend, Sarah, earned twice as much as Lily. Write an expression in simplest form that represents the total amount earned by the three girls.

Words	Sophie earned d dollars. Lily earned two dollars more than Sophie. Sarah earned twice as much as Lily.
Variables	Let d = the amount Sophie earned. Let $d + 2$ = the amount Lily earned. Let $2(d + 2)$ = the amount Sarah earned.
Expression	To find the total, add the expressions.

$d + (d + 2) + 2(d + 2) = d + (d + 2) + 2(d) + 2(2)$	*Distributive Property*
$= d + (d + 2) + 2d + 4$	*Multiply.*
$= (d + d + 2d) + 2 + 4$	*Associative Property*
$= (1d + 1d + 2d) + 2 + 4$	*Identity Property*
$= (1 + 1 + 2)d + 2 + 4$	*Distributive Property*
$= 4d + 6$	*Simplify.*

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 5

SKILL 3 Name ________ Date ________

Simplifying Expressions and Equations

When an algebraic expression is separated into parts by addition and subtraction signs, each part is called a **term**. The numerical part of a term that contains a variable is called the **coefficient** of the variable. **Like terms** are terms that contain the same variables, such as $3a$ and $7a$ or $9mn$ and $2mn$. A term without a variable is called a **constant**. Constant terms are also like terms. An algebraic expression is in **simplest form** if it has no like terms and no parentheses.

EXAMPLE ***Simplify the expression $x + 5(y + 2x)$.***

$x + 5(y + 2x) = x + 5(y) + 5(2x)$	*Distributive Property*
$= x + 5y + 10x$	*Multiply.*
$= 1x + 5y + 10x$	*Identity Property*
$= 1x + 10x + 5y$	*Commutative Property*
$= (1 + 10)x + 5y$	*Distributive Property*
$= 11x + 5y$	*Simplify.*

When solving equations, sometimes it is necessary to simplify the equation by combining like terms before the equation can be solved.

EXAMPLES ***Solve each equation.***

$6a - 2a + 5 = 17$	
$4a + 5 = 17$	*Combine like terms.*
$4a + 5 - 5 = 17 - 5$	*Subtract 5 from each side.*
$4a = 12$	*Simplify.*
$\frac{4a}{4} = \frac{12}{4}$	*Divide each side by 4.*
$a = 3$	*Simplify.*
$4(2x - 1) = -6(x + 3)$	
$8x - 4 = -6x - 18$	*Distributive Property*
$8x - 4 + 6x = -6x - 18 + 6x$	*Add 6x to each side.*
$14x - 4 = -18$	*Simplify.*
$14x - 4 + 4 = -18 + 4$	*Add 4 to each side.*
$14x = -14$	*Simplify.*
$\frac{14x}{14} = -\frac{14}{14}$	*Divide each side by 14.*
$x = -1$	*Simplify.*

Glencoe/McGraw-Hill 5 Course 2 Intervention

Student Workbook, p. 6

EXERCISES *Simplify each expression.*

1. $6y + 9y$ **15y**
2. $-4m + 2m$ **−2m**
3. $13v - 9v$ **4v**
4. $7z + 5 - 3z + 2$ **4z + 7**
5. $2p - 11p$ **−9p**
6. $3g - 6 + 6$ **3g**

Solve each equation.

7. $18p - 2p + 6 = 9 + 5$ $\mathbf{\frac{1}{2}}$
8. $10b - 4 - 6b = 24 - 4$ **6**
9. $8n + 6 = 19 + 7n$ **13**
10. $-3m + 8m = 11 - 4 - 2m$ **1**
11. $6(3w + 5) = 2(10w + 10)$ **5**
12. $5(3x + 1) = 2(13x - 3)$ **1**
13. $3a + 4 - 2a - 7 = 4a + 3$ **−2**
14. $4(8 - 3w) = 32 - 8(w + 2)$ **4**

APPLICATIONS

15. Suppose you buy 5 videos that each cost c dollars, a DVD for $30, and a CD for $20. Write an expression in simplest form that represents the total amount spent. **5c + 50**
16. Malik earned d dollars raking leaves. His friend, Isaiah, earned three times as much. A third friend, Daniel, earned five dollars less than Malik. Write an expression in simplest form that represents the total amount earned by the three friends. **5d − 5**
17. A rectangle has length $2x - 3$ and width $x + 1$. Write an expression in simplest form that represents the perimeter of the rectangle. **6x − 4**

Glencoe/McGraw-Hill 6 Course 2 Intervention

SKILL 4

TEACHER NOTES

Adding and Subtracting Decimals

OBJECTIVE: Add and subtract decimals. (Strand: Number and Operation)

USING THE TRANSPARENCY: Give groups of three students an addition or subtraction problem. Have one student line up the decimal points and another student find the sum or difference. The third student checks the answer with a calculator.

USING THE STUDENT WORKBOOK: Have pairs of students create additional addition and subtraction problems using menus or advertisements.

EXTENSION: Tell students that the perimeter of a rectangle is 20 centimeters and the width is 6.25 centimeters. Ask them to find the length of the rectangle.

Transparency, Skill 4

SKILL 4 WARM UP

Adding and Subtracting Decimals

To add 5.1, 3.84, and 4.3245, follow these steps.

Step 1	Step 2
Line up the decimal points. 5.1000 3.8400 +4.3245 Annex zeros as needed to align the decimal points.	Add as with whole numbers. 5.1000 3.8400 +4.3245 13.2645 Place the decimal point in the answer in line with the decimal point in the addends.

To subtract 5.493 from 34.1, follow these steps.

Step 1	Step 2
Line up the decimal points. 34.100 −5.493 Annex zeros as needed to align the decimal points.	Subtract as with whole numbers. 34.100 − 5.493 28.607 Place the decimal point in the answer in line with the decimal points.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 7

SKILL 4 Name ______________ Date ________

Adding and Subtracting Decimals

To add decimals, line up the decimal points. Then add the same way you add whole numbers.

EXAMPLES *16.45 + 18.62* *77.3 + 88.45 + 90*

16.45 + 18.62 = 35.07

77.30 + 88.45 + 90.00 = 255.75 (Annex zeros.)

The sum is 35.07. The sum is 255.75.

To subtract decimals, line up the decimal points. Then subtract the same way you would subtract whole numbers.

EXAMPLES *45.63 − 15.47* *134 − 105.67*

45.63 − 15.47 = 30.16

134.00 − 105.67 = 28.33 (Annex zeros.)

The difference is 30.16. The difference is 28.33.

EXERCISES *Find each sum or difference.*

1. 8.22 + 6.83 **15.05**
2. 17.532 − 8.173 **9.359**
3. 47.9 + 134.2 **182.1**
4. 1.36 − 0.48 **0.88**
5. 0.817 − 0.6824 **0.1346**
6. 68.7 + 1.47 **70.17**

Glencoe/McGraw-Hill 7 Course 2 Intervention

Student Workbook, p. 8

7. 46 − 4.49 **41.51**
8. 1.0349 + 10.08 **11.1149**
9. 23 − 4.093 **18.907**
10. 47.9 + 32.422 **80.322**
11. 52.5 + 8.62 **61.12**
12. 3 + 24.15 + 56.052 **83.202**
13. 36 + 215.5 + 4.63 **256.13**
14. 16.2 − 5.59 **10.61**
15. 58 − 0.232 **57.768**
16. 23 − 1.59 **21.41**
17. 15.6 − 0.423 **15.177**
18. 38 + 3.65 **41.65**
19. 3.56 + 0.49 **4.05**
20. 170 − 67.34 **102.66**
21. 43.896 − 22.75 **21.146**

APPLICATIONS *The results of the 2000 Presidential election are given at the right. Use this information to answer Exercises 22–24.*

2000 Presidential Elections	
Candidate	Percent (%) of Popular Vote
Browne	0.36
Buchanan	0.42
Bush	47.87
Gore	48.38
Hagelin	0.08
Harris	0.01
Nader	2.74
Phillips	0.09
Write-In	0.02
Other	0.03

Source: *The World Almanac*

22. What percent of the vote was cast for Bush or Gore? **96.25%**
23. How many more percentage points did Gore receive than Bush? **0.51 percentage points**
24. What percent of the vote was cast for listed candidates other than Gore or Bush? **3.75%**
25. Three pieces of cardboard are 0.125 inch, 0.38 inch, and 0.0634 inch thick. What is the combined thickness of all three pieces? **0.5684 in.**
26. A weightlifter lifted 46.8 kilograms on his first lift. His next lift was 50 kilograms. How much more did he lift on his second lift than his first? **3.2 kg**
27. In a race, the first place finisher had a time of 29.14 seconds. The last-place finisher had a time of 35 seconds. What was the difference between the times? **5.86 s**

Glencoe/McGraw-Hill 8 Course 2 Intervention

SKILL 5

TEACHER NOTES

Multiplying and Dividing Decimals

OBJECTIVE: Multiply and divide decimals. (Strand: Number and Operation)

USING THE TRANSPARENCY: Ask the students what they should do if the product has fewer digits than the number of decimal places it needs. Ask the students what they should do if the dividend does *not* have enough decimal places to move the decimal point the same number of places as the divisor.

USING THE STUDENT WORKBOOK: Show students several meat labels. Read the weight of the meat and the price per pound. Ask the students how they would determine the total cost of the package of meat.

EXTENSION: Have pairs of students use the financial pages of a newspaper to make up problems about changing one currency to another.

Transparency, Skill 5

SKILL 5 WARM UP

Multiplying and Dividing Decimals

Allison earns $10.25 per hour as a cashier at a grocery store. One week, she worked 32.5 hours. How much did she earn that week?

To determine how much Allison earned, multiply $10.25 by 32.5.

```
   10.25    ←  two decimal places
 × 32.5     ←  one decimal place
   5125
  2050
 3075
 333.125    ←  three decimal places
```

Allison earned 333.125, or $333.13.

If Allison earned $358.75 one week, how many hours did she work that week?

To determine how many hours Allison worked, divide $358.75 by $10.25.

```
           35
10.25.)358.75.
       3075
        5125
        5125
           0
```

Change 10.25 to 1025 by moving the decimal point two places to the right.

Move the decimal point in the dividend two places to the right.

Divide as with whole numbers. Because the division ends with the ones place, it is not necessary to move the decimal point to the quotient.

Allison worked 35 hours.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 9

SKILL 5 Name ______ Date ______

Multiplying and Dividing Decimals

EXAMPLE *Multiply 2.56 by 1.03.*

```
    2.56  ←  2 decimal places
 ×  1.03  ←  2 decimal places
     768
    000
   256
  2.6368  ←  4 decimal places
```

The sum of the decimal places in the factors is 4, so the product has 4 decimal places.

The product is 2.6368.

EXAMPLE *Divide 0.201 by 0.3.*

```
        0.67
0.3.)0.2.01
      0
      2 0
      1 8
        21
        21
         0
```

Change 0.3 to 3 by moving the decimal point one place to the right.
Move the decimal point in the dividend one place to the right.
Divide as with whole numbers, placing the decimal point above the new point in the dividend.

The quotient is 0.67.

EXERCISES *Multiply.*

1. 2.5 × 1.3 = **3.25**
2. 6.92 × 53 = **366.76**
3. 46.89 × 0.06 = **2.8134**
4. 925.1 × 30.2 = **27,938.02**
5. 45.21 × 3.2 = **144.672**
6. 164.24 × 6.15 = **1010.076**

Glencoe/McGraw-Hill 9 Course 2 Intervention

Student Workbook, p. 10

7. 20.03 × 1.86 = **37.2558**
8. 10.26 × 30.5 = **312.93**
9. 49.76 × 5.17 = **257.2592**

Divide.

10. 0.04)0.092 **2.3**
11. 0.7)0.245 **0.35**
12. 0.06)0.204 **3.4**
13. 0.63)7.56 **12**
14. 4.6)115 **25**
15. 8.1)132.03 **16.3**
16. 4.7)43.381 **9.23**
17. 0.68)4.42 **6.5**
18. 0.84)25.62 **30.5**

APPLICATIONS

19. Members of the student body ran 87.75 miles on a 0.25 mile track to raise money for charity. How many laps did they run? **351**
20. A factory manager needs 3.25 yards of material to make a skirt. How many yards of fabric must be used to make 200 skirts? **650 yd**
21. Samantha worked 40.5 hours this week. She makes $9.50 per hour. How much money did she earn this week? **$384.75**
22. Batting averages are calculated to the nearest thousandth. Hikiro has 85 hits in 200 at bats. What is his batting average? **0.425**
23. Joshua took a 37.5-mile boat trip. It took him 2.5 hours. What was the average speed of the boat? **15 miles per hour**
24. Julia bought 3.5 pounds of mixed nuts that cost $7.49 per pound. How much did 3.5 pounds of nuts cost? **$26.22**

Glencoe/McGraw-Hill 10 Course 2 Intervention

SKILL 6

TEACHER NOTES

Adding and Subtracting Fractions

OBJECTIVE: Add and subtract fractions. (Strand: Number and Operation)

USING THE TRANSPARENCY: On the chalkboard, draw an oversized ruler marked in eighth-inch increments. Draw arrows to model $\frac{1}{8} + \frac{1}{4}$.

USING THE STUDENT WORKBOOK: Explain that there are many common denominators for any set of fractions, but only one least common denominator. Other common denominators may be used, but the answers will need to be simplified.

EXTENSION: Have students use fraction tiles to model one of the application exercises.

Transparency, Skill 6

SKILL 6 WARM UP

Adding and Subtracting Fractions

What fraction of each dollar is spent on utilities and mortgage expenses?

Add $\frac{6}{25}$ and $\frac{3}{10}$.

To add fractions with unlike denominators, rename the fractions so that they have a common denominator.

Household Expenses	
Mortgage	$\frac{3}{10}$
Maintenance	$\frac{9}{100}$
Housekeeping Supplies	$\frac{1}{10}$
Property Taxes	$\frac{3}{25}$
Utilities	$\frac{6}{25}$
Furnishings	$\frac{3}{20}$

$$\frac{6}{25} = \frac{12}{50}$$
$$+\frac{3}{10} = +\frac{15}{50}$$
$$\frac{27}{50}$$

Find the LCD of 25 and 10.
The LCD of 25 and 10 is 50.
Rename $\frac{6}{25}$ as $\frac{12}{50}$, and $\frac{3}{10}$ as $\frac{15}{50}$.

$\frac{27}{50}$ is spent on utilities and mortgage expenses.

How much more is spent on furnishings than is spent on housekeeping supplies?

Subtract $\frac{1}{10}$ from $\frac{3}{20}$.

$$\frac{3}{20} = \frac{3}{20}$$
$$-\frac{1}{10} = -\frac{2}{20}$$
$$\frac{1}{20}$$

The LCD of 20 and 10 is 20.
Rename $\frac{1}{10}$ as $\frac{2}{20}$.

$\frac{1}{20}$ more is spent on furnishings than on housekeeping supplies.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 11

SKILL 6 Name ______________ Date ________

Adding and Subtracting Fractions

To add or subtract fractions with unlike denominators, rename the fractions so that they have a common denominator.

EXAMPLES *Find each sum or difference.*

a. $\frac{1}{4} = \frac{2}{8}$; $+\frac{5}{8} = +\frac{5}{8}$; $\frac{7}{8}$. The sum is $\frac{7}{8}$.

b. $\frac{1}{6} = \frac{5}{30}$; $+\frac{7}{10} = +\frac{21}{30}$; $\frac{26}{30} = \frac{13}{15}$. The sum is $\frac{13}{15}$.

c. $16\frac{1}{2} = 16\frac{7}{14}$; $+14\frac{5}{7} = +14\frac{10}{14}$; $30\frac{17}{14} = 31\frac{3}{14}$. The sum is $31\frac{3}{14}$.

d. $\frac{8}{9} - \frac{1}{3}$; $\frac{8}{9} = \frac{8}{9}$; $-\frac{1}{3} = -\frac{3}{9}$; $\frac{5}{9}$. The difference is $\frac{5}{9}$.

e. $\frac{5}{6} - \frac{3}{8}$; $\frac{5}{6} = \frac{20}{24}$; $-\frac{3}{8} = -\frac{9}{24}$; $\frac{11}{24}$. The difference is $\frac{11}{24}$.

f. $6 - 3\frac{2}{5}$; $6 = 5\frac{5}{5}$; $-3\frac{2}{5} = -3\frac{2}{5}$; $2\frac{3}{5}$. The difference is $2\frac{3}{5}$.

EXERCISES *Find each sum or difference.*

1. $\frac{1}{5} + \frac{1}{4}$ **$\frac{9}{20}$**
2. $\frac{5}{12} + \frac{1}{3}$ **$\frac{3}{4}$**
3. $\frac{1}{6} + \frac{3}{5}$ **$\frac{23}{30}$**
4. $\frac{7}{8} - \frac{1}{4}$ **$\frac{5}{8}$**
5. $\frac{7}{10} - \frac{3}{8}$ **$\frac{13}{40}$**
6. $\frac{11}{12} - \frac{1}{6}$ **$\frac{3}{4}$**

Glencoe/McGraw-Hill 11 Course 2 Intervention

Student Workbook, p. 12

7. $5\frac{1}{4} + 7\frac{1}{3}$ **$12\frac{7}{12}$**
8. $11\frac{3}{4} + 8\frac{2}{3}$ **$20\frac{5}{12}$**
9. $13 + 9\frac{7}{8}$ **$22\frac{7}{8}$**
10. $15\frac{1}{2} + 9\frac{4}{5}$ **$25\frac{3}{10}$**
11. $12\frac{1}{2} - 8\frac{2}{3}$ **$3\frac{5}{6}$**
12. $14\frac{5}{8} - 6\frac{5}{6}$ **$7\frac{19}{24}$**
13. $18\frac{7}{8} - 13$ **$5\frac{7}{8}$**
14. $11 - 3\frac{5}{9}$ **$7\frac{4}{9}$**
15. $16\frac{2}{5} - 13\frac{3}{4}$ **$2\frac{13}{20}$**
16. $\frac{3}{10} + \frac{4}{15}$ **$\frac{17}{30}$**
17. $\frac{3}{8} + \frac{5}{12}$ **$\frac{19}{24}$**
18. $18\frac{5}{18} - 8\frac{1}{9}$ **$10\frac{1}{6}$**
19. $2\frac{1}{4} + 3\frac{1}{2} + 5\frac{5}{6}$ **$11\frac{7}{12}$**
20. $15\frac{3}{4} + 12\frac{5}{16} + 10\frac{3}{8}$ **$38\frac{7}{16}$**
21. $21 + 8\frac{7}{10} + 14\frac{3}{4}$ **$44\frac{9}{20}$**

APPLICATIONS

22. Ashley spends $\frac{1}{4}$ of her study time studying math and $\frac{1}{6}$ of her time studying history. How much of her study time does she spend on math and history? **$\frac{5}{12}$**
23. Hinto repaired her bike for $\frac{5}{6}$ hour and then rode it for $\frac{3}{5}$ hour. How much more time did she spend repairing her bike? **$\frac{7}{30}$ h**
24. A tailor buys some cloth to make pants. He buys $3\frac{5}{6}$ yards of one type of fabric and $4\frac{7}{36}$ yards of another. How much fabric did he buy in all? **$8\frac{1}{36}$ yd**
25. A park ranger led a group of campers on a $5\frac{1}{2}$-mile hike. They have already hiked $2\frac{1}{3}$ miles. How far do they have yet to hike? **$3\frac{1}{16}$ mi**

Glencoe/McGraw-Hill 12 Course 2 Intervention

SKILL **7**

TEACHER NOTES

Multiplying and Dividing Fractions

OBJECTIVE: Multiply and divide fractions. (Strand: Number and Operation)

USING THE TRANSPARENCY: Illustrate $\frac{5}{8} \times \frac{1}{2}$ by drawing a rectangle and shading $\frac{5}{8}$ of it. Then use darker shading for $\frac{1}{2}$ the shaded region.

USING THE STUDENT WORKBOOK: Illustrate division of fractions by drawing $\frac{3}{4}$ of a circle. Ask students how many $\frac{1}{8}$ sections are in the drawing.

EXTENSION: Use colored transparency strips to model multiplication and division.

Transparency, Skill 7

SKILL 7 WARM UP

Multiplying and Dividing Fractions

If two thirds of the junior class are girls, what fraction of the entire school population are girls in the junior class?

Central High School	
Class	Fraction of School Population
Freshman	$\frac{1}{4}$
Sophomore	$\frac{1}{5}$
Junior	$\frac{3}{10}$
Senior	$\frac{1}{4}$

Multiply $\frac{3}{10}$ by $\frac{2}{3}$.

To multiply fractions, multiply the numerators and multiply the denominators.

$\frac{3}{10} \times \frac{2}{3} = \frac{3 \times 2}{10 \times 3}$ *Multiply the numerators. Multiply the denominators.*

$= \frac{6}{30}$ or $\frac{1}{5}$ *Simplify.*

One fifth of the student population are girls in the junior class.

If $\frac{3}{32}$ of the student population are boys in the freshman class, what fraction of all freshman are boys?

Divide $\frac{3}{32}$ by $\frac{1}{4}$.

To divide by a fraction, multiply by its reciprocal.

$\frac{3}{32} \div \frac{1}{4} = \frac{3}{32} \times \frac{4}{1}$ *Multiply by the reciprocal of $\frac{1}{4}$, which is $\frac{4}{1}$.*

$= \frac{3 \times 4}{32 \times 1}$ *Multiply the numerators. Multiply the denominators.*

$= \frac{12}{32}$ or $\frac{3}{8}$ *Simplify.*

Three eighths of the freshman class are boys.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 13

SKILL 7

Name ______________________ Date __________

Multiplying and Dividing Fractions

To multiply fractions, multiply the numerators and multiply the denominators.

EXAMPLE *What is the product of $\frac{5}{6}$ and $\frac{9}{10}$?*

$\frac{5}{6} \times \frac{9}{10} = \frac{5 \times 9}{6 \times 10}$ *Multiply the numerators. Multiply the denominators.*

$= \frac{45}{60}$ or $\frac{3}{4}$ *Simplify.*

The product is $\frac{3}{4}$.

To divide by a fraction, multiply by its reciprocal.

EXAMPLE *What is the quotient of $\frac{4}{15}$ and $\frac{2}{5}$?*

$\frac{4}{15} \div \frac{2}{5} = \frac{4}{15} \times \frac{5}{2}$ *Multiply by the reciprocal of $\frac{2}{5}$, which is $\frac{5}{2}$.*

$= \frac{4}{15} \times \frac{5}{2}$ *Multiply the numerators. Multiply the denominators.*

$= \frac{20}{30}$ or $\frac{2}{3}$ *Simplify.*

The quotient is $\frac{2}{3}$.

EXERCISES *Multiply. Express each answer in simplest form.*

1. $\frac{2}{3} \times \frac{1}{4}$ **$\frac{1}{6}$**
2. $\frac{3}{7} \times \frac{1}{2}$ **$\frac{3}{14}$**
3. $\frac{7}{10} \times \frac{5}{7}$ **$\frac{1}{2}$**
4. $\frac{5}{8} \times \frac{1}{4}$ **$\frac{5}{32}$**
5. $\frac{1}{6} \times \frac{3}{5}$ **$\frac{1}{10}$**
6. $\frac{4}{5} \times \frac{9}{10}$ **$\frac{18}{25}$**
7. $6 \times \frac{2}{3}$ **4**
8. $\frac{3}{5} \times 10$ **6**
9. $12 \times \frac{5}{16}$ **$3\frac{3}{4}$**

Glencoe/McGraw-Hill 13 Course 2 Intervention

Student Workbook, p. 14

Divide. Express each answer in simplest form.

10. $\frac{3}{4} \div \frac{1}{2}$ **$1\frac{1}{2}$**
11. $\frac{1}{5} \div \frac{1}{4}$ **$\frac{4}{5}$**
12. $\frac{3}{8} \div \frac{3}{4}$ **$\frac{1}{2}$**
13. $\frac{4}{5} \div \frac{2}{5}$ **2**
14. $\frac{7}{8} \div \frac{1}{4}$ **$3\frac{1}{2}$**
15. $\frac{4}{7} \div \frac{8}{9}$ **$\frac{9}{14}$**
16. $\frac{4}{9} \div \frac{2}{3}$ **$\frac{2}{3}$**
17. $\frac{5}{9} \div 5$ **$\frac{1}{9}$**
18. $20 \div \frac{3}{10}$ **$66\frac{2}{3}$**

Find each product or quotient. Express each answer in simplest form.

19. $\frac{2}{3} \times \frac{5}{9}$ **$\frac{10}{27}$**
20. $\frac{1}{6} \div \frac{2}{9}$ **$\frac{3}{4}$**
21. $\frac{9}{10} \div \frac{1}{4}$ **$3\frac{3}{5}$**
22. $\frac{1}{15} \times 15$ **1**
23. $\frac{15}{16} \div \frac{15}{16}$ **1**
24. $\frac{4}{5} \times \frac{15}{24}$ **$\frac{1}{2}$**

APPLICATIONS

25. A piece of lumber 12 feet long is cut into pieces that are each $\frac{2}{3}$ foot long. How many short pieces are there? **18**
26. About $\frac{1}{20}$ of the population of the world lives in South America. If $\frac{1}{35}$ of the population of the world lives in Brazil, what fraction of the population of South America lives in Brazil? **$\frac{4}{7}$**
27. There is $\frac{1}{3}$ pound of peanuts in 2 pounds of mixed nuts. What part of the mixed nuts are peanuts? **$\frac{1}{6}$**
28. Three fourths of an apple pie is left over from dessert. If the pie was originally cut in $\frac{1}{16}$ pieces, how many pieces are left? **12**
29. A recipe calls for $\frac{1}{8}$ cup of sugar. Christopher is making half the recipe. How much sugar will he need? **$\frac{1}{16}$c**
30. Ms. Valdez has 2 dozen golf balls. She lost $\frac{1}{3}$ of them. How many golf balls does she have left? **16**

Glencoe/McGraw-Hill 14 Course 2 Intervention

SKILL 8

TEACHER NOTES

Work Backward

OBJECTIVE: Solve problems by working backward or backtracking. (Strand: Problem Solving)

USING THE TRANSPARENCY: Discuss inverse operations and their role in the work-backward strategy.

USING THE STUDENT WORKBOOK: Separate the class into small groups. Read the following problem. *If I add 3 to my number, then divide by 6, the answer is 2. Guess my number.* Ask one student in each group to state a problem involving two operations similar to the example. The student who correctly determines the number then makes up a problem.

EXTENSION: Ask students to suggest situations for which the working-backward strategy is a reasonable strategy.

Transparency, Skill 8

SKILL 8 **WARM UP**

Work Backward

Whitney is buying a new coat. She has a coupon for $5 off the price of the coat which is applied after her end-of-the-season discount. If the final price of the coat is $72, what was the original price of the coat?

To solve this problem, use a flowchart to work backward from the final price.

p → × 0.5 → ( ) → −5 → ( )
Original price ... Final price

Start with the final price.

p → × 0.5 → ( ) → −5 → $72

Add $5 to the final price.

p → × 0.5 → $77 → −5 → $72

Divide by 0.5.

$154 → × 0.5 → $77 → −5 → $72

The original price of the coat was $154.

Glencoe/McGraw-Hill — Course 2 Intervention

Student Workbook, p. 15

SKILL 8 Name ______________ Date ______

Work Backward

Some problems start with the end result and ask for something that happened earlier. The strategy of **working backward**, or **backtracking**, can be used to solve problems like this. To use this strategy, start with the end result and undo each step.

EXAMPLE *A number is decreased by 12. The result is multiplied by 5, and 30 is added to the new result. The final result is 200. What is the number?*

Use a flowchart to show the steps in the computation.

n (Input) → − 12 → ( ) → × 5 → ( ) → + 30 → ( ) (Output)

Find the solution by starting with the output.

n (Input) → − 12 → ( ) → × 5 → ( ) → + 30 → 200 (Output)

Since 30 was added to get 200, subtract 30. 200 − 30 = 170

n (Input) → − 12 → ( ) → × 5 → 170 → + 30 → 200 (Output)

Next, divide 170 by 5. 170 ÷ 5 = 34

n (Input) → − 12 → 34 → × 5 → 170 → + 30 → 200 (Output)

Then, add 12 to 34. 34 + 12 = 46

46 (Input) → − 12 → 34 → × 5 → 170 → + 30 → 200 (Output)

Thus, the number is 46.

Glencoe/McGraw-Hill 15 Course 2 Intervention

Student Workbook, p. 16

EXERCISES *Solve by working backward.*

1. A number is added to 12, and the result is multiplied by 6. The final answer is 114. Find the number. **7**
2. A number is divided by 3, and the result is added to 20. The result is 44. What is the number? **72**
3. A number is divided by 8, and the result is added to 12. The final answer is 78. Find the number. **504**
4. Twenty five is added to a number. The sum is multiplied by 4, and 35 is subtracted from the product. The result is 121. What is the number? **14**
5. A number is divided by three, and 14 is added to the quotient. The sum is multiplied by 7. The product is doubled. The result is 252. What is the number? **12**

APPLICATIONS

6. A bacteria population doubles every 8 hours. If there are 1,600 bacteria after 2 days, how many bacteria were there at the beginning? **25 bacteria**
7. Each school day, Alexander takes 35 minutes to get ready for school. He takes 5 minutes to walk to Jaaron's house. The two boys take 15 minutes to walk from Jaaron's house to school. School starts at 8:10 A.M. If the boys want to get to school at least 10 minutes before school starts, what is the latest Alexander must get out of bed? **7:05 A.M.**
8. A fence is put around a dog pen 10 feet wide and 20 feet long. Enough fencing is left over to also fence a square garden with an area of 25 square feet. If there are 3 feet left after the fencing is completed, how much fencing was available at the beginning? **83 ft**

Glencoe/McGraw-Hill 16 Course 2 Intervention

SKILL 9

TEACHER NOTES

Properties

OBJECTIVE: Review addition and multiplication properties. (Strand: Number and Operation)

USING THE TRANSPARENCY: Watch for students who confuse the Commutative Property with the Associative Property. Emphasize that the Commutative Property involves only the *order* of numbers, while the Associative Property involves only the *grouping* of numbers.

USING THE STUDENT WORKBOOK: Use base-ten blocks or counters to illustrate the Commutative, Associative, and Distributive Properties for expressions. For example, $5 \times 3 = 3 \times 5$, $3 \times (4 \times 5) = (3 \times 4) \times 5$, and $3 \times (4 + 5) = 3 \times 4 + 3 \times 5$.

EXTENSION: Have the students work together to research the Reflexive, Symmetric, and Transitive Properties of Equality.

Transparency, Skill 9

SKILL 9 WARM UP

Properties

The table below describes the properties for addition and multiplication. The Examples column provides examples of each property using numbers.

Property	Examples	
Commutative The sum or product of two numbers is the same regardless of the order in which they are added or multiplied.	**Addition** $4 + 6 = 6 + 4$; $10 = 10$	**Multiplication** $8 \times 3 = 3 \times 8$; $24 = 24$
Associative The sum or product of three or more numbers is the same regardless of the way in which they are grouped.	**Addition** $(1 + 3) + 7 = 1 + (3 + 7)$; $4 + 7 = 1 + 10$; $11 = 11$	**Multiplication** $(5 \cdot 2) \cdot 3 = 5 \cdot (2 \cdot 3)$; $10 \cdot 3 = 5 \cdot 6$; $30 = 30$
Distributive The sum of two addends multiplied by a number is equal to the products of each addend and the number.	$9 \cdot (4 + 8) = (9 \cdot 4) + (9 \cdot 8)$; $9 \cdot (12) = 36 + 72$; $108 = 108$	
Identity Property of Addition The sum of a number and 0 is the number.	$15 + 0 = 15$	
Identity Property of Multiplication The product of a number and 1 is the number.	$32 \times 1 = 32$	
Inverse Property of Addition The sum of a number and its additive inverse (opposite) is 0.	$2 + (-2) = 0$	
Inverse Property of Multiplication The product of a number and its multiplicative inverse (reciprocal) is 1.	$3 \times \frac{1}{3} = \frac{3}{1} \times \frac{1}{3}$; $= 1$	

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 17

SKILL 9

Name ____________ Date ______

Properties

The table shows the properties for addition and multiplication.

Property	Examples	
Commutative The sum or product of two numbers is the same regardless of the order in which they are added or multiplied.	**Addition** $2 + 3 = 3 + 2$; $5 = 5$	**Multiplication** $4 \times 6 = 6 \times 4$; $24 = 24$
Associative The sum or product of three or more numbers is the same regardless of the way in which they are grouped.	**Addition** $(5 + 2) + 6 = 5 + (2 + 6)$; $7 + 6 = 5 + 8$; $13 = 13$	**Multiplication** $(3 \cdot 4) \cdot 7 = 3 \cdot (4 \cdot 7)$; $12 \cdot 7 = 3 \cdot 28$; $84 = 84$
Distributive The sum of two addends multiplied by a number is equal to the products of each addend and the number.	$5 \cdot (6 + 2) = (5 \cdot 6) + (5 \cdot 2)$; $5 \cdot (8) = 30 + 10$; $40 = 40$	
Identity Property of Addition The sum of a number and 0 is the number.	$9 + 0 = 9$	
Identity Property of Multiplication The product of a number and 1 is the number.	$15 \times 1 = 15$	
Inverse Property of Addition The sum of a number and its additive inverse (opposite) is 0.	$4 + (-4) = 0$	
Inverse Property of Multiplication The product of a number and its multiplicative inverse (reciprocal) is 1.	$2 \times \frac{1}{2} = \frac{2}{1} \times \frac{1}{2}$; $= 1$	

EXERCISES *Name the additive inverse, or opposite of each number.*

1. 8 **−8**
2. 5 **−5**
3. $\frac{3}{4}$ $\mathbf{-\frac{3}{4}}$
4. $1\frac{1}{2}$ $\mathbf{-1\frac{1}{2}}$

Name the multiplicative inverse, or reciprocal of each number.

5. 4 $\mathbf{\frac{1}{4}}$
6. 7 $\mathbf{\frac{1}{7}}$
7. $\frac{2}{5}$ $\mathbf{\frac{5}{2}}$
8. $\frac{7}{16}$ $\mathbf{\frac{16}{7}}$

Glencoe/McGraw-Hill 17 Course 2 Intervention

Student Workbook, p. 18

Name the property shown by each statement.

9. $34 + 42 = 42 + 34$ **Commutative Property of Addition**
10. $8 \times (53 + 12) = (8 \times 53) + (8 \times 12)$ **Distributive Property**
11. $\frac{1}{16} \times 16 = 1$ **Inverse Property of Multiplication**
12. $16 \cdot (5 \cdot 15) = (16 \cdot 5) \cdot 15$ **Associative Property of Multiplication**
13. $\frac{2}{5} \cdot \frac{5}{3} = \frac{5}{3} \cdot \frac{2}{5}$ **Commutative Property of Multiplication**
14. $(32 + 48) + 52 = 32 + (48 + 52)$ **Associative Property of Addition**
15. $256 + 0 = 256$ **Identity Property of Addition**
16. $\frac{3}{10} \cdot \frac{10}{3} = 1$ **Inverse Property of Multiplication**
17. $1 \times 143 = 143$ **Identity Property of Multiplication**
18. $81 + (-81) = 0$ **Inverse Property of Addition**

APPLICATIONS

19. Michael rides his bike $2\frac{3}{5}$ as long as Jacob. Find Michael's riding time if Jacob rides for 45 minutes. **117 minutes**
20. A daisy is 24 inches tall. The height of a sunflower is $3\frac{1}{2}$ times the height of the daisy. Find the height of the sunflower. **84 inches**
21. Jasmine buys an apple for $0.45, an orange for $0.55, and a pear for $0.99. Write an expression you could use to mentally calculate her total. What is her total? **(0.45 + 0.55) + 0.99; $1.99**
22. The distance from the library to the park is 1.2 miles, and the distance from the park to the pool is 0.5 mile. The park is between the library and the pool. Show that the distance from the library to the pool is the same as the distance from the pool to the library. **1.2 + 0.5 = 0.5 + 1.2**
23. Greeting cards cost $2 each and wrapping paper costs $3 per roll. Write an expression you could use to find the total cost of buying 6 greeting cards and 6 rolls of wrapping paper. What is the total cost? **6(2 + 3); $30**

Glencoe/McGraw-Hill 18 Course 2 Intervention

SKILL 10

TEACHER NOTES

Function Tables

OBJECTIVE: Make function tables. (Strand: Algebra)

USING THE TRANSPARENCY: Tell students that a handicap in golf is subtracted from the actual score. Ask students to write an equation for finding the final score if a person has a handicap of 15.

USING THE STUDENT WORKBOOK: If a family of 9 wants to buy each family member x tacos, the equation $y = 9x$ represents the number of tacos they would need to buy. Ask students to write an equation for their family.

EXTENSION: Ask students to write an equation for the function table.

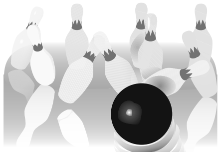
x	y
0	0
5	45
8	72

Transparency, Skill 10

SKILL 10 WARM UP

Function Tables

Shelby likes to go bowling. In her Saturday morning league, she has a handicap of 12 points. This means that she must add 12 points to each game score. In this way, all bowlers have a chance to win.



The equation that can be used to compute Shelby's final game score is $y = x + 12$, where x is the actual score and y is the final score. Make a function table showing the final score if Shelby's actual score is 115, 120, 122, 124, 127, or 130.

$y = x + 12$

x	$x + 12$	y
115	115 + 12	127
120	120 + 12	132
122	122 + 12	134
124	124 + 12	136
127	127 + 12	139
130	130 + 12	142

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 19

SKILL 10 Name ______________________ Date __________

Function Tables

A student ticket to the Franklin School of Music's annual concert costs \$3.00. The equation that can be used to find the costs of x tickets is $y = 3x$.

EXAMPLE *Make a function table showing the total cost of 2, 4, 6, 8, or 10 tickets.*

$y = 3x$

x	$3x$	y
2	3(2)	6
4	3(4)	12
6	3(6)	18
8	3(8)	24
10	3(10)	30

EXERCISES *Complete each function table.*

1. $y = x - 7$

x	$x - 7$	y
10	10 − 7	3
14	14 − 7	**7**
20	**20 − 7**	**13**
25	**25 − 7**	**18**
50	**50 − 7**	**43**

2. $y = x \div 2$

x	$x \div 2$	y
4	**4 ÷ 2**	**2**
8	**8 ÷ 2**	**4**
10	**10 ÷ 2**	**5**
30	**30 ÷ 2**	**15**
100	**100 ÷ 2**	**50**

3. $y = 4x - 8$

x	$4x - 8$	y
5	4(5) − 8	12
10	4(10) − 8	**32**
20	**4(20) − 8**	**72**
50	**4(50) − 8**	**192**
100	**4(100) − 8**	**392**

4. $y = 6x + 1$

x	$6x + 1$	y
2	**6(2) + 1**	**13**
4	**6(4) + 1**	**25**
8	**6(8) + 1**	**49**
20	**6(20) + 1**	**121**
100	**6(100) + 1**	**601**

Glencoe/McGraw-Hill 19 Course 2 Intervention

Student Workbook, p. 20

5. $y = 2x - 2$

x	$2x - 2$	y
1	**2(1) − 2**	**0**
2	**2(2) − 2**	**2**
3	**2(3) − 2**	**4**
4	**2(4) − 2**	**6**
8	**2(8) − 2**	**14**

6. $y = 2.5x + 1$

x	$2.5x + 1$	y
0	**2.5(0) + 1**	**1**
2	**2.5(2) + 1**	**6**
4	**2.5(4) + 1**	**11**
10	**2.5(10) + 1**	**26**
25	**2.5(25) + 1**	**63.5**

APPLICATIONS *The cost per hour of operating appliances is listed at the right. Use this information to make a function table for the cost of operating each appliance for 1, 2, 3, 5, or 10 hours.*

Appliance	Cost per Hour
Television	12¢
Microwave Oven	14¢
Vacuum Cleaner	7¢
Computer	24¢

7. Television
$y = 12x$

x	$12x$	y
1	**12(1)**	**12**
2	**12(2)**	**24**
3	**12(3)**	**36**
5	**12(5)**	**60**
10	**12(10)**	**120**

8. Microwave Oven
$y = 14x$

x	$14x$	y
1	**14(1)**	**14**
2	**14(2)**	**28**
3	**14(3)**	**42**
5	**14(5)**	**70**
10	**14(10)**	**140**

9. Vacuum Cleaner
$y = 7x$

x	$7x$	y
1	**7(1)**	**7**
2	**7(2)**	**14**
3	**7(3)**	**21**
5	**7(5)**	**35**
10	**7(10)**	**70**

10. Computer
$y = 24x$

x	$24x$	y
1	**24(1)**	**24**
2	**24(2)**	**48**
3	**24(3)**	**72**
5	**24(5)**	**120**
10	**24(10)**	**240**

Glencoe/McGraw-Hill 20 Course 2 Intervention

SKILL 11

TEACHER NOTES

Problem-Solving Strategies

OBJECTIVE: Solve problems using guess-and-check, looking for a pattern, or eliminating possibilities. (Strand: Problem Solving)

USING THE TRANSPARENCY: Discuss the usefulness of examining information to look for a pattern. Encourage students to describe the pattern using words.

USING THE STUDENT WORKBOOK: Tell students that when using the guess-and-check strategy, each new guess should reflect the results from the last guess. You may want to suggest that students cross out the eliminated possibilities when using the eliminating-possibilities strategy.

EXTENSION: Have students make up several patterns that begin with 1, 2, … .

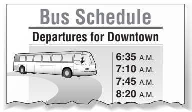
Transparency, Skill 11

SKILL 11 **WARM UP**

Problem-Solving Strategies

Logan has a part of a schedule for the bus that leaves from the corner near his house to go downtown. He wants to catch the bus sometime between 11:00 A.M. and 11:30 A.M. When should he expect the bus to pick up passengers during this time frame?

To solve this problem, look for a pattern.



6:35 A.M.
+ 35 minutes
7:10 A.M.
+ 35 minutes
7:45 A.M.
+ 35 minutes
8:20 A.M.

The bus seems to leave every 35 minutes. Extend the pattern to find when the bus will leave between 11:00 A.M. and 11:30 A.M.

8:20 A.M.
+ 35 minutes
8:55 A.M.
+ 35 minutes
9:30 A.M.
+ 35 minutes
10:05 A.M.
+ 35 minutes
10:40 A.M.
+ 35 minutes
11:15 A.M.
+ 35 minutes
11:50 A.M.

According to the pattern, the bus will pick up passengers at the corner near Logan's house at 11:15 A.M.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 21

SKILL 11 Name ____________ Date ________

Problem-Solving Strategies

Three possible strategies for solving problems are listed below.

- Guess and Check
- Look for a Pattern
- Eliminate the Possibilities

EXAMPLE *The Connor family bought some tickets to the zoo. Admission is $12 for adults and $7 for children under 12. They spent $71 for admission. How many adult tickets and how many children's tickets did the Connor family buy?*

Use the guess-and-check strategy to solve the problem. Suppose your first guess is 2 adults and 5 children.

$2 \times 12 + 5 \times 7 = 59$

This guess is too low. Try 3 adults and 6 children.

$3 \times 12 + 6 \times 7 = 78$

This guess is too high. Try 3 adults and 5 children.

$3 \times 12 + 5 \times 7 = 71$

The Connor family bought 3 adult tickets and 5 children tickets.

EXAMPLE *Kwan gave the clerk $60 to pay for a purse that costs $32.95 and a hat that costs $17.50. Should she expect about $10, $20, or $30 in change?*

In this problem, an exact answer is not needed. Use the eliminate-the-possibilities strategy.

First estimate the answer by rounding $32.95 to $33 and $17.50 to $18. Kwan spent about $33 + $18 or $51. Since $60 − $51 = $9, you can eliminate $20 and $30 as possible answers.

The correct answer is about $10.

Glencoe/McGraw-Hill 21 Course 2 Intervention

Student Workbook, p. 22

EXERCISES *Solve.*

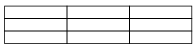
1. Fill in the boxes at the right with the digits 0, 1, 3, 4, 5, and 7 to make a correct multiplication problem. Use each digit exactly once.

   [3] [4] × [5] = [1] [7] [0]

2. Write the next two numbers in the pattern.
   $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \ldots$ **$\frac{5}{6}, \frac{6}{7}$**

3. Does 81.4 × 0.68 equal 553.52, 55.352, or 5.5352? Do *not* actually compute. **55.352**

4. What is the total number of rectangles in the figure at the right? **36 rectangles**



APPLICATIONS

5. Abby's test scores were 95, 82, 78, 84, and 88. Is the best estimate of her average test score 90, 85, 70, or 75? **85**

6. Erica has some quarters and dimes in her pocket. The value of the coins is $1.65. If she has a total of 9 coins, how many quarters and how many dimes does Erica have? **5 quarters and 4 dimes**

7. James wants to work up to doing 40 sit-ups a day. He plans to do 5 sit-ups the first day, 9 sit-ups the second day, 13 sit-ups the third day, and so on. On what day will he do 45 sit-ups? **11th day**

8. The school bell rings at 8:05 A.M., 8:47 A.M., 8:50 A.M., 9:32 A.M., 9:35 A.M., 10:17 A.M., 10:20 A.M., and 11:02 A.M. If the pattern continues, what are the next three times the bell will ring? **11:05 A.M., 11:47 A.M., 11:50 A.M.**

9. Armando bought a car. He paid $3,000 down and will pay $350 per month for 48 months. Does the car cost closer to $30,000, $25,000, $20,000, or $15,000? **$20,000**

10. Jennifer bought some cookies for 55¢ each and some bottles of fruit drink for 80¢ each. She spent $5.70. How many cookies and bottles of fruit drink did she buy? **6 cookies and 3 bottles fruit drinks**

11. The length of a rectangle is 6 more inches than the width. The area of the rectangle is 216 square inches. What are the dimensions of the rectangle? **12 in. by 18 in.**

Glencoe/McGraw-Hill 22 Course 2 Intervention

SKILL 12

TEACHER NOTES

Divisibility Rules

OBJECTIVE: Determine if a number is divisible by 2, 3, 5, 6, 9, or 10. (Strand: Number and Operation)

USING THE TRANSPARENCY: Have students make a chart in which they list the divisibility rules with several examples for each. Focus on the relationship between the rules for 2, 3, and 6.

USING THE STUDENT WORKBOOK: Have students write down his or her house number or the last four digits of his or her phone number and determine if the number is divisible by 2, 3, 5, 6, 9, or 10.

EXTENSION: Have students write a rule for a number that is divisible by 15.

Transparency, Skill 12

SKILL 12 WARM UP

Divisibility Rules

Mario owns a florist shop. Today Mario bought 198 carnations to sell in his shop. He plans to run a special on the carnations and sell them in equal bundles. He wants the bundles to have no more than 10 flowers. If he does *not* want any carnations left over, how many should he put in each bundle?

You need to find what number or numbers divide into 198 without a remainder. To do this, you will need to use divisibility rules.

The ones digit is 8 which is divisible by 2, so 198 is divisible by 2.

The sum of the digits (1 + 9 + 8 = 18) is divisible by 3, so 198 is divisible by 3.

The ones digit is *not* a 0 or a 5, so 198 is *not* divisible by 5.

Since 198 is divisible by 2 and by 3, it is also divisible by 6.

The sum of the digits (1 + 9 + 8 = 18) is divisible by 9, so 198 is divisible by 9.

The ones digit is *not* a 0, so 198 is *not* divisible by 10.

Mario can sell the carnations as bundles of 2, 3, 6, or 9.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 23

SKILL 12 Name ______________________ Date __________

Divisibility Rules

Sometimes we need to know if a number is divisible by another number. In other words, does a number divide evenly into another number. You can use divisibility rules.

A number is divisible by:
- 2 if the ones digit is divisible by 2.
- 3 if the sum of the digits is divisible by 3.
- 5 if the ones digit is 0 or 5.
- 6 if the number is divisible by 2 and 3.
- 9 if the sum of the digits is divisible by 9.
- 10 if the ones digit is zero.

EXAMPLE *Determine whether 2,346 is divisible by 2, 3, 5, 6, 9, or 10.*

2: The ones digit is 6 which is divisible by 2. So 2,346 is divisible by 2.
3: The sum of the digits (2 + 3 + 4 + 6 = 15) is divisible by 3. So 2,346 is divisible by 3.
5: The ones digit is *not* 0 or 5. So 2,346 is *not* divisible by 5.
6: The number is divisible by 2 and 3. So 2,346 is divisible by 6.
9: The sum of the digits (2 + 3+ 4 + 6 = 15) is *not* divisible by 9. So 2,346 is *not* divisible by 9.
10: The ones digit is not 0. So 2,346 is *not* divisible by 10.

2,346 is divisible by 2, 3, and 6.

EXERCISES *Use the divisibility rules to determine whether the first number is divisible by the second number.*

1. 3,465,870; 5 **yes**
2. 5,653,121; 3 **no**
3. 34,456,433; 9 **no**
4. 6,432; 10 **no**

Glencoe/McGraw-Hill 23 Course 2 Intervention

Student Workbook, p. 24

5. 42,981; 2 **no**
6. 73,125; 3 **yes**
7. 3,469; 6 **no**
8. 3,522; 6 **yes**

Determine whether each number is divisible by 2, 3, 5, 6, 9, or 10.

9. 660 **2, 3, 5, 6, 10**
10. 5,025 **3, 5**
11. 5,091 **3**
12. 356 **2**
13. 240 **2, 3, 5, 6, 10**
14. 657 **3, 9**
15. 8,760 **2, 3, 5, 6, 10**
16. 3,408 **2, 3, 6**
17. 4,605 **3, 5**
18. 7,800 **2, 3, 5, 6, 10**
19. 8,640 **2, 3, 5, 6, 9, 10**
20. 432 **2, 3, 6, 9**
21. 1,700,380 **2, 5, 10**
22. 4,937,728 **2**

APPLICATIONS

23. Ms. Vescelius wants to divide her class into cooperative learning groups. If there are 28 students in the class and she wants all the groups to have the same number of students, how many students should she put in each group?
2, 4, 7, or 14 students

24. The Kennedy High School band has 117 members. The band director is planning rectangular formations for the band. What formations could he make with all the band members?
3 by 39, 9 by 13

25. Fisher Mountain Bike Company wants to produce between 1,009 and 1,030 mountain bicycles per month. Since the demand for the bicycles is great everywhere, they want to ship equal numbers to each of their 6 stores. Find the possible number of bicycles Fisher should ship.
1,014, 1020, or 1,026 bicycles

26. Name the greatest 4-digit number that is divisible by 2, 3, and 5.
9,990

Glencoe/McGraw-Hill 24 Course 2 Intervention

SKILL 13

TEACHER NOTES

Multiples

OBJECTIVE: Find multiples of numbers. (Strand: Number and Operation)

USING THE TRANSPARENCY: Write the numbers 4, 8, 12, 16, 20, 24, 28, 32, and 36 on the chalkboard. Have students describe how these numbers are related and how they would extend the sequence.

USING THE STUDENT WORKBOOK: Have students work in pairs. Have one student write two multiples of a number and the second student state the number of which they are multiples. Then have students reverse roles.

EXTENSION: Have students roll two dice to create a two digit number. Then identify multiples of that number.

Transparency, Skill 13

SKILL 13 WARM UP

Multiples

Some doctors encourage their adult patients to follow the rule below to calculate their ideal weight.

100 pounds for the first 5 feet in height
+5 pounds for every inch over 5 feet
ideal weight

According to this rule, what are the ideal weights for adults from 5 feet tall to 5 feet 9 inches tall?

The answers can be found using **multiples** of 5.

Height	Weight over 100 lb (multiples of 5)	Ideal Weight
5′	0	100
5′1″	5	105
5′2″	10	110
5′3″	15	115
5′4″	20	120
5′5″	25	125
5′6″	30	130
5′7″	35	135
5′8″	40	140
5′9″	45	145

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 25

SKILL 13 Name ______________ Date ________

Multiples

Bryan noticed that every time he spent $1 at the department store, he paid 8¢ in sales tax. He decided to make a table of the amount of sales tax charged on whole-dollar purchases.

EXAMPLE *Can you help him make the table?*

The amount of sales tax charged on whole-dollar purchases can be found using **multiples** of 8. A multiple of a number is the product of that number and any whole number.

Amount of Purchase	Amount of Sales Tax
$1	8¢
$2	16¢
$3	24¢
$4	32¢
$5	40¢
$6	48¢
$7	56¢
$8	64¢
$9	72¢
$10	80¢

EXERCISES *List the first four multiples of each number.*

1. 10 **10, 20, 30, 40**
2. 9 **9, 18, 27, 36**
3. 15 **15, 30, 45, 60**
4. 7 **7, 14, 21, 28**
5. 18 **18, 36, 54, 72**
6. 12 **12, 24, 36, 48**
7. 20 **20, 40, 60, 80**
8. 25 **25, 50, 75, 100**
9. 16 **16, 32, 48, 64**

Glencoe/McGraw-Hill 25 Course 2 Intervention

Student Workbook, p. 26

Determine whether the first number is a multiple of the second number.

10. 56; 7 **yes**
11. 42; 14 **yes**
12. 81; 18 **no**
13. 45; 11 **no**
14. 100; 20 **yes**
15. 72; 36 **yes**
16. 95; 19 **yes**
17. 225; 25 **yes**
18. 110; 21 **no**

APPLICATIONS ***Kyle is planning a trip. He plans to drive 55 miles per hour. Use this information to answer Exercises 19 and 20.***

19. How far will Kyle travel in
    a. 1 hour? **55 miles**
    b. 2 hours? **110 miles**
    c. 3 hours? **165 miles**
    d. 4 hours? **220 miles**
    e. 5 hours? **275 miles**
    f. 6 hours? **330 miles**
20. Suppose after Kyle's trip he determines that he actually averaged 60 miles per hour. How could you use your answers to Exercise 19 to determine the distance at this rate?
    Add successive multiples of 5 to each answer.
21. Tia is laying a pattern of tiles in rows. One row has tiles that are 4 inches long, and the next row has tiles that are 5 inches long. In how many inches will the ends of the two rows be even and the pattern start to repeat?
    20 inches

Glencoe/McGraw-Hill 26 Course 2 Intervention

SKILL 14 TEACHER NOTES

Greatest Common Factor

OBJECTIVE: Find the greatest common factor of two or more numbers. (Strand: Number and Operation)

USING THE TRANSPARENCY: Write the numbers 32 and 48 on the chalkboard. Have students state how they would find the greatest common factor of these two numbers. Discuss different strategies.

USING THE STUDENT WORKBOOK: Have students work in pairs. Have one student find the common factors of a set of numbers and the other student find the greatest common factor. Then have the students reverse roles.

EXTENSION: Have students pick two numbers. Then have the students use a Venn diagram to list the factors of each number. Then have students use the diagram to find the greatest common factor.

Transparency, Skill 14

SKILL 14 WARM UP

Greatest Common Factor

Find the greatest common factor (GCF) of 24, 36, and 42.

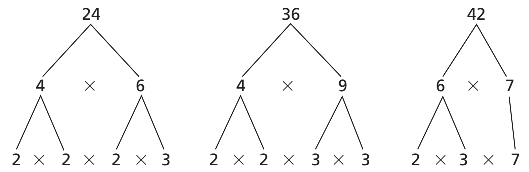
There are two methods that can be used.

Method 1: List the factors of each number.
Determine the common factors.
Find the greatest of these common factors.

factors of 24:	1, 2, 3, 4, 6, 8, 12, 24
factors of 36:	1, 2, 3, 4, 6, 9, 12, 18, 36
factors of 42:	1, 2, 3, 6, 7, 14, 21, 42
common factors:	1, 2, 3, 6

The GCF of 24, 36, and 42 is 6.

Method 2: Use a factor tree to find the prime factorization of each number.
Determine the common prime factors.
Find the product of the common factors.



common prime factors: 2, 3

The GCF of 24, 36, and 42 is 2 × 3, or 6.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 27

SKILL 14 Name ______ Date ______

Greatest Common Factor

The **greatest common factor (GCF)** of two or more numbers is the greatest number that is a factor of each number. One way to find the greatest common factor is to list the factors of each number and then choose the greatest common factors.

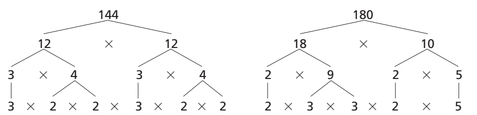
EXAMPLE *Find the GCF of 36 and 48.*

factors of 36:	**1**, **2**, **3**, **4**, **6**, 9, **12**, 18, 36
factors of 48:	**1**, **2**, **3**, **4**, **6**, 8, **12**, 16, 24, 48
common factors:	1, 2, 3, 4, 6, 12

The GCF of 36 and 48 is 12.

Another way to find the GCF is to use the prime factorization of each number. Then identify all common prime factors and find their product.

EXAMPLE *Find the GCF of 144 and 180.*



common prime factors: 2, 2, 3, 3

The GCF of 144 and 180 is 2 × 2 × 3 × 3, or 36.

Glencoe/McGraw-Hill 27 Course 2 Intervention

Student Workbook, p. 28

EXAMPLES *Find the GCF for each set of numbers.*

1. 18, 24 **6**
2. 64, 40 **8**
3. 60, 75 **15**
4. 28, 52 **4**
5. 54, 72 **18**
6. 48, 72 **24**
7. 63, 81 **9**
8. 84, 144 **12**
9. 72, 170 **2**
10. 96, 216 **24**
11. 225, 500 **25**
12. 121, 231 **11**
13. 240, 320 **80**
14. 350, 140 **70**
15. 162, 243 **81**
16. 256, 640 **128**
17. 9, 18, 12 **3**
18. 30, 45, 15 **15**
19. 81, 27, 108 **27**
20. 16, 20, 36 **4**
21. 98, 168, 196 **14**

APPLICATIONS

22. Sharanda is tiling the wall behind her bathtub. The area to be tiled measures 48 inches by 60 inches. What is the largest square tile that Sharanda can use and not have to cut any tiles? **12 in. by 12 in.**

23. Mr. Mitchell is a florist. He received a shipment of 120 carnations, 168 daisies, and 96 lilies. How many mixed bouquets can he make if there are the same number of each type of flower in each bouquet, and there are no flowers left over? **24**

24. Students at Washington Middle School collected 126 cans of fruit, 336 cans of soup, and 210 cans of vegetables for a food drive. The students are making care packages with at least one of each type of canned good. If the students divide each type of canned good evenly among the care packages, what is the greatest number of care packages if there are no canned goods remaining? **42**

Glencoe/McGraw-Hill 28 Course 2 Intervention

SKILL 15 TEACHER NOTES

Least Common Multiple

OBJECTIVE: Find the least common multiple of two or more numbers. (Strand: Number and Operation)

USING THE TRANSPARENCY: Watch for students who confuse the GCF with the LCM. Prevent this by distinguishing between factors and multiples. Stress that multiples are found by *multiplying*, factors by *dividing*.

USING THE STUDENT WORKBOOK: Many students will choose to list multiples when finding the LCM. Charts may be helpful for students to keep track of the multiples.

EXTENSION: Have students find the LCM and GCF for two numbers. Then have them find the product of the two numbers as well as the product of their GCF and LCM. Ask students what they notice. Ask them to investigate further using other pairs of numbers.

Transparency, Skill 15

SKILL 15 WARM UP

Least Common Multiple

When you multiply a number by the whole numbers 1, 2, 3, 4, and so on, you get *multiples* of the number. The **least common multiple (LCM)** of two or more numbers is the least of the common positive multiples of the numbers.

Find the least common multiple of 16 and 24.

There are two methods that can be used to find the least common multiple.

Method 1: List several multiples of each number.
Determine the common multiples.
Choose the least common multiple.

positive multiples of 16: 16, 32, 48, 64, 80, 96, …
positive multiples of 24: 24, 48, 72, 96, 120, 144, …

The LCM of 16 and 24 is 48.

Method 2: Write the prime factorization of each number.
Circle all pairs of common prime factors.
Find the product of the common factors and any other factors.

$16 = 2 \times 2 \times 2 \times 2$
$24 = 2 \times 2 \times 2 \quad \times 3$

Express each common factor and all other factors.

$2 \times 2 \times 2 \times 2 \times 3 = 48$

Multiply the common factors and any other factors.

The LCM of 16 and 24 is 48.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 29

SKILL 15 Name ________ Date ________

Least Common Multiple

A **multiple** of a number is the product of that number and any whole number. The least nonzero multiple of two or more numbers is the **least common multiple (LCM)** of the numbers.

EXAMPLE *Find the least common multiple of 6 and 8.*

positive multiples of 6: 6, 12, 18, **24**, 30, 36, 42, . . .
positive multiples of 8: 8, 16, **24**, 32, 40, 48, 56, . . .

The LCM of 6 and 8 is 24.

Prime factorization can also be used to find the LCM.

EXAMPLE *Find the least common multiple of 9, 15, and 21.*

$9 = 3 \times 3$
$15 = 3 \times 5$
$21 = 3 \times 7$

$3 \times 3 \times 5 \times 7 = 315$

Find prime factors of each number.
Circle all sets of common factors.
Multiply the common factors and any other factors.

The LCM of 9, 15, and 21 is 315.

EXERCISES *Find the LCM of each set of numbers by listing the multiples of each number.*

1. 3, 4 **12**
2. 10, 25 **50**
3. 18, 24, 48 **144**

Find the LCM of each set of numbers by writing the prime factorization.

4. 35, 49 **245**
5. 27, 36 **108**
6. 10, 12, 15 **60**

Glencoe/McGraw-Hill 29 Course 2 Intervention

Student Workbook, p. 30

Find the LCM of each set of numbers.

7. 16, 24 **48**
8. 56, 16 **112**
9. 28, 20 **140**
10. 64, 72 **576**
11. 63, 77 **693**
12. 110, 120 **1,320**
13. 66, 78, 90 **12,870**
14. 40, 60, 108 **1,080**
15. 132, 144, 156 **20,592**
16. 125, 275, 400 **22,000**
17. 196, 225, 256 **2,822,400**
18. 120, 450, 1500 **9,000**
19. Find the GCF and LCM of 36 and 54. **18; 108**
20. Find the two smallest numbers whose GCF is 7 and whose LCM is 98. **14 and 49**
21. List the first five multiples of 6*p*. **6*p*, 12*p*, 18*p*, 24*p*, 30*p***

APPLICATIONS

22. Suppose that your taxes, car insurance, and health club membership fees are all due in August. The taxes are due every three months, car insurance is due every six months, and health club membership is due every two months. Name the next month that all three bills will be due in the same month. **February**
23. Antoine is buying hamburgers and buns for a class picnic. Hamburgers come in packages of 15 patties and buns come in packages of 8. Antoine wants to have the same number of hamburger patties and buns. What is the least number of hamburger patties and buns he can buy? **120**
24. Members of the U.S. House of Representatives are elected every 2 years. United States Senators are elected every 6 years. The President of the United States is elected every 4 years. If a citizen voted for a representative, a senator, and the president in 2004, what is the next year in which the voter can vote for all three in the same year? **2016**

Glencoe/McGraw-Hill 30 Course 2 Intervention

SKILL 16

TEACHER NOTES

Powers and Exponents

OBJECTIVE: Simplify expressions involving positive and negative exponents. (Strand: Number and Operation)

USING THE TRANSPARENCY: Have students work in small groups to examine the pattern developed in the power table. Share results with the class to establish the correct rule.

USING THE STUDENT WORKBOOK: Have students create a new power table using 4 as the base.

EXTENSION: Have students research where both positive and negative exponents are used in real life settings.

Transparency, Skill 16

SKILL 16 WARM UP

Powers and Exponents

An expression like $2 \times 2 \times 2 \times 2 \times 2 \times 2$ can be written as a **power**. A power has two parts, a **base** and an **exponent**. An exponent is a shorter way of writing repeated multiplication.

The expression $2 \times 2 \times 2 \times 2 \times 2 \times 2$ can be written as 2^6.

The base is the number that is multiplied. → 3^6 ← The exponent tell how many times the base is used as a factor.

Examine the table at the right to determine a pattern to assist you in developing a rule for computing with negative exponents.

$a^{-n} = \frac{1}{a^n}$, for $a \neq 0$ and any integer n

For example, $3^{-3} = \frac{1}{3^3}$ or $\frac{1}{27}$.

Power	Value
3^4	81
3^3	27
3^2	9
3^1	3
3^0	1
3^{-1}	$\frac{1}{3}$
3^{-2}	$\frac{1}{9}$

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 31

SKILL 16 Name ______________________ Date __________

Powers and Exponents

An expression like $3 \times 3 \times 3 \times 3 \times 3 \times 3$ can be written as a power. A power has two parts, a **base** and an **exponent**. The expression $3 \times 3 \times 3 \times 3 \times 3 \times 3$ can be written as 3^6.

EXAMPLE *Write the expression $m \cdot m \cdot m \cdot m \cdot m \cdot m$ using exponents.*

The base is m. It is a factor 6 times, so the exponent is 6.

$m \cdot m \cdot m \cdot m \cdot m \cdot m = m^6$

You can also use powers to name numbers that are less than one by using exponents that are negative integers. The definition of a negative exponent states that $a^{-n} = \frac{1}{a^n}$ for $a \neq 0$ and any integer n.

EXAMPLE *Write the expression 4^{-3} using a positive exponent.*

$4^{-3} = \frac{1}{4^3}$

EXERCISES *Write each expression using exponents.*

1. $2 \cdot 2 \cdot 2 \cdot 2$ **2^4**
2. $(-3)(-3)(-3)(-3)(-3)$ **$(-3)^5$**
3. 9 **9^1**
4. $x \cdot x \cdot x$ **x^3**
5. $c \cdot c \cdot d \cdot d \cdot d \cdot d \cdot d$ **c^2d^5**
6. $8 \cdot a \cdot a \cdot a \cdot b$ **$8a^3b$**
7. $(k - 2)(k - 2)$ **$(k - 2)^2$**
8. $4 \cdot 4 \cdot 4 \cdot 4 \cdot h \cdot h$ **4^4h^2**
9. $(-w)(-w)(-w)(-w)(-w)$ **$(-w)^5$**
10. $6 \cdot 6 \cdot 6 \cdot y \cdot y \cdot y \cdot y$ **6^3y^4**

Evaluate each expression if $m = 3$, $n = 2$, and $p = -4$.

11. m^4 **81**
12. n^6 **64**
13. $3p^2$ **48**

Glencoe/McGraw-Hill 31 Course 2 Intervention

Student Workbook, p. 32

14. mn^2 **12**
15. $m^2 + p^3$ **−55**
16. $(p + 3)^5$ **−1**
17. $n^2 - 3n + 4$ **2**
18. $-2mp^2$ **96**
19. $5(n - 4)^3$ **−40**

Write each expression using a positive exponent.

20. 6^{-1} **$\frac{1}{6^1}$**
21. 4^{-3} **$\frac{1}{4^3}$**
22. $(-2)^{-4}$ **$\frac{1}{(-2)^4}$**
23. d^{-7} **$\frac{1}{d^7}$**
24. m^{-5} **$\frac{1}{m^5}$**
25. $3b^{-6}$ **$\frac{3}{b^6}$**
26. 10^{-2} **$\frac{1}{10^2}$**
27. $\frac{1}{x^{-5}}$ **x^5**
28. $\frac{7}{p^{-4}}$ **$7p^4$**

Write each fraction as an expression using a negative exponent other than −1.

29. $\frac{1}{4^{-5}}$ **4^5**
30. $\frac{1}{3^8}$ **3^{-8}**
31. $\frac{1}{7^3}$ **7^{-3}**
32. $\frac{1}{64}$ **2^{-6}**
33. $\frac{1}{27}$ **3^{-3}**
34. $\frac{1}{1{,}000}$ **10^{-3}**

Evaluate each expression if $a = -2$ and $b = 3$.

35. 5^a **$\frac{1}{25}$**
36. b^{-4} **$\frac{1}{81}$**
37. a^{-3} **$-\frac{1}{8}$**
38. $(-3)^{-b}$ **$-\frac{1}{27}$**
39. ab^{-2} **$-\frac{2}{9}$**
40. $(ab)^{-2}$ **$\frac{1}{36}$**

APPLICATIONS

41. The area of a square is found by multiplying the length of a side by itself. If a square swimming pool has a side of length 45 feet, write an expression for the area of the swimming pool using exponents.
45^2 square feet

42. A molecule of a particular chemical compound weighs one millionth of a gram. Express this weight using a negative exponent.
10^{-6} gram

43. A needle has a width measuring 2^{-5} inch. Express this measurement in standard form.
$\frac{1}{32}$ inch

Glencoe/McGraw-Hill 32 Course 2 Intervention

SKILL 17

TEACHER NOTES

Prime Factorization

OBJECTIVE: Find the prime factorization of a composite number. (Strand: Number and Operation)

USING THE TRANSPARENCY: Write 2, 5, 15, 24, 29, 32, and 39 on the chalkboard. Have students identify the prime and composite numbers. Discuss their differences.

USING THE STUDENT WORKBOOK: Have students work in small groups. Have one student begin a factor tree for an exercise by writing the number and the first row. Have each successive student add a row.

EXTENSION: Have students use blocks or tiles to form rectangles for various numbers. Have students examine numbers for which they can form only one rectangle and have them describe their findings.

Transparency, Skill 17

SKILL 17 WARM UP

Prime Factorization

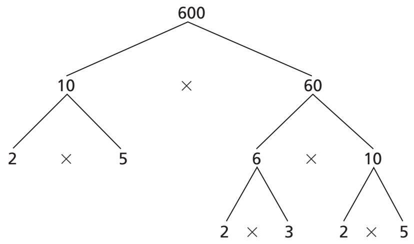
A whole number greater than 1 with exactly two factors, 1 and itself, is called a **prime number**.

A whole number greater than 1 with more than two factors is called a **composite number**.

The numbers 0 and 1 are neither prime nor composite.

A composite number can be written as the product of prime numbers. This product is called the **prime factorization** of the number.

Find the prime factorization of 600.



Since 2, 3, and 5 are prime numbers, then $2 \times 2 \times 2 \times 3 \times 5 \times 5$, or $2^3 \times 3 \times 5^2$, is the prime factorization of 600.

Glencoe/McGraw-Hill Course 2 Intervention

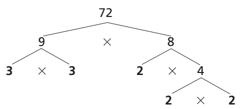
Student Workbook, p. 33

SKILL 17 Name ______________ Date ________

Prime Factorization

Every composite number can be written as the product of prime numbers. This product is called the **prime factorization** of the number. One way to find the prime factorization of a number is to use a **factor tree**.

EXAMPLE *Find the prime factorization of 72.*



Write 72 as the product of two factors. Keep factoring until all the factors are prime numbers

The prime factorization of 72 is $2 \times 2 \times 2 \times 3 \times 3$, or $2^3 \times 3^2$.

EXERCISES *Find the prime factorization of each number.*

1. 18 **2×3^2**
2. 24 **$2^3 \times 3$**
3. 27 **3^3**
4. 32 **2^5**
5. 38 **2×19**
6. 45 **$3^2 \times 5$**
7. 68 **$2^2 \times 17$**
8. 75 **3×5^2**
9. 84 **$2^2 \times 3 \times 7$**
10. 115 **5×23**
11. 132 **$2^2 \times 3 \times 11$**
12. 144 **$2^4 \times 3^2$**

Glencoe/McGraw-Hill 33 Course 2 Intervention

Student Workbook, p. 34

13. 165 **$3 \times 5 \times 11$**
14. 196 **$2^2 \times 7^2$**
15. 225 **$3^2 \times 5^2$**
16. 360 **$2^3 \times 3^2 \times 5$**
17. 400 **$2^4 \times 5^2$**
18. 576 **$2^6 \times 3^2$**
19. 888 **$2^3 \times 3 \times 37$**
20. 1,470 **$2 \times 3 \times 5 \times 7^2$**
21. 2,340 **$2^2 \times 3^2 \times 5 \times 13$**

APPLICATIONS *A new rectangular picnic area is being built at Springfield City Park.*

22. If the picnic area is to cover an area of 260 square yards, what are the whole number dimensions that are possible for the picnic area?
1 × 260, 2 × 130, 4 × 65, 5 × 52, 10 × 26, 13 × 20

23. Suppose the park manager decides to build the picnic area to cover an area of 300 square yards. What are the whole number dimensions that are possible for this picnic area?
1 × 300, 2 × 150, 3 × 100, 4 × 75, 5 × 60, 6 × 50, 10 × 30, 12 × 25, 15 × 20

23. If the original picnic area covered 180 square yards and the new picnic area is to cover twice as much area, what are the whole number dimensions that are possible for the new picnic area?
1 × 360, 2 × 180, 3 × 120, 4 × 90, 5 × 72, 6 × 60, 8 × 45, 9 × 40, 10 × 36, 12 × 30, 15 × 24, 18 × 20

Glencoe/McGraw-Hill 34 Course 2 Intervention

SKILL 18

TEACHER NOTES

Multiplying by Powers of Ten

OBJECTIVE: Multiply by powers of ten. (Strand: Number and Operation)

USING THE TRANSPARENCY: Show by using a pattern that moving the decimal point one place to the right increases the number by a factor of 10. Therefore, you move the decimal point to the *right* when using mental math to multiply by a power of 10.

USING THE STUDENT WORKBOOK: Have students work with partners to make a simple cross-number puzzle with clues that involve multiplying decimals and powers of 10. Answers should be in standard form.

EXTENSION: Challenge students to work with partners to devise a mental math strategy for multiplying a decimal by multiples of powers of 10, such as 40, 500, 5,000, and so on. Have them share their results with others.

Transparency, Skill 18

SKILL 18 WARM UP

Multiplying by Powers of Ten

Multiplying by a power of 10 moves the decimal point to the right the same number of places as the exponent.

Sometimes numbers are written in scientific notation. To write the number in standard form, multiply by powers of ten.

Finish filling in the chart below to find the diameter, not in decimal form, of each of the planets.

Planets	Diameter (miles)	Number of moves to the right	Diameter (miles) no decimals
Mercury	3.1×10^3	3	3,100
Venus	75×10^2	2	7,500
Earth	0.7926×10^4	4	7,926
Mars	421.8×10^1	1	4,218
Jupiter	8.94×10^4	4	89,400
Saturn	0.75×10^5	5	75,000
Uranus	323×10^2	2	32,300
Neptune	3×10^4	4	30,000

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 35

SKILL 18 Name ______________________ Date ________

Multiplying by Powers of Ten

The exponent in a power of ten is the same as the number of zeros in the number.

Powers of Ten

10^0	1
10^1	10
10^2	100
10^3	1,000
10^4	10,000
10^5	100,000

To multiply by a power of ten, move the decimal point to the right the number of places shown by the exponent or the number of zeros. Annex zeros if necessary.

EXAMPLES *Find each product.*

0.08×10^4

0.0800 = 800 *Move the decimal point 4 places to the right.*

The product is 800.

$6.25 \times 1,000$

6.250 = 6,250 *Move the decimal point 3 places to the right.*

The product is 6,250.

EXERCISES *Choose the correct product.*

1. 2.48×100; 0.0248 or 248 **248**
2. 0.9×10^0; 9 or 0.9 **0.9**
3. 0.039×10^2; 3.9 or 39 **3.9**
4. 1.5×10^4; 150,000 or 15,000 **15,000**

Multiply.

5. 15.24×10 **152.4**
6. 0.702×100 **70.2**
7. $5.149 \times 1,000$ **5,149**

Glencoe/McGraw-Hill 35 Course 2 Intervention

Student Workbook, p. 36

8. 0.52×100 **52**
9. 2.587×10^0 **2.587**
10. 0.2674×100 **26.74**
11. 6.8×10^2 **680**
12. 9.57×10^4 **95,700**
13. 6.2×10^5 **620,000**

Solve each equation.

14. $d = 0.92 \times 100$ **92**
15. $12.43 \times 10^3 = h$ **12,430**
16. $h = 3.68 \times 10^6$ **3,680,000**
17. $a = 0.004 \times 10^2$ **0.4**
18. $0.23 \times 1,000 = j$ **230**
19. $1.89 \times 10^0 = v$ **1.89**
20. $d = 10,000 \times 7.07$ **70,700**
21. $0.014 \times 10^2 = k$ **1.4**
22. $v = 589 \times 10^1$ **5,890**

APPLICATIONS

23. What is the length of the Amazon River if it can be represented by 3.9×10^3 miles long? How much longer is it than the Wood River which is 5.7×10^2?
3,900 miles; 3,330 miles longer

24. The United States spends 37.3×10^9 dollars on research and development in the military. Germany spends 1.4×10^9 dollars on research and development in the military. How much money do these two countries spend altogether?
$38,700,000,000

25. The diameter of Neptune is about 4.95×10^4 kilometers. The diameter of Venus is about 1.21×10^4 kilometers. About how much greater is Neptune's diameter?
about 37,400 km

Glencoe/McGraw-Hill 36 Course 2 Intervention

SKILL 19

TEACHER NOTES

Dividing by Powers of Ten

OBJECTIVE: Divide by powers of ten. (Strand: Number and Operation)

USING THE TRANSPARENCY: Review powers of ten. Ask students what happens to a whole number when it is multiplied by a power of ten. Then multiply 4.2 by a power of ten. Then have them consider what might happen to the decimal point if they divide 4.2 by a power of ten.

USING THE STUDENT WORKBOOK: Have students experiment with division of decimals by powers of ten by using their calculators. Ask students questions such as: *How many places will the decimal point move when you divide by 100?*

EXTENSION: Ask students whether a pattern emerges when numbers are divided by decimal powers of 10, such as 0.1, 0.01, and 0.001.

Transparency, Skill 19

SKILL 19 WARM UP

Dividing by Powers of Ten

Order the following expressions from least to greatest:

7.34 ÷ 1,000 76 ÷ 10 56.78 ÷ 100

Dividing by a power of 10 moves the decimal point to the left the same number of places as the number of zeros.

First, you need to divide each expression.

7.34÷1,000	Move the decimal to the left 3 places.	0.00734
76÷10	Move the decimal to the left 1 place.	7.6
56.78÷100	Move the decimal to the left 2 places.	0.5678

Now, order the three values from least to greatest.

0.00734 0.5678 7.6

Finish filling in the chart below.

division expression	number of moves to the left	answer
3.35 ÷ 10	1	0.335
3.35 ÷ 100	2	0.0335
3.35 ÷ 1,000	3	0.00335
3.35 ÷ 10,000	4	0.000335
245.7 ÷ 10	1	24.57
245.7 ÷ 100	2	2.457
245.7 ÷ 1,000	3	0.2457
245.7 ÷ 10,000	4	0.02457

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 37

SKILL 19 Name ____________ Date ________

Dividing by Powers of Ten

The exponent in a power of ten is the same as the number of zeros in the number.

Powers of Ten

10^0	1
10^1	10
10^2	100
10^3	1,000
10^4	10,000
10^5	100,000

To divide by a power of ten, move the decimal point to the left the number of places shown by the exponent or the number of zeros.

EXAMPLES *Find each quotient.*

$8 \div 10^4 = 0.0008$ *Move the decimal point 4 places to the left.*

The quotient is 0.0008.

62.5 ÷ 1,000 = 0.0625 *Move the decimal point 3 places to the left.*

The quotient is 0.0625.

EXERCISES *Choose the correct quotient.*

1. 2.48 ÷ 100; 0.0248 or 248 **0.0248**
2. $0.9 \div 10^0$; 9 or 0.9 **0.9**
3. $0.39 \div 10^2$; 0.039 or 0.0039 **0.0039**
4. $1.5 \div 10^4$; 0.00015 or 15,000 **0.00015**

Divide.

5. 15.24 ÷ 10 **1.524**
6. 0.702 ÷ 100 **0.00702**
7. 514.9 ÷ 1,000 **0.5149**

Glencoe/McGraw-Hill 37 Course 2 Intervention

Student Workbook, p. 38

8. 5.2 ÷ 100 **0.052**
9. $2.587 \div 10^0$ **2.587**
10. 267.4 ÷ 100 **2.674**
11. $68 \div 10^2$ **0.68**
12. $9.57 \div 10^4$ **0.000957**
13. $6{,}245 \div 10^5$ **0.06245**

Solve each equation.

14. $d = 92 \div 100$ **0.92**
15. $12.43 \div 10^3 = h$ **0.01243**
16. $h = 36.8 \div 10^6$ **0.0000368**
17. $a = 0.004 \div 10^2$ **0.00004**
18. $2{,}358 \div 1{,}000 = j$ **2.358**
19. $1.89 \div 10^0 = v$ **1.89**
20. $d = 76.9 \div 10{,}000$ **0.00769**
21. $8{,}714 \div 10^2 = k$ **87.14**
22. $v = 589 \div 10^1$ **58.9**

APPLICATIONS

23. Mr. Fraley bought 1,000 postage stamps for $290 for use in his office. How much did each stamp cost? **$0.29**
24. Mary donated 100 cans of soup to the local food pantry. It cost her $23 to buy the soup. How much did each can of soup cost? **$0.23**
25. George has $245.60 that he wants to split evenly with his 10 nieces and nephews. How much money will each one receive? **$24.56**
26. The planet Saturn is an average distance of about 887,000,000 miles from the sun. If a space ship could travel that distance in 10,000 hours, how fast would it be going? **88,700 mph**

Glencoe/McGraw-Hill 38 Course 2 Intervention

SKILL 20

TEACHER NOTES

Integers

OBJECTIVE: Compare and order integers. (Strand: Number and Operation)

USING THE TRANSPARENCY: Starting at the left, list the numbers appearing on the number line. Point out that the numbers increase from left to right.

USING THE STUDENT WORKBOOK: Draw a number line on the chalkboard and locate the points −5 and 3 on it. Lead students to write the expression *negative 5 is less than 3.* Similarly*, write 3 is greater than negative 5.*

Be sure students understand the meaning of the symbols < and >. Have students substitute the symbols for the words in the expressions above.

EXTENSION: Have students use the Internet to find a set of data that contains both positive and negative integers.

Transparency, Skill 20

SKILL 20 WARM UP

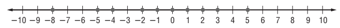
Integers

Nicole is keeping track of golfers' scores during her school's golf tournament. The final scores of the top ten finishers are listed below.

+1 −5 −8 +5 −2 −4 +3 −1 0 +2

Nicole wants to put these scores in a chart, in order from least to greatest. Can you help her?

One way to order integers is to use a number line.



On a number line, values increase as you move from the left to the right.

So, the scores in order from least to greatest are

−8, −5, −4, −2, −1, 0, 1, 2, 3, 5.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 39

SKILL 20 Name ____________ Date ________

Integers

Numbers greater than zero are called **positive numbers**. Numbers less than zero are called **negative numbers**. The set of numbers that includes positive and negative numbers, and zero are called **integers**.

EXAMPLE ***Emily recorded the temperature at noon for a week. The temperatures she recorded were 9°F, 8°F, −6°F, −3°F, −1°F, 2°F, and 1°F. What was the lowest and highest temperature recorded?***

To answer the question, locate the temperatures on a number line.

On a number line, values increase as you move to the right.

Since −6 is furthest to the left, −6°F is the coldest temperature. 9 is the farthest number to the right, so 9°F is the highest temperature.

The **absolute value** of a number is the positive number of units a number is from zero on a number line.

EXAMPLE ***Refer to the table. Which city's population changed the most?***

Population Change, 1990–2000	
Atlanta, GA	+22,457
Baltimore, MD	−84,860
Columbus, OH	+78,560
Detroit, MI	−76,704
Indianapolis, IN	+49,974
Philadelphia, PA	−68,027

Find the absolute value of each number.

|+22,457| = 22,457
|−84,860| = 84,860
|+78,560| = 78,560
|−76,704| = 76,704
|+49,974| = 49,974
|−68,027| = 68,027

Since the absolute value of −84,860 is the greatest, Baltimore, Maryland, had the greatest population change.

Glencoe/McGraw-Hill 39 Course 2 Intervention

Student Workbook, p. 40

EXERCISES ***Fill in each blank with <, >, or = to make a true sentence.***

1. 5 ___ −5 **>**
2. −4 ___ 3 **<**
3. 0 ___ −2 **>**
4. −6 ___ −12 **>**
5. −35 ___ −16 **<**
6. 19 ___ −22 **>**
7. 34 ___ 21 **>**
8. 23 ___ 23 **=**
9. −45 ___ −52 **>**

Write each set of integers in order from least to greatest.

10. {45, −23, 55, 0, −12, −37} **{−37, −23, −12, 0, 45, 55}**
11. {56, −22, 34, −34, 12, −12} **{−34, −22, −12, 12, 34, 56}**
12. {−450, −100, 254, 564, −356} **{−450, −356, −100, 254, 564}**
13. {1,276, −3,456, −943, −237, −467} **{−3,456, −943, −467, −237, 1,276}**

Find the absolute value.

14. |−3| **3**
15. |−5| **5**
16. |16| **16**
17. |27| **27**
18. |156| **156**
19. |−359| **359**
20. |−821| **821**
21. |1,436| **1,436**

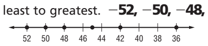
APPLICATIONS ***Write an integer to describe each situation.***

22. Julio finished the race 3 seconds ahead of the second place finisher. **+3**
23. Matthew ended his round of golf 4 under par. **−4**
24. Denver is called the Mile High City because its elevation is 5,280 feet above sea level. **+5,280**

For Exercises 25–27, refer to the table.

Record Low Temperatures	
California	−45°F
Illinois	−36°F
Maine	−48°F
Nevada	−50°F
New York	−52°F
Pennsylvania	−42°F
Washington	−48°F

25. Use a number line to order the temperatures from least to greatest. **−52, −50, −48, −48, −45, −42, −36**



26. The record low temperature for Michigan is −51°F. Which states have higher record low temperatures? **California, Illinois, Maine, Nevada, Pennsylvania, Washington**
27. Indiana's record low temperature is −36°F. Which states in the table have lower record low temperatures? **California, Maine, Nevada, New York, Pennsylvania, Washington**

Glencoe/McGraw-Hill 40 Course 2 Intervention

SKILL 21

TEACHER NOTES

Adding and Subtracting Integers

OBJECTIVE: Add and subtract integers. (Strand: Number and Operation)

USING THE TRANSPARENCY: Have each of the students pick a stock from the newspaper and have them track it for a week or two. Have them develop a table for their stock and determine whether it had a loss or gain for the time period.

USING THE STUDENT WORKBOOK: Have pairs of students find the sums of examples such as −3 + 7. Then have them add another integer to the sum so that the new sum will be the opposite of the original sum.

EXTENSION: Have students track the high temperature for your city for a week and record the variance (positive or negative) from the normal high. Find the total variance by adding all the integers.

Transparency, Skill 21

SKILL 21 **WARM UP**

Adding and Subtracting Integers

The table shows how the value of Learning Inc. stock changed each day for a week. Use this table to determine the new value of the stock at the end of each day.

Learning Inc. Stock	
Starting Value	+52
Monday	+4
Tuesday	−7
Wednesday	−3
Thursday	+6
Friday	−8

Start to end of day Monday

+52 + 4 = 56 new value: +56

Monday to end of day Tuesday

+56 − 7 = 56 + (−7) = 49 new value: +49

Tuesday to end of day Wednesday

+49 − 3 = 49 + (−3) = 46 new value: +46

Wednesday to end of day Thursday

+46 + 6 = 52 new value: +52

Thursday to end of day Friday

+52 − 8 = 52 + (−8) = 44 new value: +44

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 41

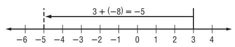
SKILL 21 Name ____________ Date ______

Adding and Subtracting Integers

You can use a number line to add integers. Locate the first addend on the number line. Move right if the second addend is positive. Move left if the second addend is negative.

EXAMPLE *Find 3 + (−8).*

Start at 3. Since −8 is negative, move left 8 units.



Therefore, 3 + (−8) = − 5.

When you add integers, remember:

- The sum of two positive integers is positive.
- The sum of two negative integers is negative.
- The sum of a positive and negative integer is:
  positive if the positive integer has the greater absolute value.
  negative if the negative integer has the greater absolute value.

To subtract an integer, add its opposite.

EXAMPLE *Find 4 −7.*

4 − 7 = 4 + (−7) To subtract 7, add −7.

= − 3

Find 5 − (−6).

5 − (−6) = 5 + (+ 6) To subtract −6, add + 6.

= 11

Glencoe/McGraw-Hill 41 Course 2 Intervention

Student Workbook, p. 42

EXERCISES *Find each sum or difference.*

1. 15 + (−10) **5**	2. − 20 + (− 9) **−29**	3. 16 − (−3) **19**
4. − 11 − (−6) **−5**	5. 65 − (−45) **110**	6. − 11 + (−19) **−30**
7. 12 + 15 **27**	8. − 2 − 16 **−18**	9. 8 − 17 **−9**
10. 16 + (−8) **8**	11. − 8 + 34 **26**	12. − 12 + (−37) **−49**
13. 23 − 17 **6**	14. −9 − 25 **−34**	15. 14 + 98 **112**
16. −63 + 53 **−10**	17. (−27) − (−18) **−9**	18. 31 − 74 **−43**
19. 81 + 62 **143**	20. 41 − (−35) **76**	21. −55 − 23 **−78**
22. 20 + (−50) **−30**	23. −16 − (−16) **0**	24. −125 + 79 **−46**

APPLICATIONS *Great Adventures Outdoor Shop reported profits and losses for a five-month period as shown in the table.*

Profit and Loss	
May	profit of $800
June	loss of $1,400
July	loss of $900
August	profit of $500
September	profit of $1,200

25. How much more money was lost in June than in July?
$500

26. How much more were the total profits for the last two months than for the first three months?
$3,200

27. From May through September, did the store have an overall loss or gain and how much?
profit of $200

28. How much did the store lose in October if the overall loss from May through October was $500?
$700

Glencoe/McGraw-Hill 42 Course 2 Intervention

SKILL 22

TEACHER NOTES

Multiplying and Dividing Integers

OBJECTIVE: Multiply and divide integers. (Strand: Number and Operation)

USING THE TRANSPARENCY: Discuss the rules for multiplying and dividing integers.

USING THE STUDENT WORKBOOK: Have students work in groups and write several integer division problems. Have the groups exchange papers and rewrite each of the division problems as multiplication problems.

EXTENSION: Have students work in pairs. One student should write an answer to a multiplication or division problem and the other student writes one possible problem to give the answer.

Transparency, Skill 22

SKILL 22 WARM UP

Multiplying and Dividing Integers

Erin wrote 5 checks for $35 each. What was the change in her checking account balance after writing these checks?

Let the integer -35 represent a check amount. To find the total change in her account after writing the checks, multiply -35 by 5.

$$-35 \times 5 = -175$$

The total change in her account was $-$$175.

Dylan recorded nighttime temperatures each hour for a science report. During a four-hour period, the temperature dropped 16°F. If the temperature dropped at the same rate over the four-hour period, what was the temperature change each hour?

Let -16 represent the temperature change. To find the change in temperature each hour, divide -16 by 4.

$$-16 \div 4 = -4$$

The change in temperature each hour was -4°F.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 43

SKILL 22 Name ______________________ Date __________

Multiplying and Dividing Integers

When multiplying or dividing integers:
If two integers have the same sign, their product or quotient is positive.
If two integers have different signs, their product or quotient is negative.

EXAMPLE *Solve each equation.*

$a = 8 \times (-4)$	*One factor is positive and the other is negative.*
$a = -32$	*The product is negative.*
The solution is -32.	
$b = -3 \times (-12)$	*Both factors are negative.*
$b = 36$	*The product is positive.*
The solution is 36.	
$c = -63 \div (-7)$	*Both factors are negative.*
$c = 9$	*The quotient is positive.*
The solution is 9.	
$d = -52 \div 4$	*The factors have different signs.*
$d = -13$	*The quotient is negative*
The solution is -13.	

EXERCISES *Tell whether the product or quotient is positive or negative. Then find the product or quotient.*

1. 8×9 **positive; 72**
2. $4 \times (-5)$ **negative; -20**
3. $-81 \div (-9)$ **positive; 9**
4. $-16 \div 4$ **negative; -4**
5. -5×7 **negative; -35**
6. $27 \div 3$ **positive; 9**
7. $56 \div (-8)$ **negative; -7**
8. $-3 \times (-6)$ **positive; 18**
9. $-42 \div 7$ **negative; -6**
10. 6×8 **positive; 48**

Glencoe/McGraw-Hill 43 Course 2 Intervention

Student Workbook, p. 44

Solve each equation.

11. $a = -16 \times 4$ **-64**
12. $b = 120 \div 20$ **6**
13. $c = -240 \div (-4)$ **60**
14. $d = -64 \div 8$ **-8**
15. $e = 14 \times (-8)$ **-112**
16. $f = 144 \div 6$ **24**
17. $g = -80 \div (-16)$ **5**
18. $h = 14 \times 36$ **504**
19. $j = -11 \times 11$ **-121**
20. $k = -16 \times (-9)$ **144**
21. $m = 240 \div (-8)$ **-30**
22. $n = -315 \div 9$ **-35**
23. $p = 14 \times 12$ **168**
24. $q = 18 \times 0$ **0**
25. $r = 285 \div (-15)$ **-19**
26. $s = -33 \times (-9)$ **297**

APPLICATIONS *A full 60-gallon water storage tank drains at a rate of 3 gallons per minute.*

27. How much water is in the tank after 4 minutes?
48 gal
28. How much water is in the tank after 8 minutes?
36 gal
29. How long does it take to drain 15 gallons of water?
5 min
30. How long does it take to drain the entire tank?
20 min
31. Suppose water is added to the tank at a rate of 2 gallons a minute. How long will it take to drain the tank?
60 min

Glencoe/McGraw-Hill 44 Course 2 Intervention

SKILL 23

TEACHER NOTES

Metric Units of Measure

OBJECTIVE: Convert metric units of measure and determine reasonableness of measurements. (Strand: Measurement)

USING THE TRANSPARENCY: Students may be less familiar with metric units than customary units of measure. Spend some time discussing each unit of measure.

USING THE STUDENT WORKBOOK: Remind students how to multiply and divide by 10, 100, and 1,000. Discuss why changing among metric units is easier than changing among customary units.

EXTENSION: Ask students to find the meaning of the prefixes *giga*- and *nano*-. Ask students how many meters are in a gigameter.

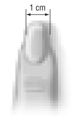
Transparency, Skill 23

SKILL 23 WARM UP

Metric Units of Measure

The *millimeter*, *centimeter*, *meter*, and *kilometer* are units of length.

about 1 millimeter (mm) thick



about 1 centimeter (cm) wide

about 1 meter (m) long

One kilometer (km) is about 6 city blocks.

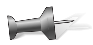
The *milliliter*, *liter*, and *kiloliter* are units of capacity.

about 1 milliliter (mL)

about 1 liter (L)

about 1 kiloliter (kL)

The *milligram*, *gram*, and *kilogram* are units of mass.



about 1 gram (g)

about 1 kilogram (kg)

One milligram (mg) is about the mass of a grain of salt.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 45

SKILL 23 Name ______________________ Date __________

Metric Units of Measure

Metric units of length are millimeters, centimeters, meters, and kilometers.

Metric units of capacity are milliliters, liters, and kiloliters.

Metric units of mass are milligrams (mg), grams (g), and kilograms (kg).

Length
1 centimeter (cm) = 10 millimeters (mm) 1 meter (m) = 100 centimeters 1 meter = 1,000 millimeters 1 kilometer (km) = 1,000 meters
Capacity
1 liter (L) = 1,000 milliliters (mL) 1 kiloliter (kL) = 1,000 liters
Mass
1 gram (g) = 1,000 milligrams (mg) 1 kilogram (kg) = 1,000 grams

When changing from a smaller unit to a larger unit, divide.
When changing from a larger unit to a smaller unit, multiply.

EXAMPLE ***Change 65 meters to centimeters.***

65 = 5 _____ cm — *You are changing from a larger unit (m) to a smaller unit (cm), so multiply.*

65 × 100 = 6,500 — *Since 1 meter = 100 centimeters, multiply by 100.*

65 m = 6,500 cm

Change 500 milliliters to liters.

500 mL = _____ L — *You are changing from a smaller unit (mL) to a larger unit (L), so divide.*

500 ÷ 1,000 = 0.5 — *Since 1 liter = 1,000 milliliters, divide by 1,000.*

Change 4,500 grams to kilograms.

4,500 g = _____ kg — *You are changing from a smaller unit (g) to a larger unit (kg), so divide.*

4,500 ÷ 1,000 = 4.5 — *Since 1 kilogram = 1,000 grams, divide by 1,000.*

4,500 g = 4.5 kg

Glencoe/McGraw-Hill 45 Course 2 Intervention

Student Workbook, p. 46

EXERCISES ***Complete.***

1. 55 mm = **5.5** cm
2. 71 cm = **710** mm
3. 7 km = **7,000** m
4. 750 m = **0.75** km
5. 210 cm = **2.1** m
6. 1.4 m = **140** cm
7. 5 m = **5,000** mm
8. 900 mm = **0.9** m
9. 3 km = **3,000,000** mm
10. 70 L = **70,000** mL
11. 9000 mL = **9** L
12. 0.6 kL = **600** L
13. 52 L = **0.052** kL
14. 70,000 mL = **0.07** kL
15. 90 mL = **0.00009** kL
16. 16 kg = **16,000** g
17. 66 g = **0.066** kg
18. 1.2 g = **0.0012** kg

APPLICATIONS ***Choose the best estimate.***

19. length of a race — 5 cm, 5 m, (5 km)
20. wingspan of an eagle — 2.4 cm, (2.4 m), 2.4 km
21. length of a computer disk — (90 mm), 90 cm, 90 m
22. capacity of can of soft drink — (355 mL), 355 L, 355 kL
23. capacity of a bathtub — 80 mL, (80 L), 80 kL
24. amount of vanilla in a cookie recipe — (3 mL), 3 L, 3 kL
25. mass of a nickel — 5 mg, (5 g), 5 kg
26. mass of an adult human — 60 mg, 60 g, (60 kg)
27. mass of an apple — 0.2 mg, 0.2 g, (0.2 kg)
28. The average shower uses 19 liters of water per minute. If you take a five-minute shower each day, how many kiloliters of water do you use in a 30-day month? **2.85 kL**
29. Soft drinks are sold in 2 liter containers. How many milliliters of soft drink are in one of these containers? **2,000 mL**
30. The mass of a collie is 33,000 grams, and the mass of a basset hound is 26 kilograms. Which dog is bigger? **collie**

Glencoe/McGraw-Hill 46 Course 2 Intervention

SKILL 24

TEACHER NOTES

Scientific Notation

OBJECTIVE: Translate numbers in scientific notation to standard form and numbers in standard form to scientific notation. (Strand: Number and Operation)

USING THE TRANSPARENCY: Have students guess at the proper ordering of the numbers before the numbers are converted to standard form. Use the size of the factor and the size of the exponent as a guide.

USING THE STUDENT WORKBOOK: Ask students to identify the differences between numbers written in scientific notation which involve positive and negative exponents.

EXTENSION: Have students write distances from your school to four other cities in both scientific notation and standard form.

Transparency, Skill 24

SKILL 24 WARM UP

Scientific Notation

Juan and his family plan to take a hike as part of a weekend camping trip. Juan found the table below on the Internet. It identifies the different hiking trails in the park and gives their lengths from start to finish. Help Juan and his family order the trails from shortest to longest by expressing each of the distances in standard form.

Trail Name	Length
Sunshine Trail	2.35×10^4 feet
Lookout Point Trail	6.18×10^3 feet
Canyon Trail	4.6×10^4 feet

The trail lengths are shown in **scientific notation**. Scientific notation is used when dealing with very large or very small numbers where it can be difficult to keep track of the place value.

A number is expressed in scientific notation when it is written as the product of a factor and a power of 10. The factor must be greater than or equal to 1 and less than 10.

To write a number in scientific notation, place the decimal point after the first nonzero digit. Then find the power of 10.

Sunshine Trail: $2.35 \times 10^4 = 2.35 \times 10{,}000 = 23{,}500$ feet — *$10^4 = 10{,}000$ Move the decimal point 4 places to the right.*

Lookout Point Trail: $6.18 \times 10^3 = 6.18 \times 1{,}000 = 6{,}180$ feet — *$10^3 = 1{,}000$ Move the decimal point 3 places to the right.*

Canyon Trail: $4.6 \times 10^4 = 4.6 \times 10{,}000 = 46{,}000$ feet — *$10^4 = 10{,}000$ Move the decimal point 4 places to the right.*

From shortest to longest, the trails are Lookout Point Trail, Sunshine Trail, and Canyon Trail.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 47

SKILL 24 Name ________________ Date ________

Scientific Notation

A number is expressed in scientific notation when it is written as the product of a factor and a power of ten. The factor must be greater than or equal to 1 and less than 10.

EXAMPLE *Express each number in standard form.*

$8.26 \times 10^5 = 8.26 \times 100{,}000 = 826{,}000$ — *$10^5 = 100{,}000$ Move the decimal point 5 places to the right.*

$3.71 \times 10^{-4} = 3.71 \times 0.0001 = 0.000371$ — *$10^{-4} = 0.0001$ Move the decimal point 4 places to the left.*

Express each number in scientific notation.

$68{,}000{,}000 = 6.8 \times 10{,}000{,}000$ — *The decimal point moves 7 places.*
$= 6.8 \times 10^7$ — *The exponent is positive.*

$0.000029 = 2.9 \times 0.00001$ — *The decimal point moves 5 places.*
$= 2.9 \times 10^{-5}$ — *The exponent is negative.*

EXERCISES *Express each number in standard form.*

1. 7.24×10^3 **7,240**
2. 1.09×10^{-5} **0.0000109**
3. 9.87×10^{-7} **0.000000987**
4. 5.8×10^6 **5,800,000**
5. 3.006×10^2 **300.6**
6. 4.999×10^{-4} **0.0004999**
7. 2.875×10^{-5} **0.00002875**
8. 6.3×10^4 **63,000**
9. 4.003×10^6 **4,003,000**
10. 1.28×10^{-2} **0.0128**

Glencoe/McGraw-Hill 47 Course 2 Intervention

Student Workbook, p. 48

Express each number in scientific notation.

11. 7,500,000 **7.5×10^6**
12. 291,000 **2.91×10^5**
13. 0.00037 **3.7×10^{-4}**
14. 12,600 **1.26×10^4**
15. 0.0000002 **2.0×10^{-7}**
16. 0.004 **4.0×10^{-3}**
17. 60,000,000 **6.0×10^7**
18. 40,700,000 **4.07×10^7**
19. 0.00081 **8.1×10^{-4}**
20. 12,500 **1.25×10^4**

Choose the greater number in each pair.

21. 3.8×10^3, 1.7×10^5 **1.7×10^5**
22. 0.0015, 2.3×10^{-4} **0.0015**
23. 60,000,000, 6.0×10^6 **60,000,000**
24. 4.75×10^{-3}, 8.9×10^{-6} **4.75×10^{-3}**
25. 0.00145, 1.2×10^{-3} **0.00145**
26. 7.01×10^3, 7,000 **7.01×10^3**

APPLICATIONS

27. The distance from Earth to the Sun is 1.55×10^8 kilometers. Express this distance in standard form.
155,000,000 km
28. In 2001, the population of Asia was approximately 3,641,000,000. Express this number in scientific notation.
3.641×10^9
29. A large swimming pool under construction at the Greenview Heights Recreation Center will hold 240,000 gallons of water. Express this volume in scientific notation.
2.4×10^5
30. A scientist is comparing two chemical compounds in her laboratory. Compound A has a mass of 6.1×10^{-7} gram, and compound B has a mass of 3.6×10^{-6} gram. Which of the two compounds is heavier?
Compound B

Glencoe/McGraw-Hill 48 Course 2 Intervention

SKILL 25

TEACHER NOTES

Surface Area of Rectangular Prisms and Cylinders

OBJECTIVE: Find the surface area of rectangular prisms and cylinders. (Strand: Measurement)

USING THE TRANSPARENCY: Give students various boxes. Have the students work in groups to find the surface area of the boxes.

USING THE STUDENT WORKBOOK: Cut up an oatmeal box to show that the curved surface is actually a rectangle with a length of $2\pi r$.

EXTENSION: Have students find rectangular prisms with the smallest surface area and greatest volume.

Transparency, Skill 25

SKILL 25 WARM UP

Surface Area of Rectangular Prisms and Cylinders

Ms. Diaz is designing the outside of the cereal box at the right. What is the total area that she needs to design?

To answer this question, you need to find the sum of the areas of the six surfaces of the box. This sum is called the **surface area**.

front:	$7.5 \times 12 = 90$
back:	$7.5 \times 12 = 90$
top:	$7.5 \times 2.5 = 18.75$
bottom:	$7.5 \times 2.5 = 18.75$
right side:	$12 \times 2.5 = 30$
left side:	$12 \times 2.5 = 30$

The surface area is $90 + 90 + 18.75 + 18.75 + 30 + 30$ or 277.5 square inches. Ms. Diaz is designing an area of 277.5 square inches.

Glencoe/McGraw-Hill Course 2 Intervention

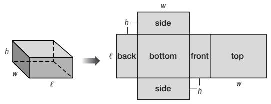
Student Workbook, p. 49

SKILL 25 Name ______ Date ______

Surface Area of Rectangular Prisms and Cylinders

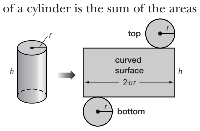
The sum of the areas of all the surfaces of a solid is called the **surface area.**

The surface area of a rectangular prism is the sum of the areas of each of its six faces.



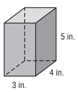
top and bottom: $(\ell \times w) + (\ell \times w) = 2\ell w$
front and back: $(\ell \times h) + (\ell \times h) = 2\ell h$
two sides: $(w \times h) + (w \times h) = 2wh$
surface area $= 2\ell w + 2\ell h + 2wh$

The surface area of a cylinder is the sum of the areas of the two bases and the curved surface.

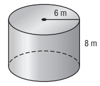


top and bottom: $\pi r^2 + \pi r^2 = 2\pi r^2$
curved surface: $(2\pi r) \times h = 2\pi rh$
surface area $= 2\pi r^2 + 2\pi rh$

EXAMPLE *Find the surface area of each solid.*



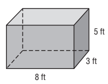
surface area $= 2\ell w + 2\ell h + 2wh$
surface area $= 2 \times 3 \times 4 + 2 \times 3 \times 5 + 2 \times 4 \times 5$
surface area $= 94$
The surface area is 94 square inches.



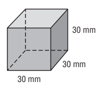
surface area $= 2\pi r^2 + 2\pi rh$
surface area $= 2\pi r^2 \times 6^2 + 2\pi \times 6 \times 8$
surface area ≈ 527.8
The surface area is about 527.8 square meters.

Glencoe/McGraw-Hill 49 Course 2 Intervention

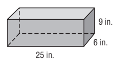
Student Workbook, p. 50

1. 

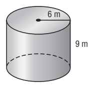
158 ft²

2. 

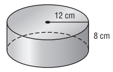
5,400 mm²

3. 

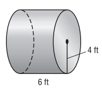
858 in²

4. 

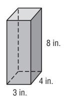
565.5 m²

5. 

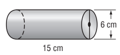
1,508.0 cm²

6. 

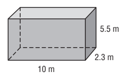
251.3 ft²

7. 

136 in²

8. 

339.3 cm²

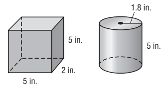
9. 

181.3 m²

APPLICATIONS

10. A box company is making rectangular boxes that are 10 centimeters by 8 centimeters by 5 centimeters. How many of these boxes can the company make using 200,000 square centimeters of cardboard?
588 boxes

11. The two boxes have about the same volume. Which box takes less material to manufacture?
the cylinder



12. A wheel of cheese is sealed in a wax covering. The wheel of cheese is in the shape of a cylinder that has a diameter of 25 centimeters and a height of 20 centimeters. What is the surface area of the cheese that needs to be covered in wax.
about 2,552.5 cm²

Glencoe/McGraw-Hill 50 Course 2 Intervention

SKILL 26

TEACHER NOTES

Circumference and Area of Circles

OBJECTIVE: Find the area and circumference of circles. (Strand: Measurement)

USING THE TRANSPARENCY: Ask students to draw circles on grid paper using a compass. Have them estimate the area of the circles by counting squares. Compare the estimates to the areas found using the formula.

USING THE STUDENT WORKBOOK: Discuss the parts of a circle. Be sure students understand the relationship between radius and diameter.

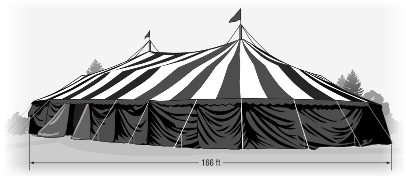
EXTENSION: Ask students to find the radius of a circle that has an area of 78.54 square meters.

Transparency, Skill 26

SKILL 26 WARM UP

Circumference and Area of Circles

The large circular tent used by a circus is 166 feet in diameter. Eighty people are needed to erect the tent. It takes 2 to 5 minutes to erect the tent after the tent master starts the process.



What is the distance around the tent?

$C = \pi d$

$C = \pi \times 166$

$C \approx 521.5$ *Use a calculator.*

The distance around the tent is about 521.5 feet.

What is the area covered by the tent?

The radius is half of 166 or 83 feet.

$A = \pi r^2$

$A = \pi \times 83^2$

$A \approx 21{,}642.4$ *Use a calculator.*

The tent covers about 21,642.4 square feet of ground.

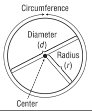
Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 51

SKILL 26 Name ____________ Date ________

Circumference and Area of Circles

The parts of a circle are illustrated at the right. Notice that the radius is one-half of the diameter.



	Circumference	Area
Formula	$C = \pi d$ or $C = 2\pi r$ (d = diameter and r = radius)	$A = \pi r^2$ (r = radius)
Example	(7 in.) $C = 2\pi r$; $C = 2\pi \times 7$; $C \approx 44.0$ Use a calculator; The circumference is about 44.0 inches.	(18 cm) The radius is half of 18 or 9 centimeters; $A = \pi r^2$; $A = \pi \times 9^2$; $A \approx 254.5$ Use a calculator. The area is about 254.5 square centimeters.

EXERCISES *Find the circumference and area of each circle. Round to the nearest tenth.*

1. (9 m) **56.5 m; 254.5 m²**
2. (4 ft) **25.1 ft; 50.3 ft²**
3. (26 in.) **81.7 in.; 530.9 in²**
4. (34 mm) **106.8 mm; 907.9 mm²**
5. (1.5 cm) **9.4 cm; 7.1 cm²**
6. (15 yd) **47.1 yd; 176.7 yd²**

Glencoe/McGraw-Hill 51 Course 2 Intervention

Student Workbook, p. 52

7. (21 m) **66.0 m; 346.4 m²**
8. (16 mm) **100.5 mm; 804.2 mm²**
9. (0.5 yd) **3.1 yd; 0.8 yd²**

APPLICATIONS

10. The approximate diameter of Earth is 3,960 miles. What is the distance around the equator? **about 12,440.7 mi**
11. A circular garden has a diameter of 28 feet. The garden is to be covered with peat moss. If each bag of peat moss covers 160 square feet, how many bags of peat moss will be needed? **4 bags**
12. What is the area of a pizza with a diameter of 14 inches? **about 153.9 in²**
13. The stage of a theater is a semicircle. If the radius of the stage is 32 feet, what is the area of the stage? **about 1,608.5 ft²**
14. A Ferris wheel has a diameter of 212 feet. How far will a passenger travel in one revolution of the wheel? **about 666.0 ft**
15. A water sprinkler produces a spray that goes out 25 feet. If it sprays the water in a circular pattern, what is the area of the lawn that it waters? **about 1,963.5 ft²**
16. The diameter of a bicycle wheel is 26 inches. How many feet will the bicycle travel if the wheel turns 20 times? **about 136.1 ft**
17. The Roman Pantheon is 142 feet in diameter. What is the distance around the Pantheon? **about 446.1 ft**
18. The diameter of a dime is 17.9 millimeters. What is the area of one side of the coin? **about 251.6 mm²**

Glencoe/McGraw-Hill 52 Course 2 Intervention

SKILL 27

TEACHER NOTES

Volume of Rectangular Prisms and Cylinders

OBJECTIVE: Find the volume of rectangular prisms and cylinders. (Strand: Measurement)

USING THE TRANSPARENCY: Have students measure your classroom and determine the volume of the room.

USING THE STUDENT WORKBOOK: Give students rectangular boxes and cylindrical cans. Have the students work in groups to find the volume of the objects.

EXTENSION: Provide different size containers and have students order them from least to greatest volume.

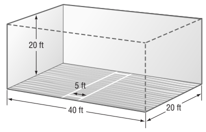
Transparency, Skill 27

SKILL 27 WARM UP

Volume of Rectangular Prisms and Cylinders

A diagram of a four-wall handball court is shown.

What is the volume of a room used to play four-wall handball?



Volume is the amount of space that a three-dimensional figure contains. The volume of a prism or a cylinder can be found by multiplying the area of the base times the height.

$$V = Bh$$

In this formula, B represents the area of the base, and h represents the height.

The base of a handball court is a rectangle that is 40 feet by 20 feet.

$$B = 40 \times 20 \text{ or } 800$$

The height of the handball court is 20 feet.

$$V = Bh$$
$$V = 800 \times 20$$
$$V = 16{,}000$$

The volume of a room used to play four-wall handball is 16,000 cubic feet.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 53

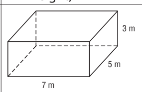
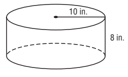
SKILL 27 Name ______________________ Date __________

Volume of Rectangular Prisms and Cylinders

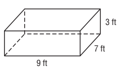
The volume of an object is the amount of space a solid contains. Volume is measured in cubic units. The volume of a prism or a cylinder can be found by multiplying the area of the base times the height.

$$V = Bh$$

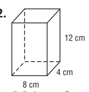
For a rectangular prism, the area of the base equals the length times the width. For cylinders, the area of the base equals pi times the radius squared.

	Rectangular Prism	Cylinder
Volume Formula	$V = \ell wh$ (ℓ = length, w = width, and h = height)	$V = \pi r^2 h$ (r = radius and h = height)
Example	 $V = \ell wh$ $V = 7 \times 5 \times 3$ $V = 105$ The volume is 105 cubic meters.	 $V = \pi r^2 h$ $V = \pi \times 10^2 \times 8$ $V \approx 2{,}513.3$ Use a calculator. The volume is about 2,513.3 cubic inches.

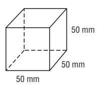
EXERCISES *Find the volume of each rectangular prism.*

1. 

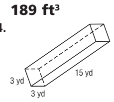
189 ft³

2. 

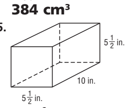
384 cm³

3. 

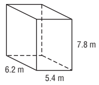
125,000 mm³

4. 

135 yd³

5. 

$302\frac{1}{2}$ in³

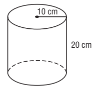
6. 

261.144 m³

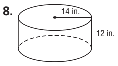
Glencoe/McGraw-Hill 53 Course 2 Intervention

Student Workbook, p. 54

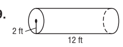
Find the volume of each cylinder. Round to the nearest tenth.

7. 

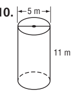
6,283.2 cm³

8. 

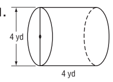
7,389.0 in³

9. 

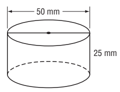
150.8 ft³

10. 

216.0 m³

11. 

50.3 yd³

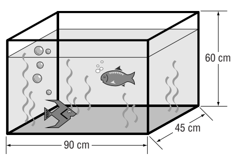
12. 

49,087.4 mm³

APPLICATIONS

13. Mariah is making cylindrical candles. The candles she plans to make have a diameter of 3 inches and a height of 8 inches. If she has 200 cubic inches of wax, how many candles can Mariah make. **3 candles**

14. A fish tank is shown at the right.



a. What is the volume of the tank? **243,000 cm³**

b. If the tank is filled to the height of 50 centimeters, what is the volume of the water in the tank? **202,500 cm³**

15. A square cake pan is 8 inches long on each side. It is 2 inches deep. A round cake pan has a diameter of 8 inches. It is 2 inches deep.

a. Which pan can hold more cake batter? **the square cake pan**

b. How much greater is the volume of the pan that holds more batter? **about 27.5 in³**

16. How many cubic inches are in a cube that is 1 foot on each side? **1,728 in³**

Glencoe/McGraw-Hill 54 Course 2 Intervention

SKILL 28

TEACHER NOTES

Nets and Solids

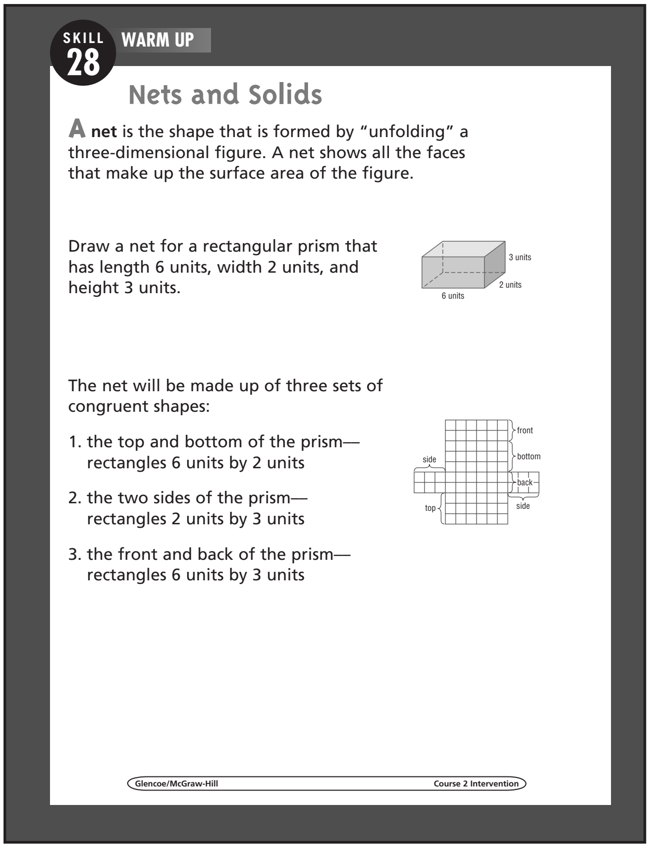
OBJECTIVE: Draw nets for rectangular prisms and top, side, and front views of other solids. (Strand: Measurement)

USING THE TRANSPARENCY: Supply graph paper to help the students draw a more accurate net.

USING THE STUDENT WORKBOOK: Ask students to use a ruler and graph paper to assist in their drawing.

EXTENSION: Have students bring in objects from home that could be used to draw nets and top, side, and front views.

Transparency, Skill 28



SKILL 28 WARM UP

Nets and Solids

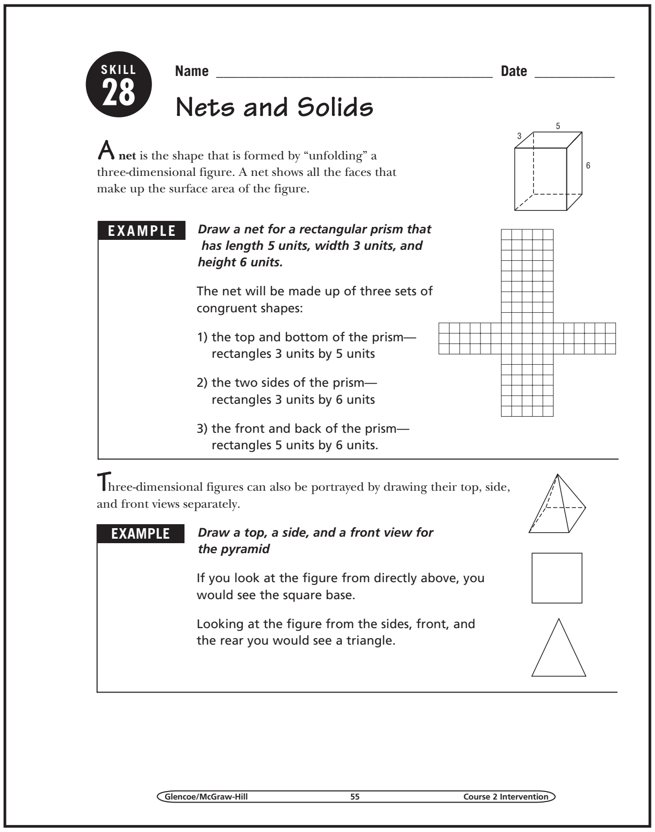
A **net** is the shape that is formed by "unfolding" a three-dimensional figure. A net shows all the faces that make up the surface area of the figure.

Draw a net for a rectangular prism that has length 6 units, width 2 units, and height 3 units.

The net will be made up of three sets of congruent shapes:

1. the top and bottom of the prism—rectangles 6 units by 2 units
2. the two sides of the prism—rectangles 2 units by 3 units
3. the front and back of the prism—rectangles 6 units by 3 units

Student Workbook, p. 55



SKILL 28 Name ______________ Date ________

Nets and Solids

A **net** is the shape that is formed by "unfolding" a three-dimensional figure. A net shows all the faces that make up the surface area of the figure.

EXAMPLE *Draw a net for a rectangular prism that has length 5 units, width 3 units, and height 6 units.*

The net will be made up of three sets of congruent shapes:

1) the top and bottom of the prism—rectangles 3 units by 5 units

2) the two sides of the prism—rectangles 3 units by 6 units

3) the front and back of the prism—rectangles 5 units by 6 units.

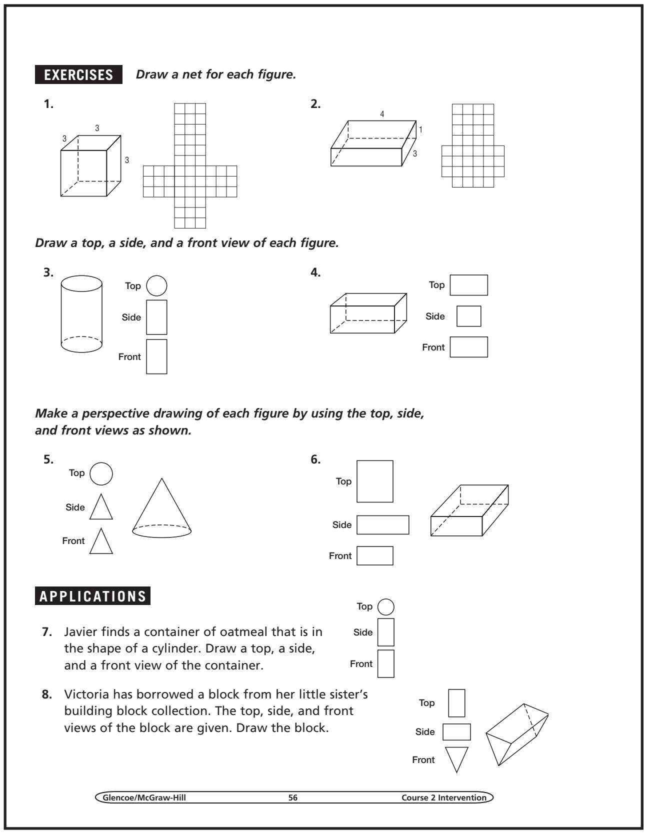
Three-dimensional figures can also be portrayed by drawing their top, side, and front views separately.

EXAMPLE *Draw a top, a side, and a front view for the pyramid*

If you look at the figure from directly above, you would see the square base.

Looking at the figure from the sides, front, and the rear you would see a triangle.

Student Workbook, p. 56



EXERCISES *Draw a net for each figure.*

1.

2.

Draw a top, a side, and a front view of each figure.

3.

4.

Make a perspective drawing of each figure by using the top, side, and front views as shown.

5.

6.

APPLICATIONS

7. Javier finds a container of oatmeal that is in the shape of a cylinder. Draw a top, a side, and a front view of the container.

8. Victoria has borrowed a block from her little sister's building block collection. The top, side, and front views of the block are given. Draw the block.

SKILL 29

TEACHER NOTES

Three-Dimensional Figures

OBJECTIVE: Investigate and draw three-dimensional figures. (Strand: Geometry)

USING THE TRANSPARENCY: Discuss the difference between prisms and pyramids. Ask students how prisms and cylinders are related and how they differ. Ask students how pyramids and cones are similar and how they are different.

USING THE STUDENT WORKBOOK: Have students study a model of a rectangular prism. Have students identify the faces, bases, edges, and vertices.

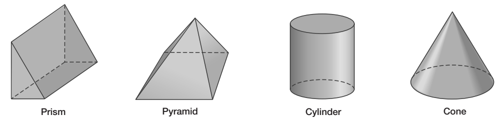
EXTENSION: Have students draw different Venn diagrams to classify three-dimensional figures.

Transparency, Skill 29

SKILL 29 WARM UP

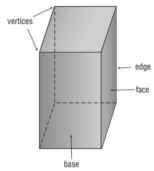
Three-Dimensional Figures

Two types of three-dimensional figures, or solids, are **prisms** and **pyramids**. These three-dimensional figures have flat surfaces. Prisms and pyramids are named by their bases.



The flat surfaces that form the figures are called **faces**. The faces intersect to form **edges**. The edges intersect to form **vertices**.

Some solids have curved surfaces.

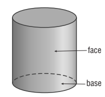


What items in your home or classroom are in the shape of a rectangular prism?

Cereal boxes, shoe boxes, and paperback books are examples of rectangular prisms.

What items in your home or classroom are in the shape of a cylinder?

Soup cans, soda cans, and oatmeal boxes are examples of cylinders.



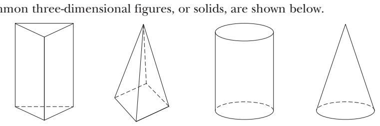
Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 57

SKILL 29 Name ______________________ Date __________

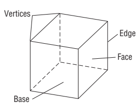
Three-Dimensional Figures

Common three-dimensional figures, or solids, are shown below.

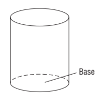


The flat surfaces of a prism or pyramid are called **faces**. The faces intersect to form **edges**. The edges intersect to form **vertices**.

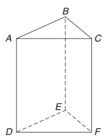
Prisms and pyramids are named by their bases. The prism at the right is a square prism.



At least two faces of a prism must be parallel and congruent polygons. These are called the **bases**. The base of a pyramid can be any polygon. All other faces are triangles. The bases of cylinders and cones are circles.



EXAMPLES *Refer to the triangular prism.*



List the faces of the prism. Identify the bases.

Faces: △*ABC*, △*DEF*, *ACFD*, *ABED*, and *BCFE*

Bases: △*ABC* and △*DEF*

List the edges of the prism.

$\overline{AB}$, $\overline{BC}$, $\overline{AC}$, $\overline{AD}$, $\overline{BE}$, $\overline{CF}$, $\overline{DE}$, $\overline{EF}$, and $\overline{DF}$

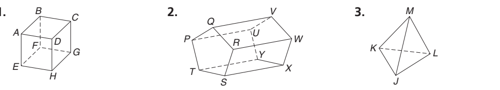
List the vertices of the prism.

A, B, C, D, E, F

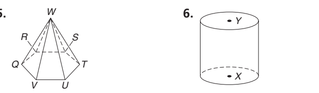
Glencoe/McGraw-Hill 57 Course 2 Intervention

Student Workbook, p. 58

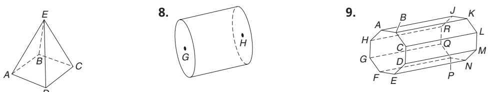
EXERCISES *Name each solid. Identify the bases.*



1. **square prism; ABCD, EFGH**
2. **pentagonal prism; PQRST, UVWXY**
3. **triangular pyramid; △JKL**



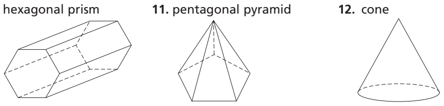
4. **cone; circle C**
5. **hexagonal pyramid; QRSTUV**
6. **cylinder; circles X and Y**



7. **square pyramid; ABCD**
8. **cylinder; circles G and H**
9. **octagonal prism ABCDEFGH, JKLMNPQR**

Draw each solid.

10. hexagonal prism 11. pentagonal pyramid 12. cone



APPLICATIONS *Name two real-world examples of each solid.*

13. rectangular prism
14. square pyramid
15. cylinder
16. triangular pyramid
17. pentagonal prism
18. cone

13–18. Answers will vary.

Glencoe/McGraw-Hill 58 Course 2 Intervention

SKILL 30

TEACHER NOTES

Weight and Mass

OBJECTIVE: To convert between different units of measure within the same system. (Strand: Measurement)

USING THE TRANSPARENCY: Have students discuss products they purchase by weight or that show the products' weight. This may include bags of potatoes, grains, fresh fish, vehicles and so on.

USING THE STUDENT WORKBOOK: Have students discuss in small groups strategies they can use to remember how to convert between units.

EXTENSION: Have students make a list of five objects and exchange with another student. The second student should determine which units (both customary and metric) would be most appropriate to use in weighing the object.

Transparency, Skill 30

SKILL 30 WARM UP

Weight and Mass

Lee is driving a delivery truck and comes to a bridge that says "Maximum Weight 4 Tons." When he left the warehouse, the weight of the truck was 6,800 pounds.

Can Lee continue in this direction for his delivery? He has the following conversion chart to use in situations like this.

	ounces	pounds	tons
1 ounce	1 ounce	$\frac{1}{16}$ pound	$\frac{1}{32{,}000}$ ton
1 pound	16 ounces	1 pound	$\frac{1}{2{,}000}$ ton
1 ton	32,000 ounces	2,000 pounds	1 ton

Lee can either convert both measurements to tons or both to pounds. To convert from tons to pounds, multiply by 2,000. So, $4 \times 2{,}000 = 8{,}000$ pounds. Lee can also divide 6,800 by 2,000. So, $6{,}800 \div 2{,}000 = 3.4$.

Since Lee is below 8,000 pounds and under 4 tons, the bridge is safe to use.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 59

SKILL 30 Name ______________ Date ________

Weight and Mass

This table shows the relationship among different units of mass in the metric system.

	milligrams	centigrams	decigrams	grams	decagrams	hectograms	kilograms
1 milligram	1 milligram	0.1 centigram	0.01 decigram	0.001 gram	0.0001 decagram	0.00001 hectogram	0.000001 kilogram
1 centigram	10 milligrams	1 centigram	0.1 decigram	0.01 gram	0.001 decagram	0.0001 hectogram	0.00001 kilogram
1 decigram	100 milligrams	10 centigrams	1 decigram	0.1 gram	0.01 decagram	0.001 hectogram	0.0001 kilogram
1 gram	1,000 milligrams	100 centigrams	10 decigrams	1 gram	0.1 decagram	0.01 hectogram	0.001 kilogram
1 decagram	10,000 milligrams	1,000 centigrams	100 decigrams	10 grams	1 decagram	0.1 hectogram	0.01 kilogram
1 hectogram	100,000 milligrams	10,000 centigrams	1,000 decigrams	100 grams	10 decagrams	1 hectogram	0.1 kilogram
1 kilogram	1,000,000 milligrams	100,000 centigrams	10,000 decigrams	1,000 grams	100 decagrams	10 hectograms	1 kilogram

This table shows the relationship among different units of weight in the U.S. Customary system.

	ounces	pounds	tons
1 ounce	1 ounce	1/16 pound	1/32,000 ton
1 pound	16 ounces	1 pound	1/2,000 ton
1 ton	32,000 ounces	2,000 pounds	1 ton

EXAMPLES *Convert each mass into the units given.*

1. 2,000 milligrams = 2 grams = 0.002 kilograms
2. 35 grams = 350 decigrams = 3,500 centigrams

Glencoe/McGraw-Hill 59 Course 2 Intervention

Student Workbook, p. 60

EXERCISES *Convert each weight into the units given.*

3. 24 ounces = **$1\frac{1}{2}$** pounds
4. 4,000 pounds = **64,000** ounces = **2** tons
5. 80 ounces = **5** pounds = **$\frac{1}{400}$** tons
6. $1\frac{1}{2}$ tons = **3,000** pounds = **48,000** ounces
7. 10 pounds = **160** ounces = **$\frac{1}{200}$** tons
8. $\frac{1}{4}$ ton = **50** pounds = **8,000** ounces

APPLICATIONS

9. Which is heavier, 1.5 kilograms or 23,000 milligrams? **1.5 kilograms**
10. The mass of a medium-sized mouse is about 20 grams. The mass of a medium-sized cat is about 6 kilograms. How many mice would balance one cat on a scale? **300**
11. The weight of a penny is 2.5 grams. The weight of a liter of water is 1 kilogram (not including the container). If a 1-liter bottle of water costs $2.00, and you paid for it in pennies, would the pennies weigh more than the water? **No; the pennies would weigh 500 grams, the water would weigh 1,000 grams**
12. Which is heavier, $2\frac{1}{4}$ pounds or 40 ounces? **40 ounces**
13. Tony wants to buy 5 pounds of rice, but the store only sells rice in 10-ounce packages. How many packages does he need? **8 packages**
14. A box of crackers weighs 12 ounces. A crate holds 37.5 pounds of crackers. How many boxes are in a crate? **50 boxes**

Glencoe/McGraw-Hill 60 Course 2 Intervention

SKILL 31 — TEACHER NOTES

Simplify and Use Logical Reasoning

OBJECTIVE: Solve problems by solving simpler problems, or using logical reasoning. (Strand: Problem Solving)

USING THE TRANSPARENCY: Ask students to find the area of the floor of a room that is *not* rectangular. Students should make the measurements they need to find the area and do the calculations. Ask students to tell what simpler problems they solved to find the area.

USING THE STUDENT WORKBOOK: Show the class a photo of a large number of people. Ask the students how they would use the solve-a-simpler-problem strategy to determine the number of people in the photo.

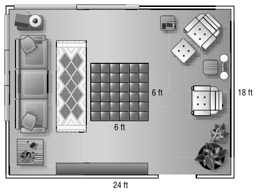
EXTENSION: Ask students to find the number of diagonals there are in a convex polygon with 40 sides by solving simpler problems.

Transparency, Skill 31

SKILL 31 WARM UP

Simplify and Use Logical Reasoning

Genaro wants to put carpet in his den. In the center of the room is a tile hearth for his stove. He does not want to carpet that area. How much carpet does he need?



You can solve this problem by solving two simpler problems. First find the total area of the den. Then find the area of the hearth. Subtract to find the area that will be carpeted.

Find the area of the den.

$24 \times 8 = 432$

The area of the den is 432 square feet.

Find the area of the hearth.

$6 \times 6 = 36$

The area of the hearth is 36 square feet.

Find the area that will be carpeted.

$432 - 36 = 396$

Genaro needs 396 square feet of carpet.

Glencoe/McGraw-Hill — Course 2 Intervention

Student Workbook, p. 61

SKILL 31 Name ____________ Date ________

Simplify and Use Logical Reasoning

Two possible strategies for solving problems are listed below.

• Solve a Simpler Problem • Use Logical Reasoning

EXAMPLE ***Find the sum of the whole numbers from 1 to 200.***

This would be a tedious problem to solve using a calculator or adding the numbers yourself. The problem is easier to solve if you solve a simpler problem. First, consider the partial sums indicated below.

1, 2, 3, …, 100, 101, …, 198, 199, 200

$100 + 101 = 201$
$3 + 198 = 201$
$2 + 199 = 201$
$1 + 200 = 201$

Notice that each sum is 201. There are 100 of these partial sums.

$201 \times 100 = 20{,}100$

The sum of the whole numbers from 1 to 200 is 20,100.

EXAMPLE ***Neva, Justin, Toshiro, and Sydney are lining up by height. Toshiro is not standing next to Sydney. Neva is the shortest and is not standing next to Toshiro. List the students from shortest to tallest.***

Use logical reasoning to solve this problem.

- Since Neva is the shortest, write Neva in the first position.
- Since Toshiro and Sydney are not standing next to each other, write Justin in the third position.
- Since Neva and Toshiro are not standing next to each other, write Toshiro in the fourth position.
- Since Sydney is the only student left, write Sydney in the second position.

1. Neva 2. Sydney 3. Justin 4. Toshiro

The students from shortest to tallest are Neva, Sydney, Justin, and Toshiro.

Glencoe/McGraw-Hill 61 Course 2 Intervention

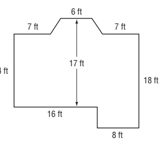
Student Workbook, p. 62

EXERCISES *Solve.*

1. Find the sum of the whole numbers from 1 to 400. **80,200**
2. Find the sum of the even numbers from 2 to 100. **2,550**
3. There are three boards each a different odd number of feet long. If the boards are placed end to end, the total length is 9 feet. What are the lengths of the boards? **1 ft, 3 ft, and 5 ft**
4. A total of 492 digits are used to print all the page numbers of a book beginning with page 1. How many pages are in the book? **200 pages**
5. Anna, Iris, and Oki each have a pet. The pets are a fish, cat, and a bird. Anna is allergic to cats. Oki's pet has 2 legs. Whose pet is the fish? **Anna**

APPLICATIONS

6. Connie, Kristina, and Roberta are the pitcher, catcher, and shortstop for a softball team, but not necessarily in that order. Kristina is not the catcher. Roberta and Kristina share a locker with the shortstop. Who plays each position? **Connie: shortstop; Kristina: pitcher; Roberta: catcher**
7. Mr. Lee wants to carpet the room shown at the right. How much carpet will he need? **392 ft²**



8. Doug, Louann, and Sandy have lockers next to each other. Louann rides the bus with the person whose locker is at the right. Doug's locker is not next to Luann's locker. Who has the locker at the left? **Louann**
9. A rectangular field is fenced on two adjacent sides by a brick wall. The field is 63 yards long with an area of 1,323 square yards. How much fencing is needed on the two sides of the field? **84 yd**
10. A vending machine sells items that cost 80¢. It only accepts quarters, dimes, and nickels. If it only accepts exact change, how many different combinations of coins must the machine be programmed to accept? **20 combinations**

Glencoe/McGraw-Hill 62 Course 2 Intervention

SKILL 32

TEACHER NOTES

Counting Outcomes and Tree Diagrams

OBJECTIVE: Use different counting methods. (Strand: Data Analysis and Probability)

USING THE TRANSPARENCY: Ask students to predict how many different shapes they would have if they drew squares and triangles in red, black, green, and yellow. Have them make a tree diagram to check their prediction.

USING THE STUDENT WORKBOOK: Point out to students that multiplication is a time-saving method for finding the number of possible outcomes. Help students to see that the Fundamental Counting Principle can be applied to more than two events.

EXTENSION: Ask students to describe a circumstance under which they would rather use a tree diagram than the Fundamental Counting Principle. Then have them describe a situation when using a tree diagram would not be practical.

Transparency, Skill 32

SKILL 32 WARM UP

Counting Outcomes and Tree Diagrams

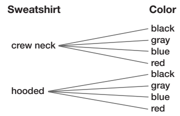
Theo is buying a new sweatshirt to use at track practice. He has a choice of crew neck or hooded. The sweatshirts come in black, gray, blue, and red. How many different sweatshirts are there from which Theo can choose?

One way to solve this is to make a list.

crew neck, black	hooded, black
crew neck, gray	hooded, gray
crew neck, blue	hooded, blue
crew neck, red	hooded, red

There are 8 different sweatshirts.

Another way to solve this problem is to make a **tree diagram**.



According to the tree diagram, there are 8 different sweatshirts available.

Another way to solve this problem is to use the **Fundamental Counting Principle**.

Fundamental Counting Principle

If an event M can occur in m ways and it is followed by event N that can occur in n ways, then the event M followed by event N can occur in $m \times n$ ways.

choices for type × choices for colors = possible sweatshirts
2 × 4 = 8

In each solution, the number of sweatshirts from which to choose is 8.

Student Workbook, p. 63

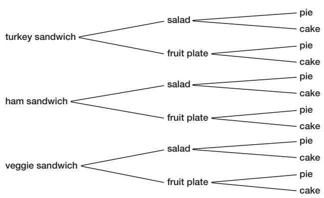
SKILL 32 Name ______________ Date ______

Counting Outcomes and Tree Diagrams

An organized list can help you determine the number of possible outcomes for a situation. One type of organized list is a **tree diagram.**

EXAMPLE ***The lunch special at Morgan's Diner is a choice of a turkey, ham, or veggie sandwich, salad, or fruit plate, and either pie or cake. If you wish to order the lunch special, how many different choices do you have?***

To answer this question, make a tree diagram.



There are 12 choices for the lunch special.

The **Fundamental Counting Principle** states that if an event M can occur m ways and it is followed by an event N that can occur n ways, then the event M followed by event N can occur $m \times n$ ways.

EXAMPLE ***If two quarters are tossed, find the total number of outcomes.***

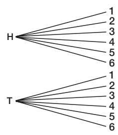
Use the Fundamental Counting Principle.

There are 2 possible outcomes when tossing a coin, heads or tails.
outcomes for quarter 1 × outcomes for quarter 2 = possible outcomes
2 × 2 = 4
There are 4 possible outcomes if 2 quarters are tossed.

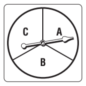
Student Workbook, p. 64

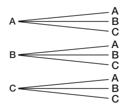
EXERCISES ***Draw a tree diagram to find the number of outcomes for each situation.***

1. A coin and a number cube are tossed.



2. The spinner is spun twice.





Use the Fundamental Counting Principle to find the number of outcomes for each situation.

3. 5 types of juice come in 3 different sized containers.
5 × 3 = 15
15 outcomes

4. T-shirts come in 3 sizes and 6 colors.
3 × 6 = 18
18 outcomes

5. Baseball hats come in 2 styles and 3 sizes for each of 12 teams.
2 × 3 × 12 = 72
72 outcomes

6. Pizzas come in 5 sizes, with 2 different crusts and 14 available toppings.
5 × 2 × 14 = 140
140 outcomes

APPLICATIONS

7. Mrs. Jenkins' history test has 10 questions. Seven of the questions are multiple-choice with four answer choices. Two of the questions are true-false. How many possible sets of answers are there for the test? **65,536 sets of answers**

8. Ryan is buying a new bicycle. He can choose from a mountain bike, a stunt bike, or a BMX bike. Each of the bikes comes in 6 colors. The bikes offer a choice of 2 types of tires and 3 types of seats. How many different bicycles can Ryan select? **108 bicycles**

9. Lonan is choosing a new password for his email account. The password must contain eight characters. The first two characters of his password must be letters and the last 6 digits must be any digit 0–9. How many possible passwords can Lonan create? **676,000,000 passwords**

SKILL 33

TEACHER NOTES

Permutations

OBJECTIVE: Find the number of permutations of objects. (Strand: Data Analysis and Probability)

USING THE TRANSPARENCY: Choose three students. Tell them that they are standing in line at a movie theater. Have them arrange themselves in as many different orders as possible. Then ask them how they could determine the number of ways 3 out of 7 people could stand in line.

USING THE STUDENT WORKBOOK: Show students the sports section of a newspaper. For whichever sport is in season, have students name teams in a league. Ask students to find how many arrangements of first and second place are possible.

EXTENSION: Ask students to write a problem that has $P(15, 3)$ as the answer. Ask them to evaluate $P(15, 3)$.

Transparency, Skill 33

SKILL 33 **WARM UP**

Permutations

Several countries of the world have flags that consist of three different-colored vertical stripes. Study the flags at the right. How many flags such as these could be made using the colors black, blue, green, orange, red, white, and yellow? Remember that each flag must have three vertical stripes and each stripe on the flag must be a different color.

In this case, order is important. An arrangement or listing in which order is important is called a **permutation**.

There are a total of 7 colors. Therefore, there are 7 choices for the color of the first stripe. Once the first color has been chosen, there are 6 remaining colors for the middle stripe. There are 5 possible colors for the last stripe.

$$7 \times 6 \times 5 = 210$$

There are 210 possible flags that can be made.

Student Workbook, p. 65

SKILL 33 Name ______________________ Date ________

Permutations

An arrangement or listing in which order is important is called a **permutation**. $P(n, r)$ stands for the number of permutations of n things taken r at a time.

EXAMPLE *There are 6 runners in a race. How many permutations of first, second, and third place are possible?*

There are 6 choices for first place, then 5 choices for second place, and finally 4 choices for third place. Find $P(6, 3)$

$P(6, 3) = 6 \times 5 \times 4$
$= 120$

The number of permutations is 120.

The expression $6 \times 5 \times 4 \times 3 \times 2 \times 1$ can be written as 6!. It is read *six factorial*. In general, $n!$ is the product of whole numbers starting at n and counting backward to 1. To find the number of permutations involving all members of a group, $P(n, n)$, find $n!$.

EXAMPLE *There are 6 runners in a race. In how many ways can they finish the race?*

There are 6 choices for first, 5 choices for second, and so on.

$P(6, 6) = 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 720$

There are 720 ways in which the runners can finish the race.

EXERCISES *Find the value of each expression.*

1. $P(5, 2)$ **20**
2. $P(8, 3)$ **336**
3. $P(4, 3)$ **24**
4. $P(7, 4)$ **840**
5. $P(10, 2)$ **90**
6. $P(4, 4)$ **24**
7. $P(6, 1)$ **6**
8. $P(9, 5)$ **15,120**
9. 4! **24**
10. 5! **120**
11. 8! **40,320**
12. 10! **3,628,800**
13. $\frac{6!}{3!}$ **120**
14. $\frac{5!}{4!}$ **5**
15. $\frac{6!}{2!}$ **360**
16. $\frac{8!}{5!}$ **336**

Student Workbook, p. 66

APPLICATIONS

17. How many ways can a winner and a runner-up be chosen from 8 show dogs at a dog show? **56 ways**
18. In how many ways can 5 horses in a race cross the finish line? **120 ways**
19. In how many ways can a president, vice-president, secretary, and treasurer be chosen from a club with 12 members? **11,880 ways**
20. A shelf has a history book, a novel, a biography, a dictionary, a cookbook, and a home-repair book. In how many ways can 4 of these books be rearranged on another shelf? **360 ways**
21. In how many ways can 8 people be seated at a counter that has 8 stools in a row? **40,320 ways**
22. Eight trained parrots fly onto the stage but find there are only 5 perches. How many different ways can the parrots land on the perches if only one parrot is on each perch? **6,720 ways**
23. Seven students are running for class president. In how many different orders can the candidates make their campaign speeches? **5,040 orders**
24. In how many different ways can a coach name the first three batters in a nine-batter softball lineup? **504 ways**
25. How many different flags consisting of 4 different-colored vertical stripes can be made up from blue, green, red, black, and white? **120 flags**
26. In how many ways can the gold, silver, and bronze medals be awarded to 10 swimmers? **720 ways**

SKILL 34

TEACHER NOTES

Probability

OBJECTIVE: Find the probability of simple events and compound (independent and dependent) events. (Strand: Data Analysis and Probability)

USING THE TRANSPARENCY: Have groups of students use a deck of cards to help them find simple probabilities such as *P*(2), *P*(heart), and *P*(even numbered card). Then have students discuss what happens to the number of cards when two cards are drawn and the first is not returned to the deck.

USING THE STUDENT WORKBOOK: Supply groups of students with spinners. Ask the students to determine the probability of spinning a certain number. Then, have them spin the spinner twice to determine the probability of a certain number combination or sum.

EXTENSION: Have students analyze the probabilities included in a specific card or board game.

Transparency, Skill 34

SKILL 34 WARM UP

Probability

A standard deck of playing cards contains 52 cards. The cards are divided into suits: clubs (black), hearts (red), spades (black), and diamonds (red). Each suit has cards numbered 2 through 10, a jack (J), queen (Q), king (K), and ace (A).

If a card is randomly selected from the deck, what is the probability that it will be a diamond?

The **probability** of a simple event is the ratio of the number of ways the event can occur to the number of possible outcomes.

$P(\text{diamond}) = \frac{13}{52}$ ← *number of diamonds* / ← *number of cards*

$= \frac{1}{4}$ The probability of randomly selecting a diamond is $\frac{1}{4}$.

A **compound event** consists of two or more simple events. In **independent events**, the outcome of one event does *not* affect the outcome of another event. If the outcome of one event affects the outcome of another event, they are **dependent events**.

Two cards are randomly drawn from a deck. Find each probability.

1 drawing an ace, replacing the card, then drawing a club

The events are independent since the outcome of one does *not* affect the other.

$P(\text{ace}) = \frac{4}{52}$ or $\frac{1}{13}$

$P(\text{club}) = \frac{13}{52}$ or $\frac{1}{4}$

$P(\text{ace then club}) = \frac{1}{13} \cdot \frac{1}{4} = \frac{1}{52}$

2 drawing two jacks without replacing the first card

The events are dependent since there is one less card from which to choose on the second draw.

$P(\text{jack}) = \frac{4}{52}$ or $\frac{1}{13}$

$P(\text{jack}) = \frac{3}{51}$ or $\frac{1}{17}$

$P(\text{two jacks}) = \frac{1}{13} \cdot \frac{1}{17} = \frac{1}{221}$

Glencoe/McGraw-Hill Course 2 Intervention

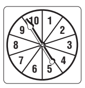
Student Workbook, p. 67

SKILL 34 Name ______________ Date ________

Probability

The **probability** of an event is the ratio of the number of ways an event can occur to the number of possible outcomes. The probability of one event occurring is called a **simple probability**.

EXAMPLE ***The spinner has ten equally likely outcomes. Find the probability of spinning a number less than 7.***



Numbers less than 7 are 1, 2, 3, 4, 5, and 6.
There are 10 possible outcomes.

probability of a number less than 7 = $\frac{6}{10}$ or $\frac{3}{5}$

The probability of spinning a number less than 7 is $\frac{3}{5}$.

A **compound event** consists of two or more simple events. **Independent events** occur when the outcome of one event does *not* affect the outcome of another event. If the outcome of one event affects the outcome of another event, the events are called **dependent events**.

EXAMPLES ***Tiles numbered 1 through 25 are placed in a box. Two tiles are selected at random. Find each probability.***

drawing an even number, replacing the tile, and then randomly drawing a multiple of 3

The events are independent since the outcome of one drawing does not affect the other.

$P(\text{even number}) = \frac{12}{25}$ $P(\text{multiple of 3}) = \frac{8}{25}$

$P(\text{even number, multiple of 3}) = \frac{12}{25} \cdot \frac{8}{25}$ or $\frac{96}{625}$

drawing a number greater than 10, and then drawing a number less than 10 without replacing the first tile

The events are dependent since there is one less tile from which to choose on the second draw.

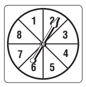
$P(n > 10) = \frac{15}{25}$ or $\frac{3}{5}$ $P(n < 10) = \frac{9}{24}$ or $\frac{3}{8}$

$P(n > 10, n < 10) = \frac{3}{5} \cdot \frac{3}{8}$ or $\frac{9}{40}$

Glencoe/McGraw-Hill 67 Course 2 Intervention

Student Workbook, p. 68

EXERCISES ***The spinner shown is equally likely to stop on each of the sections. Find each probability.***

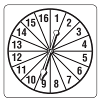


1. $P(n < 5)$ **$\frac{1}{2}$**
2. $P(\text{even number})$ **$\frac{1}{2}$**
3. $P(\text{multiple of 4})$ **$\frac{1}{4}$**
4. $P(\text{factor of 6})$ **$\frac{1}{2}$**

A bag of marbles contains 3 yellow, 6 blue, 1 green, 12 red, and 8 orange marbles. Find each probability.

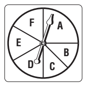
5. $P(\text{red})$ **$\frac{2}{5}$**
6. $P(\text{blue or yellow})$ **$\frac{3}{10}$**
7. $P(\text{not orange})$ **$\frac{11}{15}$**
8. $P(\text{yellow then blue, with replacement})$ **$\frac{1}{50}$**
9. $P(\text{green then red without replacement})$ **$\frac{2}{145}$**
10. $P(\text{yellow, yellow, orange, without replacement})$ **$\frac{2}{1{,}015}$**

The spinner shown is equally likely to stop on each of the sections. The spinner is spun twice. Find each probability.



11. $P(\text{multiple of 2, multiple of 3})$ **$\frac{5}{32}$**
12. $P(n > 10, n > 12)$ **$\frac{3}{32}$**
13. $P(\text{product is even})$ **$\frac{1}{2}$**
14. $P(\text{sum} = 20)$ **$\frac{13}{256}$**

A number cube is rolled and the spinner is spun. Find each probability.



15. $P(\text{6 and B})$ **$\frac{1}{48}$**
16. $P(\text{odd number and E})$ **$\frac{1}{12}$**
17. $P(n > 3 \text{ and A, B, or C})$ **$\frac{1}{4}$**
18. $P(n < 3 \text{ and vowel})$ **$\frac{5}{36}$**

APPLICATIONS ***Brianna, Mai-Lin, and Camila are playing a board game in which two number cubes are tossed to determine how far a player's game piece is to move.***

19. Brianna needs to move her piece 9 spaces to return it to base. What is the probability that she will roll 9? **$\frac{1}{9}$**
20. If Mai-Lin rolls doubles, then she gets to roll again. What is the probability that Mai-Lin will get to roll twice on her next turn? **$\frac{1}{6}$**

Glencoe/McGraw-Hill 68 Course 2 Intervention

SKILL 35

TEACHER NOTES

Theoretical and Experimental Probability

OBJECTIVE: Determine theoretical and experimental probabilities. (Strand: Data Analysis and Probability)

USING THE TRANSPARENCY: Have students discuss the meaning of theoretical probability and experimental probability.

USING THE STUDENT WORKBOOK: Have students work in small groups. Have each group choose one of the experiments mentioned in the Exercises and conduct a similar experiment.

EXTENSION: Have students design and carry out an experiment to solve the following problem: *A coach for the school softball team mixed up the hats of 6 players, and then handed them out to the players at random. Find the probability that at least one player gets her own hat.*

Transparency, Skill 35

SKILL 35 WARM UP

Theoretical and Experimental Probability

Trevor wants to determine the probability of getting heads when a coin is tossed. He decides to find both the theoretical and experimental probabilities.

The **theoretical probability** of getting heads, represented by $P(H)$, is the ratio of the number of ways to toss heads to the number of possible outcomes.

$P(H) = \frac{1}{2}$

To find the experimental probability of getting heads, Trevor tosses the coin 50 times and records the number of times it lands with heads facing up. He records 28 heads.

The **experimental probability** of getting heads is the ratio of the number of successful trials to the number of trials.

$\frac{28}{50} = \frac{14}{25}$

Another experiment may result in a different experimental probability.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 69

SKILL 35 Name ______________________ Date __________

Theoretical and Experimental Probability

The **theoretical probability** of an event is the ratio of the number of ways the event can occur to the number of possible outcomes.

The **experimental probability** of an event is the ratio of the number of successful trials to the number of trials.

EXAMPLE *Sean wants to determine the probability of getting a sum of 7 when rolling two number cubes. The sample space, or all possible outcomes, for rolling two number cubes is shown below.*

1, 1	1, 2	1, 3	1, 4	1, 5	1, 6
2, 1	2, 2	2, 3	2, 4	2, 5	2, 6
3, 1	3, 2	3, 3	3, 4	3, 5	3, 6
4, 1	4, 2	4, 3	4, 4	4, 5	4, 6
5, 1	5, 2	5, 3	5, 4	5, 5	5, 6
6, 1	6, 2	6, 3	6, 4	6, 5	6, 6

What is the theoretical probability of rolling a sum of 7? What is the experimental probability of rolling a sum of 7 if Sean rolls the number cubes 20 times and records 4 sums of 7?

There are 6 sums of 7 shown in the sample space above. So, the theoretical probability of rolling a sum of 7 is $\frac{6}{36}$ or $\frac{1}{6}$.

Since Sean rolled 4 sums of 7 on 20 rolls, the experimental probability is $\frac{4}{20}$ or $\frac{1}{5}$.

EXERCISES *Find the theoretical probability of each of the following.*

1. getting tails if you toss a coin $\frac{1}{2}$
2. getting a 6 if you roll a number cube $\frac{1}{6}$
3. getting a sum of 2 if you roll two number cubes $\frac{1}{36}$

Glencoe/McGraw-Hill 69 Course 2 Intervention

Student Workbook, p. 70

4. getting a sum less than 6 if you roll two number cubes $\frac{5}{18}$
5. Amanda rolled one number cube 30 times and got 8 sixes.
   a. What is her experimental probability of getting a six? $\frac{4}{15}$
   b. What is her experimental probability of *not* getting a six? $\frac{11}{15}$
6. Ramón rolled two number cubes 36 times and got 3 sums of 11.
   a. What is his experimental probability of getting a sum of 11? $\frac{1}{12}$
   b. What is his experimental probability of *not* getting a sum of 11? $\frac{11}{12}$

APPLICATIONS *While playing a board game, Akira rolled a pair of number cubes 48 times and got doubles 10 times.*

7. What was his experimental probability of rolling doubles? $\frac{5}{24}$
8. How does his experimental probability compare to the theoretical probability of rolling doubles?
   The experimental probability is slightly greater.
9. How do you think the experimental probability compares to the theoretical probability in most experiments?
   The experimental probability should be close to the theoretical probability.
10. Do you think the experimental probability is ever equal to the theoretical probability? Explain?
    Sample answer: Yes, especially if many trials are used.

Glencoe/McGraw-Hill 70 Course 2 Intervention

SKILL 36

TEACHER NOTES

Using Statistics to Make Predictions

OBJECTIVE: Use best-fit lines to make predictions based on data collected. (Strand: Data Analysis and Probability)

USING THE TRANSPARENCY: Review the concepts of slope, *y*-intercept, and slope-intercept form with students.

USING THE STUDENT WORKBOOK: Remind students that answers given are sample answers and may differ from their answers because of use of differing ordered pairs.

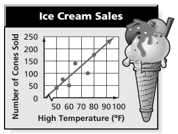
EXTENSION: Have students survey other students of varying ages and gather data on age and height. Use this data to predict the height for a 16-year-old.

Transparency, Skill 36

SKILL 36 WARM UP

Using Statistics to Make Predictions

A **best-fit line** is a line that is very close to most of the data points.



Use the information from the graph to write an equation in slope-intercept form for the best-fit line and then predict the number of ice cream cones sold in a day when the high temperature for the day is 92°F.

Step 1 First, select two points on the line and find the slope. Use (50, 40) and (80, 175).

$m = \frac{y_2 - y_1}{x_2 - x_1}$ *Definition of slope*

$= \frac{175 - 140}{80 - 50}$ *$x_1 = 50$, $y_1 = 40$, $x_2 = 80$, $y_2 = 175$*

$= 4.5$ *Simplify.*

Step 2 Find the *y*-intercept.

$y = mx + b$ *Slope-intercept form*

$175 = 4.5(80) + b$ *$y = 175$, $m = 4.5$, $x = 80$*

$-185 = b$ *Simplify.*

Step 3 Write the equation.

$y = mx + b$ *Slope-intercept form*

$y = 4.5x - 185$ *$m = 4.5$, $b = -185$*

Step 4 Predict the number of cones sold on a day where the high temperature is 92°F.

$y = 4.5(92) - 185$ *$x = 92$*

$= 229$ *Simplify.*

A prediction for the number of ice cream cones sold on a day when the high temperature is 92°F is 229 cones.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 71

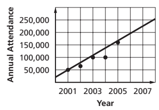
SKILL 36 Name ______________________ Date __________

Using Statistics to Make Predictions

When real-life data are collected in a statistical experiment, the points graphed usually do not form a straight line. They may, however, approximate a linear relationship. A **best-fit line** can be used to show such a relationship. A best-fit line is a line that is very close to most of the data points.

EXAMPLE ***Use the best-fit line to predict the annual attendance at Fun Times Amusement Park in 2007.***

Draw a line so that the points are as close as possible to the line. Extend the line so that you can find the *y* value for an *x* value of 2007. The *y* value for 2007 is about 225,000.



So, the annual attendance at Fun Times Amusement Park in 2007 is 225,000 people.

You can also write an equation of a best-fit line.

EXAMPLE ***Use the information from the example above. Write an equation in slope-intercept form for the best-fit line and then predict the annual attendance in 2008.***

Step 1 First, select two points on the line and find the slope. Choose (2001, 50,000) and (2003, 100,000).

$m = \frac{y_2 - y_1}{x_2 - x_1}$ *Definition of slope*

$= \frac{100{,}000 - 50{,}000}{2003 - 2001}$ *$x_1 = 2001$, $y_1 = 50{,}000$; $x_2 = 2003$, $y_2 = 100{,}000$*

$= 25{,}000$ *Simplify.*

Step 2 Find the *y*-intercept.

$y = mx + b$ *Slope-intercept form*

$50{,}000 = 25{,}000(2001) + b$ *$y = 50{,}000$, $m = 25{,}000$, $x = 2001$*

$-49{,}975{,}000 = b$ *Simplify.*

(Continued on the next page.)

Glencoe/McGraw-Hill 71 Course 2 Intervention

Student Workbook, p. 72

Step 3 Write the equation.

$y = mx + b$ Slope-intercept form

$y = 25{,}000x - 49{,}975{,}000$ $m = 25{,}000$, $b = -49{,}975{,}000$

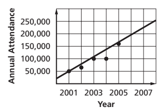
Step 4 Solve the equation.

$y = 25{,}000(2008) - 49{,}975{,}000$ $x = 2008$

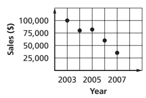
$-225{,}000$ *Simplify.*

The predicted annual attendance at Fun Times Amusement Park in 2008 is 225,000.

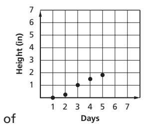
EXERCISES



1. Predict the sales figure for 2008.
   $25,000



2. What is the gas mileage for a car weighing 4,500 pounds? **12 miles per gallon**



3. How tall would a tomato plant be ten days after planting the seed? **3.5 inches**

APPLICATIONS

4. Use the graph in Exercise 2. Determine the equation of the best-fit line. Use it to predict the gas mileage for a car weighing 4,000 pounds.
   Sample answer: $y = -0.01x + 53$; 13 miles per gallon

5. Use the graph in Exercise 3. Determine the equation of the best-fit line. Use it to predict the height of the tomato plant 8 days after planting.
   Sample answer: $y = 0.25x + 0.25$; 2.25 inches

Glencoe/McGraw-Hill 72 Course 2 Intervention

SKILL 37

TEACHER NOTES

Mean, Median, and Mode

OBJECTIVE: Find the mean, median, and mode of a set of data. (Strand: Data Analysis and Probability)

USING THE TRANSPARENCY: Write the numbers 1, 2, 3, and 3 on the chalkboard. Have students describe how they would find the mean, median, and mode of the data.

USING THE STUDENT WORKBOOK: Write a set of data on 3″ × 5″ cards with one number on each card. Have pairs of students arrange the cards in order from least to greatest. Have them find the mean, median, and mode.

EXTENSION: Have students use newspapers and magazines to find real-world examples of mean, median, and mode. Have them discuss reasons as to why the mean, median, or mode was chosen to represent the specific data.

Transparency, Skill 37

SKILL 37 WARM UP

Mean, Median, and Mode

The table at the right shows Jeff Gordon's finishing positions in the NASCAR Championship. What was his average position for the years listed?

You can analyze this set of data by using three measures of **central tendency: mean, median**, and **mode**.

Finishing Position			
Year	Position	Year	Position
1993	14	1999	6
1994	8	2000	9
1995	1	2001	1
1996	2	2002	4
1997	1	2003	4
1998	1		

To find the mean, find the sum of the numbers. Then divide by the number of items.

$$\frac{14 + 8 + 1 + 2 + 1 + 1 + 6 + 9 + 1 + 4 + 4}{11} \approx 4.6$$

To find the median, arrange the numbers in order from least to greatest, and then find the middle number.

1 1 1 1 2 4 4 6 8 9 14

↑ median

To find the mode, find the number that appears most often. In this case, the mode is 1 since it appears the most times.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 73

SKILL 37 Name ____________ Date ______

Mean, Median, and Mode

You can analyze a set of data by using three measures of central tendency: **mean, median,** and **mode.**

EXAMPLE *Tim Duncan, 2003's Most Valuable Player in the National Basketball Association, helped the San Antonio Spurs win the NBA Championship. In winning the six games of the series, Duncan scored 32, 19, 21, 23, 29, and 21 points. Find the mean, median, and mode of his scores.*

Mean: $\frac{32 + 19 + 21 + 23 + 29 + 21}{6} \approx 24.167$

The mean is about 24 points.

Median: 19, 21, 21, 23, 29, 32

$\frac{21 + 23}{2} = 22$

The median is 22 points.

Mode: The mode is 21 since it is the number that appears the most times.

EXERCISES *Find the mean, median, and mode for each set of data.*

1. 2, 3, 7, 8, 10, 3, 1, 7, 5 **mean = 5.1; median = 5; mode = 3**
2. 17, 18, 20, 13, 23, 37, 20, 16 **mean = 20.5; median = 19; mode = 20**
3. 4.8, 6.4, 7.2, 4.5, 2.3, 6.0, 3.5 **mean = 5.0; median = 4.8; mode = none**
4. 82, 77, 82, 76, 79, 78, 81, 86 **mean = 80.1; median = 80; mode = 82**
5. 40, 42, 41, 43, 41, 40, 40, 42, 43 **mean = 41.3; median = 41; mode = 40**
6. \$7.50, \$7.00, \$8.50, \$7.50, \$4.50, \$6.50, \$8.00, \$6.00, \$4.50 **mean = \$6.67; median = \$7.00; mode = \$4.50 and \$7.50**

Glencoe/McGraw-Hill 73 Course 2 Intervention

Student Workbook, p. 74

7. 1.78, 1.45, 1.33, 1.72, 1.94, 1.73, 1.14 **mean = 1.58; median = 1.72; mode = none**
8. 3, −3, 1, 4, 5, 0, −4, −1, 2, −1 **mean = 0.6; median = 0.5; mode = −1**
9. 90%, 98%, 96%, 85%, 91%, 90%, 88%, 87%, 88%, 90% **mean = 90.3%; median = 90%; mode = 90%**
10. 5.8 cm, 8.9 cm, 8.8 cm, 8.6 cm, 8.8 cm, 8.8 cm, 8.9 cm **mean = 8.4 cm; median = 8.8 cm; mode = 8.8 cm**
11. \$50,000, \$37,500, \$43,900, \$76,900, \$46,000, \$48,580 **mean = \$50,480; median = \$47,290; mode = none**
12. 29.1°F, 33.9°F, 38.2°F, 46.5°F, 55.4°F, 62.0°F, 63.6°F, 62.3°F, 56.1°F, 47.2°F, 37.3°F, 32.0°F **mean = 47.0°F; median = 46.9°F; mode = none**

APPLICATIONS *The data at the right shows the ages of U.S. Presidents from 1900–2004 at the time of their inaugurations. Use this data to answer Exercises 13–16.*

58	42	51	56	55
51	54	51	60	62
43	55	56	61	52
69	64	46	54	

13. What is the mode of the data? **51 years old**
14. What is the mean of the data? **54.7 years old**
15. What is the median of the data? **55 years old**
16. If the age of each President was 1 year older, would it change
    a. the mean? Why or why not? **Yes, the mean would now be 55.7 years old because all the numbers increased but were still divided by 19.**
    b. the median? Why or why not? **Yes, the median would now be 56 years old because the center values increased by one.**
    c. the mode? Why or why not? **yes, the mode would be 52 years old because the most common ages would increase by one.**

Glencoe/McGraw-Hill 74 Course 2 Intervention

SKILL 38 TEACHER NOTES

Frequency Tables

OBJECTIVE: Organize data in a frequency table. (Strand: Data Analysis and Probability)

USING THE TRANSPARENCY: Ask students to identify the title and the column headings of the frequency table. Discuss why it is important to have these on a table.

USING THE STUDENT WORKBOOK: Ask students why intervals were used to organize the information in the example. Discuss why they think that intervals of $10,000 were used. Ask students what other intervals might be used.

EXTENSION: Have students conduct a survey of their classmates and organize the information in a frequency table.

Transparency, Skill 38

SKILL 38 WARM UP

Frequency Tables

Mr. Washington asked the students in his class how many hours they used a computer on Sunday. The results are listed below.

2 5 6 3 6 0 6 4 6 5 3 1 2

2 5 5 8 2 1 3 9 4 3 3 0

Make a frequency table to organize this information.

Mr. Washington's Class Sunday Computer Usage					
Number of Hours	Tally	Frequency	Relative Frequency	Cumulative Frequency	Relative Cumulative Frequency
0	II	2	$\frac{2}{25} = 00.8$	2	$\frac{2}{25} = 0.08$
1	II	2	$\frac{2}{25} = 0.08$	4	$\frac{4}{25} = 0.16$
2	IIII	4	$\frac{4}{25} = 0.16$	8	$\frac{8}{25} = 0.32$
3	卌	5	$\frac{5}{25} = 0.20$	13	$\frac{13}{25} = 0.52$
4	II	2	$\frac{2}{25} = 0.08$	15	$\frac{15}{25} = 0.60$
5	IIII	4	$\frac{4}{25} = 0.16$	19	$\frac{19}{25} = 0.76$
6	IIII	4	$\frac{4}{25} = 0.16$	23	$\frac{23}{25} = 0.92$
7		0	$\frac{0}{25} = 0.00$	23	$\frac{23}{25} = 0.92$
8	I	1	$\frac{1}{25} = 0.04$	24	$\frac{24}{25} = 0.96$
9	I	1	$\frac{1}{25} = 0.04$	25	$\frac{25}{25} = 1.00$

Student Workbook, p. 75

SKILL 38 Name ______________________ Date __________

Frequency Tables

There are four frequency values that can be considered.

absolute frequency: the frequency for an individual interval
relative frequency: the ratio of an interval's absolute frequency to the total number of elements
cumulative frequency: the sum of the absolute frequency of an interval and all previous absolute frequencies
relative cumulative frequency: the ratio of an interval's cumulative frequency to the total number of elements

EXAMPLE ***The base prices of new cars from one manufacturer are listed below.***

$24,625 $16,200 $22,225 $40,450 $35,050 $33,565 $44,535
$22,075 $24,370 $20,465 $9,995 $21,560 $25,330 $24,695
$28,105 $21,630 $22,145 $41,995 $28,905 $30,655 $10,700
$18,995 $20,060 $37,900 $22,080

Organize this information in a frequency table. Determine the absolute frequencies, relative frequencies, cumulative frequencies and relative cumulative frequencies for the data. Then find the range of the data.

Use intervals of 10,000 to organize the data.

New Car Prices					
Interval	Tally	Absolute Frequency	Relative Frequency	Cumulative Frequency	Relative Cumulative Frequency
$0–$9,999	|	1	$\frac{1}{25} = 0.04$	1	$\frac{1}{25} = 0.04$
$10,000–$19,999	|||	3	$\frac{3}{25} = 0.12$	4	$\frac{4}{25} = 0.16$
$20,000–$29,999	卌 卌 ||||	14	$\frac{14}{25} = 0.56$	18	$\frac{18}{25} = 0.72$
$30,000–$39,999	||||	4	$\frac{4}{25} = 0.16$	22	$\frac{22}{25} = 0.88$
$40,000–$49,999	|||	3	$\frac{3}{25} = 0.12$	25	$\frac{25}{25} = 1.00$

To determine the range, find the difference between the highest price and lowest price.
$44,535 − $9,995 = $34,540

Student Workbook, p. 76

EXAMPLE ***Organize the information in a frequency table. Determine the absolute frequencies, relative frequencies, cumulative frequencies, and relative cumulative frequencies for the data.***

1. Test scores of students in a classroom.
94, 81, 85, 59, 83, 73, 75, 96, 72, 87, 77, 88, 90, 65, 71, 82, 86, 89, 68, 96

Score	Tally	Absolute Frequency	Relative Frequency	Cumulative Frequency	Relative Cumulative Frequency
50–59	|	**1**	$\frac{1}{20} = 0.05$	**1**	$\frac{1}{20} = 0.05$
50–59	||	**2**	$\frac{2}{20} = 0.10$	**3**	$\frac{2}{20} = 0.15$
50–59	卌	**5**	$\frac{5}{20} = 0.25$	**8**	$\frac{8}{20} = 0.40$
50–59	卌 |||	**8**	$\frac{8}{20} = 0.45$	**16**	$\frac{16}{20} = 0.80$
50–59	||||	**4**	$\frac{4}{20} = 0.20$	**20**	$\frac{20}{20} = 1.00$

APPLICATIONS ***Use a frequency table to determine the absolute frequencies, relative frequencies, cumulative frequencies, and relative cumulative frequencies for the data.***

2. World Series champions from 1990–2003.

1990 Cincinnati Reds	1991 Minnesota Twins	1992 Toronto Blue Jays
1993 Toronto Blue Jays	1994 *Not Held*	1995 Atlanta Braves
1996 New York Yankees	1997 Florida Marlins	1998 New York Yankees
1999 New York Yankees	2000 New York Yankees	2001 Arizona Diamondbacks
2002 Anaheim Angels	2003 Florida Marlins	

SKILL 39

TEACHER NOTES

Circle Graphs

OBJECTIVE: Construct circle graphs. (Strand: Data Analysis and Probability)

USING THE TRANSPARENCY: Discuss the steps used in preparing a circle graph as the example is discussed. Survey the class according to telephone exchanges and express results in a circle graph.

USING THE STUDENT WORKBOOK: Have students find circle graphs in magazines and newspapers. Tell the students to pick a circle graph that gives the percent for each section. Have them use the percents to find the number of degrees of each section and then check the angles in the drawing with a protractor.

EXTENSION: Ask students what information a circle graph does *not* provide that another type of graph might provide.

Transparency, Skill 39

SKILL 39 WARM UP

Circle Graphs

The areas of the oceans are listed in the chart below.

Ocean	Pacific	Atlantic	Indian	Arctic
Area in millions of square miles	63.8	31.8	28.4	5.4

A **circle graph** shows how the whole is divided into parts. Make a circle graph to show what part of all the oceans is represented by each of the oceans.

First find the total area of the oceans.

$63.8 + 31.8 + 28.4 + 5.4 = 129.4$

Then find the ratio that compares the area of each of the oceans to the total area. Use a calculator. Round to the nearest hundred.

Pacific: $\frac{63.8}{129.4} \approx 0.49$ Atlantic: $\frac{31.8}{129.4} \approx 0.25$

Indian: $\frac{28.4}{129.4} \approx 0.22$ Arctic: $\frac{5.4}{129.4} \approx 0.04$

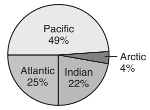
To find the number of degrees for each section of the graph, multiply each ratio by 360°. Round to the nearest degree.

Pacific: $0.49 \times 360° \approx 176°$ Atlantic: $0.25 \times 360° = 90°$

Indian: $0.22 \times 360° \approx 79°$ Arctic: $0.04 \times 360° \approx 14°$

Use a compass to construct a circle and a protractor to make angles that measure 176°, 90°, 79°, and 14°. Note that the sum of the degrees is *not* 360° due to rounding.

Area of Oceans



Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 77

SKILL 39 Name ______ Date ______

Circle Graphs

The air surrounding Earth is referred to as the atmosphere. Without air there would be no life on Earth. Air is a mixture of gases. By volume, dry air is composed of 78% nitrogen, 21% oxygen, and 1% other gases.

EXAMPLE *Make a circle graph to show the composition of the Earth's atmosphere.*

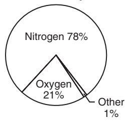
To make a circle graph, first find the number of degrees that correspond to each percent. Use a calculator and round to the nearest degree.

Nitrogen: 78% of 360° ≈ 281°
Oxygen: 21% of 360° ≈ 76°
Other: 1% of 360° ≈ 4°

Use a compass and a protractor to draw the circle graph.

Note that the sum of the degrees is *not* 360° because of rounding.

Earth's Atmosphere

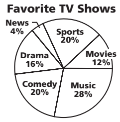


EXERCISES *Make a circle graph to show the data in each chart.*

1.

Favorite TV Shows	
Movies	12%
Sports	20%
News	4%
Drama	16%
Comedy	20%
Music	28%

Favorite TV Shows



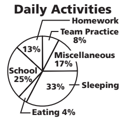
Glencoe/McGraw-Hill 77 Course 2 Intervention

Student Workbook, p. 78

2.

Daily Activities	
Sleeping	8 hours
Eating	1 hours
School	6 hours
Homework	3 hours
Team practice	2 hours
Miscellaneous	4 hours

Daily Activities

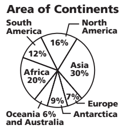


APPLICATIONS *Make a circle graph to show the data in each chart.*

3.

Area of Continents	
Continent	**Area in Millions of Square Miles**
Europe	3.8
Asia	17.4
North America	9.4
South America	6.9
Africa	11.7
Oceania and Australia	3.3
Antarctica	5.4

Area of Continents



4.

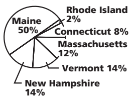
World Cup Winners	
Country	**Number of Wins**
Argentina	2
Brazil	4
England	1
Italy	3
Uruguay	2
West Germany	3

World Cup Winners

5.

Area of New England States	
State	**Area in Square Miles**
Maine	33,215
New Hampshire	9,304
Vermont	9,609
Massachusetts	8,257
Connecticut	5,009
Rhode Island	1,214

Area of New England States



6. Make a circle graph showing how you spent your time last Saturday. **See students' work.**

Glencoe/McGraw-Hill 78 Course 2 Intervention

SKILL 40

TEACHER NOTES

Stem-and-Leaf Plots

OBJECTIVE: Construct stem-and-leaf plots. (Strand: Data Analysis and Probability)

USING THE TRANSPARENCY: Ask students to name a number between 10 and 50. List their responses and ask the following questions.

- How could these numbers be organized based on the digits they have in common?
- How could you arrange the numbers to make organizing them easier?

USING THE STUDENT WORKBOOK: Point out to students that a stem-and-leaf plot is most useful for displaying data within a reasonably narrow range of stem values. Ask for examples of such data.

EXTENSION: Have students compare a stem-and-leaf plot with a line plot. Ask them to describe what they have in common and explain how they are different.

Transparency, Skill 40

SKILL 40 WARM UP

Stem-and-Leaf Plots

The projected populations of ten major world cities for the year 2015 are listed at the right. Make a stem-and-leaf plot for this data.

City	Projected Population 2015
Bombay	26,000,000
Calcutta	17,000,000
Dhaka	21,000,000
Jakarta	17,000,000
Karachi	19,000,000
Lagos	23,000,000
Mexico City	19,000,000
New York	17,000,000
Sao Paulo	20,000,000
Tokyo	26,000,000

A **stem-and-leaf** plot can be used to organize data. The greatest place value of the numbers is used to form the **stem**. The next greatest place value is used to form the **leaves**.

In this case, the stem will be the ten millions place value, and the leaves will be the millions place value. List the stem digits on the left and the leaf digits on the right. Include a statement that tells others what the numbers represent.

1 | 7 7 7 9 9
2 | 0 1 3 6 6

1 | 7 means 17,000,000 people.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 79

SKILL 40 Name ____________ Date ________

Stem-and-Leaf Plots

A **stem-and-leaf** plot is one way to organize a list of numbers. The **stems** represent the greatest place value in the numbers. The **leaves** represent the next place value.

EXAMPLE *The fourteen states with the most representatives in the House of Representatives are listed below. Make a stem-and-leaf plot for this data.*

State	Representatives	State	Representatives
California	52	New Jersey	13
Florida	23	New York	31
Georgia	11	North Carolina	12
Illinois	20	Ohio	19
Indiana	10	Pennsylvania	21
Massachusetts	10	Texas	30
Michigan	16	Virginia	11

The stem will be the tens place and the leaves will be the ones place.

1 | 00112369
2 | 013
3 | 01
4 |
5 | 2

1 | 0 means 10 representatives.

EXERCISES *Make a stem-and-leaf plot for each set of data.*

1. 56, 65, 57, 69, 58, 55, 52, 55, 66, 60, 53, 63

5 | 2 3 5 5 6 7 8
6 | 0 3 5 6 9
5 | 2 means 52

2. 230, 350, 260, 370, 240, 380, 290, 270, 220, 350, 300, 280

2 | 2 3 4 6 7 8 9
3 | 0 5 5 7 8
2 | 2 means 220

Glencoe/McGraw-Hill 79 Course 2 Intervention

Student Workbook, p. 80

3. 4.5, 6.8, 5.2, 5.9, 5.1, 6.7, 4.0, 4.4, 6.0, 6.9

4 | 0 4 5
5 | 1 2 9
6 | 0 7 8 9
4 | 0 means 4.0

7. 1,900, 2,000, 2,600, 3,000, 2,500, 1,800, 2,200, 2,700, 1,600, 1,700, 2,000, 2,300

1 | 6 7 8 9
2 | 0 0 2 3 5 6 7
3 | 0
1 | 6 means 1,600

APPLICATIONS *Each number below represents the age of workers at Fred's Fast Food.*
20 52 21 39 40 58 27 48 36 20 51 26
45 30 49 22 59 50 33 35 28 43 55 20
Use this data to answer Exercises 5–10.

5. Make a stem-and-leaf plot of the data.
2 | 0 0 0 1 2 6 7 8
3 | 0 3 5 6 9
4 | 0 3 5 8 9
5 | 0 1 2 5 8 9
2 | 0 means 20 years old.

6. How many people work at Fred's Fast Food?
24 people

7. What is the difference in the ages between the oldest and youngest workers at Fred's?
39 years

8. What is the most common age for a worker?
20 years old

9. Which age group is most widely represented?
the twenties

10. How many workers are older than 35 years?
13 workers

11. Measure the length of your classmates' shoes in centimeters. Record the numbers and make a stem-and-leaf plot.
See students' work.

12. What is the most common length of your classmates' shoes?
Answers will vary.

Glencoe/McGraw-Hill 80 Course 2 Intervention

SKILL 41

TEACHER NOTES

Misleading Graphs

OBJECTIVE: Investigate misleading graphs. (Strand: Data Analysis and Probability)

USING THE TRANSPARENCY: Have students make a list of things to check to determine whether a graph is presenting statistics in a misleading way.

USING THE STUDENT WORKBOOK: Ask students to explain how someone in advertising could use a misleading graph to sell a product. Have students look through magazines and newspapers for examples of graphs. Ask them to determine whether they were designed to support a particular point of view.

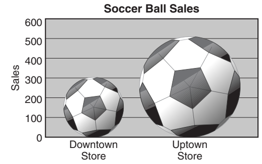
EXTENSION: Have students keep track of the closing price of several stocks for a couple of weeks. Have students make a misleading graph for the change in the stock value.

Transparency, Skill 41

SKILL 41 **WARM UP**

Misleading Graphs

The manager of the Uptown Store proudly shows his sales staff the graph below. Is this graph misleading in any way?



The Downtown Store sold about 300 soccer balls and the Uptown Store sold about 500 soccer balls. The Uptown Store sold less than twice the number sold by the Downtown Store. Yet, the soccer ball representing the sales at the Uptown Store is about three times as big as the soccer ball representing the Downtown Store. The graph is misleading to the casual observer who may think that the sales at the Uptown Store were three times greater than the sales at the Downtown Store.

The graph at the left is not complete. It does not give the units of measure on the vertical axis. It does not have a graph title and it does not indicate the number of people surveyed. Such a graph could be used to mislead people into thinking something that is not true.

Glencoe/McGraw-Hill Course 2 Intervention

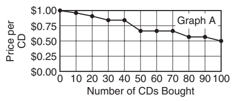
Student Workbook, p. 81

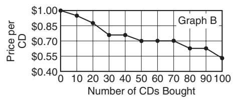
SKILL 41 Name ______ Date ______

Misleading Graphs

Graphs can be used to present data in ways that are misleading.

EXAMPLE ***A company that sells computer CDs wants to encourage customers to buy more by showing how much the price drops as they buy more CDs. Which of the following graphs is misleading? Which graph should the company use to encourage customers to buy more CDs?***

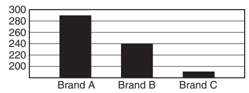




The vertical scale for Graph B does *not* begin with zero. Therefore, the drop in the cost of the CDs seems to be greater than the actual drop as shown in Graph A. Graph B is misleading.

Since the drop in the cost of the CDs seems greater in Graph B, this graph is more likely to encourage customers to buy more CDs.

EXERCISES ***Use the graph at the right to answer Exercises 1–3.***

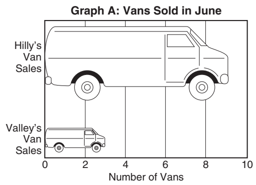


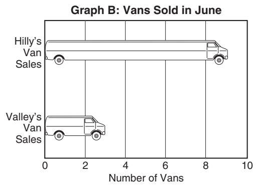
1. Which brand is the favorite of the greatest number of people?
   Brand A
2. Which brand is the favorite of the least number of people?
   Brand C
3. Why is this graph misleading?
   The scale does not start with zero. There are no labels.

Glencoe/McGraw-Hill 81 Course 2 Intervention

Student Workbook, p. 82

APPLICATIONS ***Use the graphs at the right to answer Exercises 4–11.***





4. Do Graphs A and B give the same information on sales?
   yes
5. Find the ratio of Hilly's sales to Valley's sales.
   about 3 to 1
6. In Graph A, the Hilly van is about 2.5 centimeters high by 6 centimeters long. What is its approximate area?
   15 cm²
7. In Graph A, the Valley van is about 0.75 centimeters high and 2 centimeters long. What is its approximate area?
   1.5 cm²
8. In Graph B, both vans are about 0.75 centimeter high. The Hilly van is about 6 centimeters long. What is its approximate area?
   4.5 cm²
9. In Graph B, the Valley van is about 2 centimeters long. What is its approximate area?
   1.5 cm²
10. Compute the following ratios.

    Graph A: $\frac{\text{Area of Hilly}}{\text{Area of Valley}}$ $\mathbf{\frac{10}{1}}$

    Graph B: $\frac{\text{Area of Hilly}}{\text{Area of Valley}}$ $\mathbf{\frac{3}{1}}$
11. Compare the results of Exercises 5 and 10. Which graph is misleading? Explain your answer.
    A; The actual number of vans sold by Hilly is 3 times greater, but Graph A appears to show the sales as 10 times greater.

Glencoe/McGraw-Hill 82 Course 2 Intervention

SKILL 42

TEACHER NOTES

Visualizing Information

OBJECTIVE: Solve problems by visualizing information using diagrams, graphs, or making models. (Source: Problem Solving)

USING THE TRANSPARENCY: Have students find graphs in magazines and newspapers. Discuss how the graphs help people to understand the data represented in the graphs.

USING THE STUDENT WORKBOOK: Supply groups of students with cubes so they can model the second example.

EXTENSION: Interior designers often make models or diagrams of a room to show various ways of arranging furniture. Have students pick a room and make a model or diagram to show at least two different room arrangements.

Transparency, Skill 42

SKILL 42 **WARM UP**

Visualizing Information

The zoo gift shop sells souvenir T-shirts. Last week, the shop sold 50 red T-shirts, 150 white T-shirts, 25 blue T-shirts, and 125 gray T-shirts. The manager wants to use this information to make decisions about displaying and ordering T-shirts. To help her make the decision, she makes a circle graph.

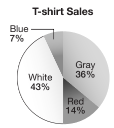
A total of 50 + 150 + 25 + 125 or 350 T-shirts were sold last week.

red $\frac{50}{350} \approx 14\%$

white $\frac{150}{350} \approx 43\%$

blue $\frac{25}{350} \approx 7\%$

gray $\frac{125}{350} \approx 36\%$



What color should take up the most space in the display?

Since white is represented by the greatest section of the graph, white T-shirts should take up the most space in the display.

Should the most popular color take up half of the display?

Since the greatest section of the graph is less than half the circle, the most popular color (white) should not take up half of the display.

Glencoe/McGraw-Hill   Course 2 Intervention

Student Workbook, p. 83

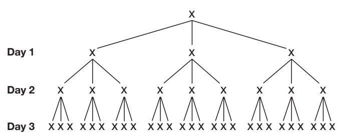
SKILL 42   Name ____________________ Date ________

Visualizing Information

Three possible ways to visualize information to solve problems are listed below.
• Draw a Diagram • Use a Graph • Make a Model

EXERCISES ***On the first day, Derrick e-mailed a joke to 3 of his friends. On the second day, each of these friends e-mailed 3 other people. On the third day, each of the people who read the joke on the second day e-mailed 3 more people. By the end of the third day, how many people read the joke?***

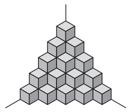
To solve the problem, draw a diagram.



Count the number of Xs in Day 1, Day 2, and Day 3. By the end of the third day 39 people read the joke. Note that the first person e-mailed the joke, but did not read it, during the three days.

EXAMPLE ***Identical boxes are stacked in the corner of a room as shown below. How many boxes are there altogether?***

Make a model using cubes and count the number of cubes.



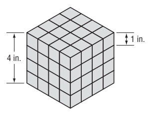
If you modeled the problem correctly, there should be 35 boxes.

Glencoe/McGraw-Hill   83   Course 2 Intervention

Student Workbook, p. 84

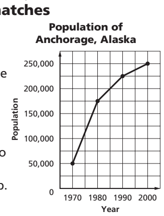
EXERCISES *Solve.*

1. How many different shapes of rectangular prisms can be formed using exactly 18 cubes? **4 shapes**
2. Six points are marked around a circle. How many straight lines must you draw to connect every point with every other point? **15 lines**
3. A cube with edges 4 inches long is painted on all six sides. Then, the cube is cut into smaller cubes with edges 1 inch long as shown at the right.
   a. How many of the smaller cubes are painted on only one side? **24 cubes**
   b. How many of the smaller cubes are painted on exactly two sides? **24 cubes**
   c. How many of the smaller cubes have no sides painted? **8 cubes**

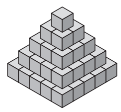


APPLICATIONS

4. Coach Robinson is the tennis coach. He wants to schedule a round-robin tournament where every player plays every other player in singles tennis. If there are 8 members on the team, how many matches should the coach schedule? **28 matches**
5. The graph shows the population growth of Anchorage, Alaska.
   a. During what 10-year period did Anchorage show the greatest growth in population? **1970 to 1980**
   b. What would you estimate the population will be in 2010? **Sample answer: 300,000**



6. Halfway through her plane flight from New York City to Orlando, Emma fell asleep. When she awoke, she still had to travel half the distance she traveled when asleep. For what fraction of the flight was Emma asleep? $\mathbf{\frac{1}{3}}$
7. Emilio wants to make a pyramid-shaped display of soccer balls for his sporting goods store. How many boxes of soccer balls will he need to make a display like the one at the right? **55 boxes**



Glencoe/McGraw-Hill   84   Course 2 Intervention

SKILL 43

TEACHER NOTES

Compare and Order Rational Numbers

OBJECTIVE: Compare and order rational numbers on a number line. (Strand: Number & Operations)

USING THE TRANSPARENCY: Have students discuss times when they have needed to convert between fractions and decimals. Examples could include reading street signs (often fractions) and comparing it to the odometer reading (decimals).

USING THE STUDENT WORKBOOK: Have students discuss which strategy in the examples they often use and which they should practice using more.

EXTENSION: Create a set of index cards that shows decimals and fractions. Have a student deal three cards to another student. That student then orders the numbers.

Transparency, Skill 43

SKILL 43 WARM UP

Compare and Order Rational Numbers

Miguel has gone to the market for his mother. She gives him the following shopping list.

0.5 pounds of chicken

$\frac{3}{4}$ cup of almonds

$1\frac{1}{4}$ pounds of tomatoes

When he gets to the store he finds that some of the items are not given in fractions or decimals. He needs to make sure he purchases enough of each item for dinner. For example, when he puts tomatoes on the scale, the weight is given in decimals.

The bag of tomatoes he has on the scale reads 1.15. Does he have enough for his mom's shopping list?

Convert $1\frac{1}{4}$ to a decimal.

$1 + \frac{1}{4}$

$1 + 0.25$

1.25

Since the scale reads 1.15, Miguel needs to add at least one more tomato so he has over 1.25 pounds.

You can use this strategy and others to compare and order rational numbers.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 85

SKILL 43 Name ______________________ Date __________

Compare and Order Rational Numbers

EXAMPLE ***Here are strategies to compare two rational numbers and determine which is greater.***

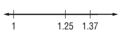
Strategy 1: Convert both numbers to decimals and see which is greater. This strategy is useful when the numbers you want to compare are decimals, fractions whose denominators are powers of 10, or fractions whose decimal equivalents you already know.

Example: Which is greater, $\frac{5}{4}$ or $1\frac{37}{100}$?

$\frac{5}{4}$ is the same as $1\frac{1}{4}$ or 1.25.

$1\frac{37}{100}$ in decimal form is 1.37.

1.25 is less than 1.37 because the two numbers both have 1 one, but 1.37 has 3 tenths, while 1.25 only has 2 tenths. So 1.37 is greater.



Strategy 2: Compare both numbers to a benchmark number. This strategy is useful when you can find a benchmark number that you know is greater than one of the numbers you are comparing and less than the other.

Example: Which is greater, -0.2 or $-\frac{3}{4}$?

Find a benchmark number that you can compare to both numbers.

$-\frac{1}{2}$ is less than -0.2. $-\frac{1}{2}$ is also greater than $-\frac{3}{4}$.

Since $-0.2 > -\frac{1}{2} > -\frac{3}{4}$, -0.2 must be greater than $-\frac{3}{4}$.

Strategy 3: Rewrite both numbers as fractions with a common denominator and compare them. This strategy is useful for fractions that are not easy to rewrite as decimals.

Example: Which is greater, $\frac{3}{12}$ or $\frac{5}{21}$?

Factor 12 and 21 to find the least common denominator.

Rewrite $\frac{3}{12}$ and $\frac{5}{21}$ with a common denominator of 84.

$\frac{3}{12} \times \frac{7}{7} = \frac{21}{84}$ $\frac{5}{21} \times \frac{4}{4} = \frac{20}{84}$

$\frac{21}{84} > \frac{20}{84}$, so $\frac{3}{12} > \frac{5}{21}$

Glencoe/McGraw-Hill 85 Course 2 Intervention

Student Workbook, p. 86

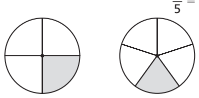
EXAMPLE

Strategy 4: Reason about the relative sizes of the numbers being compared.

Example: Which is greater, $\frac{3}{4}$ *or* $\frac{4}{5}$?

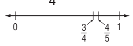
You know that fourths are larger than fifths, because if you cut an object into 5 equal pieces, the pieces must be smaller than if you cut the same object into only
4 pieces.

$\frac{3}{4} = 1 - \frac{1}{4}$ $\frac{4}{5} = 1 - \frac{1}{5}$

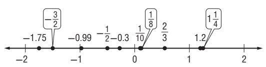


$\frac{4}{5}$ has less missing; it is closer to 1 than $\frac{3}{4}$.

So, $\frac{4}{5}$ is greater than $\frac{3}{4}$.



EXERCISES ***Show the approximate place of each number on the number line.***



1. 1.2 2. $-\frac{1}{2}$ 3. 0.1

4. -0.99 5. $-\frac{3}{2}$ 6. $\frac{1}{8}$

7. -1.75 8. $\frac{2}{3}$ 9. -0.3

Glencoe/McGraw-Hill 86 Course 2 Intervention

SKILL 44

TEACHER NOTES

Approximate Irrational Numbers

OBJECTIVE: To approximate irrational numbers. (Strand: Number & Operations)

USING THE TRANSPARENCY: Have students discuss instances where they may need to approximate an irrational number.

USING THE STUDENT WORKBOOK: Have students discuss how they know their approximation is getting closer to the irrational number.

EXTENSION: Create a set of index cards with irrational numbers. Place students in pairs and see who can use the fewest number of steps to find the best approximation of the number.

Transparency, Skill 44

SKILL 44 WARM UP

Approximate Irrational Numbers

Jason and Matthew are helping fence off a section of their yards for a garden. Both are fencing off a section across the corner of a fence, forming the hypotenuse of a triangle. Jason calculates he will need $\sqrt{41}$ feet of fence to form this hypotenuse. Matthew calculates he needs 6.2 feet.

Does Jason need more or less fencing than Matthew?

Since 6^2 is 36 and 7^2 is 49, $\sqrt{41}$ falls between these two values.

Jason makes a first estimate of 6.5.

6.5^2 is 42.25, greater than 41.

He then tries 6.3 and gets 39.69, which is less than 41.

Trying 6.4, he gets 40.96, which is really close to 41.

So, Jason needs 6.4 feet of fencing, which is greater than 6.2.
He needs more fencing than Matthew.

Student Workbook, p. 87

SKILL 44 Name ______________ Date ________

Approximate Irrational Numbers

EXAMPLE ***Estimate the decimal equivalent to $\sqrt{13}$. Write your answer with two digits to the right of the decimal point.***

Find the two perfect squares that are closest to 13.

$3^2 = 9$
$4^2 = 16$

Since $9 < 13 < 16$, $\sqrt{13}$ must be greater than $\sqrt{9}$ and less than $\sqrt{16}$. So, $3 < \sqrt{13} < 4$.

Approximate. Since 13 is a little closer to 16 than to 9, so you could start with 3.7 as your first estimate.

Test your estimate.
$(3.7)^2 = 13.69$

Revise your estimate. 3.7 was close, but greater than 13. What about 3.6?
$(3.6)^2 = 12.96$

3.6 is a very good estimate, but it only has one digit to the right of the decimal point. So you need to refine your answer again.

3.6 was only a tiny bit less than 13, so you could try 3.61 as your next estimate.

$(3.61)^2 = 13.03$

3.61 is just a little closer than 3.60, so your final estimate is 3.61.

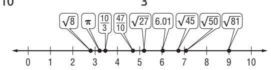
Student Workbook, p. 88

EXERCISES ***Estimate each irrational number. Write your answers with two digits to the right of the decimal point.***

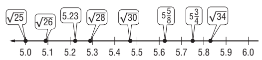
1. $\sqrt{7}$ **2.65**
2. $\sqrt{115}$ **10.72**
3. $\sqrt{30}$ **5.48**
4. $\sqrt{3}$ **1.73**
5. $\sqrt{90}$ **9.49**
6. $\sqrt{65}$ **8.06**
7. $\sqrt{21}$ **4.58**
8. $\sqrt{83}$ **9.11**
9. $\sqrt{42}$ **6.48**
10. $\sqrt{175}$ **13.23**

APPLICATIONS ***In each exercise below, place all of the numbers in their approximate locations on the number line***

11. $\sqrt{45}$, 6.01, $\sqrt{8}$, $\frac{47}{10}$, $\sqrt{81}$, $\sqrt{27}$, $\sqrt{50}$, π, $\frac{10}{3}$



12. $\sqrt{34}$, $5\frac{5}{8}$, $\sqrt{30}$, $\sqrt{28}$, 5.23, $\sqrt{25}$, $5\frac{3}{4}$, $\sqrt{26}$



SKILL 45 TEACHER NOTES

Square Roots

OBJECTIVE: Find and estimate square roots of numbers. (Strand: Algebra)

USING THE TRANSPARENCY: Write the numbers 4, 9, 16, 25, and 36 on the chalkboard. Have the students discuss what these numbers have in common. Then have them describe how they would find the square root of each number.

USING THE STUDENT WORKBOOK: Have students work in pairs. Have one student state a number that is not a perfect square. Have the other student find the best approximate square root.

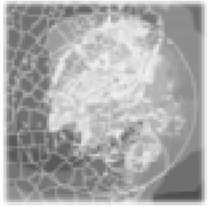
EXTENSION: Have students work in pairs. One student rolls three number cubes and forms a three-digit number. The other student finds the square root of that number.

Transparency, Skill 45

SKILL 45 **WARM UP**

Square Roots

A weather radar system can cover a circular region of 11,500 square miles. What is the range of the radar?



Use the formula for the area of a circle, $A = \pi r^2$, to find the radius of the circle, which is the range of the radar.

$a = \pi r^2$

$11{,}500 \approx 3.14 \times r^2$ *Use 3.14 for π.*

$\frac{11{,}500}{3.14} \approx \frac{3.14 \times 4\, r^2}{3.14}$ *Divide each side by 3.14.*

$3{,}662 \approx r^2$ *Simplify.*

$\sqrt{3{,}662} \approx \sqrt{r^2}$ *Take the square root of each side.*

3,662 is approximately 3,600, and $3{,}600 = 60^2$.

$60 \approx r$

The range of the weather radar is about 60 miles.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 89

SKILL 45 Name ______________ Date ________

Square Roots

If $a^2 = b$, then a is the **square root** of b. Square roots use the symbol $\sqrt{\ }$. Thus, the square root of b would be written $\sqrt{b}$.

EXAMPLE *Find the square root of each number.*

36
Since $6^2 = 36$, $\sqrt{36} = 6$.

100
Since $10^2 = 100$, $\sqrt{100} = 10$.

Numbers like 4, 9, 25, and 49 are called **perfect squares** because their square roots are whole numbers.

You can find an estimate for numbers that are not perfect squares.

EXAMPLE *Estimate $\sqrt{95}$ to the nearest whole number.*

The closest perfect square less than 95 is 81.
The closest perfect square greater than 95 is 100.

$81 < 95 < 100$

$\sqrt{81} < \sqrt{95} < \sqrt{100}$

$\sqrt{9^2} < \sqrt{95} < \sqrt{10^2}$

$9 < \sqrt{95} < 10$

So, $\sqrt{95}$ is between 9 and 10. Since 95 is closer to 100 than to 81, the best whole number estimate for $\sqrt{95}$ is 10.

EXERCISES *Find each square root.*

1. $\sqrt{25}$ **5**	2. $\sqrt{49}$ **7**	3. $\sqrt{16}$ **4**	4. $\sqrt{196}$ **14**
5. $\sqrt{256}$ **16**	6. $\sqrt{121}$ **11**	7. $\sqrt{225}$ **15**	8. $\sqrt{484}$ **22**
9. $\sqrt{529}$ **23**	10. $\sqrt{144}$ **12**	11. $\sqrt{576}$ **24**	12. $\sqrt{900}$ **30**

Glencoe/McGraw-Hill 89 Course 2 Intervention

Student Workbook, p. 90

13. $\sqrt{39}$ **6**	14. $\sqrt{106}$ **10**	15. $\sqrt{71}$ **8**	16. $\sqrt{30}$ **5**
17. $\sqrt{15}$ **4**	18. $\sqrt{155}$ **12**	19. $\sqrt{200}$ **14**	20. $\sqrt{250}$ **16**
21. $\sqrt{500}$ **22**	22. $\sqrt{297}$ **17**	23. $\sqrt{340}$ **18**	24. $\sqrt{422}$ **21**
25. $\sqrt{803}$ **28**	26. $\sqrt{644}$ **25**	27. $\sqrt{975}$ **31**	28. $\sqrt{2{,}018}$ **45**

APPLICATIONS *The area of the floor of a square room is 324 square feet. Use this information to answer Exercises 29–31.*

29. What is the length of each side of the floor? **18 feet**

30. If a square carpet with an area of 144 square feet is placed in the center of the room, what is the width of the floor that is uncovered on each side of the carpet? **3 feet**

31. How many 9-inch square tiles would be required to cover the entire floor? **576 tiles**

32. The area of a square is 1,225 square centimeters. What is the perimeter of the square? **140 centimeters**

33. A bag of Super Green Lawn Fertilizer covers 9,500 square feet. What is the largest square lawn that can be fertilized using one bag of fertilizer? Round to the nearest foot. **97 feet by 97 feet**

34. Trees in orchards are often planted evenly spaced apart in square plots. How many rows of trees are in a plot that contains 1,024 trees? **32 rows**

35. A square playground has an area of 750 square meters. Approximately how much fencing would be required to enclose the playground? **about 108 meters**

Glencoe/McGraw-Hill 90 Course 2 Intervention

SKILL 46

TEACHER NOTES

The Pythagorean Theorem

OBJECTIVE: Use the Pythagorean Theorem to find the length of a side of a right triangle. (Strand: Geometry)

USING THE TRANSPARENCY: Have students estimate the answer before completing the problem.

USING THE STUDENT WORKBOOK: Make certain that students are comfortable using their calculators to find both squares and square roots of numbers correctly.

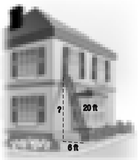
EXTENSION: Have students work in pairs. One student should draw a triangle and label the two sides. The second student should find the hypotenuse.

Transparency, Skill 46

SKILL 46 WARM UP

The Pythagorean Theorem

Kamara needs to repair a broken shutter on the outside of her house. The shutter is hanging 18 feet above the ground. Kamara places a 20-foot ladder against the side of her house with the foot of the ladder placed 6 feet from the base of the house. Will the top of the ladder be high enough to reach the broken shutter?



The diagram shows that this situation involves a right triangle. The distance from the foot of the ladder to the base of the house is one of the legs of the right triangle and the length of the ladder is the hypotenuse. We need to find how high the ladder will reach, which is the length of the missing leg.

To solve the problem, use the Pythagorean Theorem.

$c^2 = a^2 + b^2$	*Pythagorean Theorem*
$20^2 = 6^2 + b^2$	*Replace c with 20 and a with 6.*
$400 = 36 + b^2$	*Evaluate 20^2 and 6^2.*
$400 - 36 = 36 + b^2 - 36$	*Subtract 36 from each side.*
$364 = b^2$	*Simplify.*
$\sqrt{364} = \sqrt{b^2}$	*Take the square root of each side.*
$19.1 \approx b$	*Round to the nearest tenth.*

So, the top of the ladder reaches 19.1 feet up the house. This is high enough to reach the broken shutter, which is 18 feet off the ground.

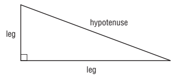
Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 91

SKILL 46 Name ____________ Date ________

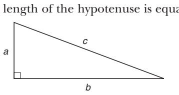
The Pythagorean Theorem

In a right triangle, the sides that form a right angle are called **legs**. The side opposite the right angle is the **hypotenuse**.



The **Pythagorean Theorem** describes the relationship between the lengths of the legs and the hypotenuse. This theorem is true for any right triangle.

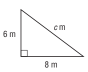
The Pythagorean Theorem states that if a triangle is a right triangle, then the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the legs.



$c^2 = a^2 + b^2$, where a and b represent the lengths of the legs and c represents the length of the hypotenuse.

If you know the lengths of two sides of a right triangle, you can use the Pythagorean Theorem to find the length of the third side. This is called **solving a right triangle**.

EXAMPLE *Find the length of the hypotenuse of the right triangle.*



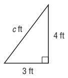
$c^2 = a^2 + b^2$	*Pythagorean Theorem*
$c^2 = 6^2 + 8^2$	*Replace a with 6 and b with 8.*
$c^2 = 36 + 64$	*Evaluate 6^2 and 8^2.*
$c^2 = 100$	*Add 36 and 64.*
$\sqrt{c^2} = \sqrt{100}$	*Take the square root of each side.*
$c = 10$	*Simplify.*

The length of the hypotenuse is 10 meters.

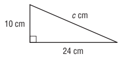
Glencoe/McGraw-Hill 91 Course 2 Intervention

Student Workbook, p. 92

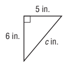
EXERCISES *In Exercises 1–6, find the length of the missing side.*

1.


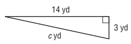
5 ft

2.


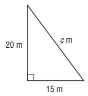
26 cm

3.


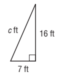
7.8 in

4.


14.3 yd

5.


25 m

6.


17.5 ft

If c is the measure of the hypotenuse, find each missing measure. Round to the nearest tenth, if necessary.

7. $a = 12$, $b = ?$, $c = 18$ **13.4**

8. $a = ?$, $b = 7$, $c = 12$ **9.7**

9. $a = ?$, $b = 24$, $c = 32$ **21.2**

10. $a = 8$, $b = ?$, $c = 15$ **12.7**

11. $a = 42$, $b = ?$, $c = 60$ **42.8**

12. $a = ?$, $b = 16$, $c = 20$ **12**

APPLICATIONS

13. Zach is working on a hat which involves a pattern made by fitting together pieces of fabric in the shape of right triangles. Each of the pieces of fabric has legs measuring 8 inches and 10 inches. Find the hypotenuse of each piece of fabric. Round to the nearest tenth. **12.8 inches**

14. Breanna is building a new house on a plot of land that is shaped like a right triangle. One of the legs of the plot measures 48 feet, and the hypotenuse measures 82 feet. Find the length of the other leg. Round to the nearest tenth. **66.5 feet**

Glencoe/McGraw-Hill 92 Course 2 Intervention

SKILL 47

TEACHER NOTES

Triangles and Quadrilaterals

OBJECTIVE: Classify triangles and quadrilaterals. (Strand: Geometry)

USING THE TRANSPARENCY: Have groups of students cut out three different triangles and place them with the triangles of other group members. Then have the groups exchange triangles and sort them first by angle measures, then by sides.

USING THE STUDENT WORKBOOK: Draw different quadrilaterals on note cards. Have one student pick a card without showing it to the class. Have students describe the quadrilateral and another student draw it on the chalkboard.

EXTENSION: Have the students create Venn diagrams showing the relationship of various quadrilaterals.

Transparency, Skill 47

SKILL 47 WARM UP

Triangles and Quadrilaterals

Triangles may be classified by the measures of their angles.

acute
All three angles are acute.

obtuse
One angle is an obtuse angle.

right
One angle is a right angle.

Triangles may also be classified by the lengths of their sides.

scalene
All sides are different lengths.

isosceles
At least two sides are the same length.

equilateral
All three sides are the same length.

Quadrilaterals can also be classified using sides and angles.

trapezoid
One pair of sides is parallel.

parallelogram
Opposite sides are parallel.

rectangle
Opposite sides are parallel and all four angles are right angles.

rhombus
Opposite sides are parallel, and all four sides are the same length.

square
All four sides are the same length, and all four angles are right angles.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 93

SKILL 47 Name ______ Date ______

Triangles and Quadrilaterals

A triangle is a polygon with three angles and three sides. Triangles may be classified by the measures of their angles or by the lengths of their sides.

Triangles			
Classification by Angles		Classification by Sides	
Acute	all angles acute	Scalene	all sides different lengths
Obtuse	one obtuse angle	Isosceles	at least two sides the same length
Right	one right angle	Equilateral	three sides the same length

A quadrilateral is a polygon with four angles and four sides. Sides and angles are also used to classify quadrilaterals.

Quadrilaterals	
Trapezoid	only one pair of parallel sides
Parallelogram	both pairs of opposite sides parallel
Rectangle	parallelogram with four right angles
Rhombus	parallelogram with four sides the same length
Square	parallelogram with four right angles and four sides the same length

EXAMPLE *Identify each polygon.*

There are two pairs of opposite parallel sides. This quadrilateral is a parallelogram.

One of the angles is obtuse and two of the sides are the same length. This triangle is obtuse and isosceles.

One of the angles is a right angle and none of the sides are the same length. This triangle is right and scalene.

One pair of sides is parallel. This quadrilateral is a trapezoid.

Glencoe/McGraw-Hill 93 Course 2 Intervention

Student Workbook, p. 94

EXERCISES *Classify each triangle by its angles and by its sides.*

1. **acute, isosceles**
2. **right, isosceles**
3. **obtuse, scalene**
4. **obtuse, isosceles**
5. **acute, equilateral**
6. **right, scalene**

Name every quadrilateral that describes each figure. Then state which name best describes the figure.

7. **parallelogram rhombus; rhombus**
8. **trapezoid; trapezoid**
9. **parallelogram, rectangle; rectangle**
10. **parallelogram; parallelogram**
11. **parallelogram, rectangle, rhombus, square; square**
12. **parallelogram; parallelogram**

APPLICATIONS *Name two real-world examples of each figure.*

13. equilateral triangle
14. trapezoid
15. rectangle
16. right scalene triangle
17. obtuse triangle
18. rhombus
19. square
20. acute isosceles triangle

Glencoe/McGraw-Hill 94 Course 2 Intervention

SKILL 48

TEACHER NOTES

Ratio and Proportion

OBJECTIVE: Write and solve ratios and proportions. (Strand: Algebra)

USING THE TRANSPARENCY: Show students different ways to set up a proportion that would still yield the correct answer.

USING THE STUDENT WORKBOOK: Have students work in groups to create pairs of ratios that are proportions.

EXTENSION: Work as a class to make a list of real-life situations that require working with proportions.

Transparency, Skill 48

SKILL 48 WARM UP

Ratio and Proportion

A **proportion** is an equation that states that two ratios are equal. In a proportion, the cross products are equal.

If one term of a proportion is not known, you can use cross products to find the term. This is called solving the proportion.

In a recent marketing research survey taken by the Better Flavor Ice Cream Company, five-eighths of the 512 people surveyed chose chocolate chip as their favorite ice cream flavor. Write and solve a proportion to find the number of people who selected chocolate chip as their favorite ice cream flavor.

Let p represent the number of people who selected chocolate chip as their favorite flavor of ice cream.

Write a proportion.

$$\frac{5}{8} = \frac{p}{512}$$

$5(512) = 8(p)$ *Cross multiply.*

$2{,}560 = 8p$ *Multiply.*

$\frac{2{,}560}{8} = \frac{8p}{8}$ *Divide each side by 8.*

$320 = p$

320 people selected chocolate chip as their favorite flavor of ice cream.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 95

SKILL 48 Name ______________ Date ________

Ratio and Proportion

A **ratio** is a comparison of two numbers by division.

EXAMPLE ***In a class of 25 students there are 12 girls and 13 are boys. Write the relationship of the number of girls to the number of boys as a ratio.***

The ratio of girls to boys can be written as 12 to 13, 12:13, or $\frac{12}{13}$.

A **proportion** is a statement that two ratios are equal. In symbols, this can be shown by $\frac{a}{b} = \frac{c}{d}$. The cross products of a proportion, ad and bc, are equal.

EXAMPLE ***Determine if the ratios $\frac{3}{5}$ and $\frac{12}{20}$ form a proportion.***

Find the cross products of $\frac{3}{5} = \frac{12}{20}$.

$\frac{3}{5} \stackrel{?}{=} \frac{12}{20}$ *Write the proportion.*

$3(20) \stackrel{?}{=} 5(12)$ *Cross multiply.*

$60 = 60$ *Simplify.*

So, $\frac{3}{5}$ and $\frac{12}{20}$ form a proportion.

If one term of a proportion is not known, you can use the cross products to set up an equation to solve for the unknown term. This is called **solving the proportion**.

EXAMPLE ***Solve the proportion $\frac{8}{12} = \frac{x}{15}$.***

$\frac{8}{12} = \frac{x}{15}$ *Write the proportion.*

$8(15) = 12(x)$ *Cross multiply.*

$120 = 12(x)$

$\frac{120}{12} = \frac{12(x)}{12}$ *Divide each side by 12.*

$10 = x$

Glencoe/McGraw-Hill 95 Course 2 Intervention

Student Workbook, p. 96

EXERCISES *Express each ratio as a fraction in simplest form.*

1. 12 pennies to 18 coins $\mathbf{\frac{2}{3}}$
2. 15 bananas out of 25 fruits $\mathbf{\frac{3}{5}}$
3. 32 footballs to 40 basketballs $\mathbf{\frac{4}{5}}$
4. 6 cups to 14 pints $\mathbf{\frac{3}{7}}$
5. 8 clarinets out of 15 instruments $\mathbf{\frac{8}{15}}$
6. 16 tulips out of 24 flowers $\mathbf{\frac{2}{3}}$
7. 12 novels out of 27 books $\mathbf{\frac{4}{9}}$
8. 9 poodles to 12 beagles $\mathbf{\frac{3}{4}}$

Solve each proportion.

9. $\frac{a}{12} = \frac{3}{9}$ **4**
10. $\frac{8}{b} = \frac{12}{21}$ **14**
11. $\frac{24}{36} = \frac{c}{15}$ **10**
12. $\frac{27}{6} = \frac{18}{d}$ **4**
13. $\frac{7}{8} = \frac{e}{56}$ **49**
14. $\frac{27}{36} = \frac{6}{f}$ **8**

APPLICATIONS

15. If 8 gallons of gasoline cost \$11.20, how much would 10 gallons cost? **\$14.00**
16. A recipe for punch calls for 4 cups of lemonade for every 6 quarts of fruit juice. How many quarts of fruit juice should Elizabeth use if she has already added 10 cups of lemonade? **15 quarts**
17. On a map, the scale is 1 inch equals 160 miles. What is the actual distance if the map distance is $3\frac{1}{2}$ inches? **560 miles**
18. One bag of jelly beans contains 14 red jelly beans. How many red jelly beans would be found in 4 bags of jelly beans? **56 red jelly beans**

Glencoe/McGraw-Hill 96 Course 2 Intervention

SKILL 49

TEACHER NOTES

Proportional Reasoning

OBJECTIVE: Solve problems using proportional reasoning. (Strand: Algebra)

USING THE TRANSPARENCY: Emphasize the importance of setting up the proportions correctly. The pattern established in the first ratio must be used in the second ratio.

USING THE STUDENT WORKBOOK: Provide grocery advertisements to groups of students. Have each group make up two problems using proportions. Have the groups exchange problems. Then have the students solve the problems.

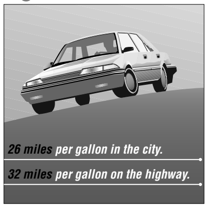
EXTENSION: Have students plan a party for your class. Then create proportions to expand the party shopping list to include more students or more classes.

Transparency, Skill 49

SKILL 49 **WARM UP**

Proportional Reasoning

D'andre wants to buy a new car. He studies the information about the car he wants before he makes the purchase. He is particularly interested in the miles per gallon the car is expected to get. He usually drives about 130 miles in the city each week. How many gallons of gasoline will D'andre need each week?



You can solve this problem by using a proportion.

miles → / gallons → $\frac{26}{1} = \frac{130}{g}$ ← miles / ← gallons	*Write a proportion.*
$(26)(g) = (1)(130)$	*Cross multiply.*
$26g = 130$	*Simplify.*
$\frac{26g}{26} = \frac{130}{26}$	*Divide each side by 26.*
$g = 5$	*Simplify.*

D'andre will need 5 gallons of gasoline each week to travel in the city.

Glencoe/McGraw-Hill   Course 2 Intervention

Student Workbook, p. 97

SKILL 49   Name ________________ Date ________

Proportional Reasoning

Super Value Grocery has a special on oranges this week. The price is 99¢ for 6 oranges.

EXAMPLE ***How many oranges can Daniel buy for $3.30?***

oranges / cost(¢) → $\frac{6}{99} = \frac{x}{330}$ ← oranges / cost(¢)	*Write a proportion.*
$(6)(330) = 99(x)$	*Cross multiply.*
$1{,}980 = 99x$	*Simplify.*
$\frac{1{,}980}{99} = \frac{99x}{99}$	*Divide each side by 99.*
$20 = x$	*Simplify.*

Daniel can buy 20 oranges.

EXERCISES ***Write a proportion to solve each problem. Then solve.***

1. 32 ounces of juice are required to make 2 gallons of punch. 6 gallons of punch require n ounces of juice. $\frac{32}{2} = \frac{n}{6}$; **96 ounces**
2. 29 students for every teacher. 348 students for t teachers. $\frac{29}{1} = \frac{348}{t}$; **12 teachers**
3. 374 miles driven using 22 gallons of gasoline. 1,122 miles driven using g gallons of gasoline. $\frac{374}{22} = \frac{1{,}122}{g}$; **66 gallons**
4. 21 bolts connect 3 panels. b bolts connect 8 panels. $\frac{21}{3} = \frac{b}{8}$; **56 bolts**
5. 32 pages for 2 sections of newspaper. p pages for 5 sections of newspaper. $\frac{32}{2} = \frac{p}{5}$; **80 pages**
6. \$2.49 for 3 bottles of water. \$8.30 for w bottles of water. $\frac{2.49}{3} = \frac{8.30}{w}$; **10 bottles**

Glencoe/McGraw-Hill   97   Course 2 Intervention

Student Workbook, p. 98

7. 3 girls for every 2 boys. 261 girls and b boys. $\frac{32}{2} = \frac{267}{b}$; **174 boys**
8. 8 packages in 2 cases. p packages in 7 cases. $\frac{8}{2} = \frac{p}{7}$; **28 packages**
9. \$11.50 earned in one hour. d earned in 6.5 hours. $\frac{11.50}{1} = \frac{d}{6.5}$; **\$74.75**
10. **1.5 inches represents 10 feet. 5 inches represents x feet.** $\frac{1.5}{10} = \frac{5}{x}$; $33\frac{1}{3}$ **ft**
11. 18 candy bars in 3 boxes. 900 candy bars in x boxes. $\frac{18}{3} = \frac{900}{x}$; **150 boxes**
12. $\frac{1}{2}$ gallon of paint covers 112 square feet. n gallons of paint covers 560 square feet. $\frac{\frac{1}{2}}{112} = \frac{n}{560}$; $2\frac{1}{2}$ **gallons**

APPLICATIONS ***Farmers often express their crop yield in bushels per acre. The table at the right shows Mr. Decker's average yields. Use this data to answer Exercises 13–16.***

Mr. Decker's Yield (Bushels per acre)	
Corn	98
Soybeans	48
Wheat	45

13. How many bushels of corn should Mr. Decker harvest from 80 acres? **7,840 bushels**
14. How many bushels of wheat should Mr. Decker expect from 105 acres? **4,725 bushels**
15. If Mr. Decker plants soybeans on 90 acres, how many bushels can he expect to harvest? **4,320 bushels**
16. Ms. Holleran harvested 3,815 bushels of corn from 35 acres. Is this yield more or less than Mr. Decker's yield? **more**
17. Ms. Galvez paid \$150 for 600 square feet of roofing. If she needs 240 square feet more, what is the extra cost? **\$60**
18. A picture measuring 25 centimeters long is enlarged on a copying machine to 30 centimeters long. If the width of the original picture is 15 centimeters, what is the width of the enlarged copy? **18 cm**

Glencoe/McGraw-Hill   98   Course 2 Intervention

SKILL 50

TEACHER NOTES

Ratios and Rates

OBJECTIVE: Understand the concepts of ratio, rate, and work to find unit rates. (Strand: Algebra)

USING THE TRANSPARENCY: Discuss other real-life situations where it would be useful to find the best buy.

USING THE STUDENT WORKBOOK: Review the rules of rounding for unit rate problems that require rounding to the nearest tenth.

EXTENSION: Have students use the distance they travel from home to school each day and the time that trip takes to find a unit rate.

Transparency, Skill 50

SKILL 50 WARM UP

Ratios and Rates

A **ratio** is a comparison of two numbers by division. A ratio made up of two measurements having different kinds of units is called a **rate**. When a rate is simplified so that it has a denominator of 1, it is called a **unit rate**.

Jordan is researching the best way to purchase the brand of laundry detergent she prefers. The detergent comes in three different size bottles and Jordan wants to determine which is the least expensive way to buy the detergent. Use the information provided in the table to find the best buy.

Laundry Detergent	
Size	**Price**
32 ounces	$3.79
64 ounces	$ 5.29
128 ounces	$11.09

In order to find the best buy, we need to find the unit cost (cost per ounce) for each of the three different size bottles of laundry detergent. Round to the nearest hundredth, if necessary.

For the 32-ounce size bottle: $\frac{\$3.79}{32 \text{ ounces}} = \$0.12$ per ounce

For the 64-ounce size bottle: $\frac{\$5.29}{64 \text{ ounces}} = \$0.08$ per ounce

For the 128-ounce size bottle: $\frac{\$11.09}{128 \text{ ounces}} = \$0.09$ per ounce

So, the best buy for Jordan is the 64-ounce size bottle of laundry detergent.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 99

SKILL 50 Name ______________ Date ______

Ratios and Rates

A **ratio** is a comparison of two numbers by division. A ratio can be written in several different ways. If there are 5 roses in a bouquet of 12 flowers, then the ratio of roses to total number of flowers in the bouquet can be written as 5 to 12, 5:12, or $\frac{5}{12}$.

EXAMPLE *Express the ratio 8 dimes out of 28 coins as a fraction in simplest form.*

$\frac{8}{28} = \frac{2}{7}$

The ratio of dimes to coins is 2 to 7. This means that for every 7 coins, 2 of them are dimes.

A **rate** is a ratio of two measurements having different kinds of units, such as $25 for 2 dozen. When a rate is simplified so that it has a denominator of 1, it is called a **unit rate**.

EXAMPLE *Express the ratio 252 miles in 4 hours as a unit rate.*

$\frac{252 \text{ miles}}{4 \text{ hours}} = \frac{63 \text{ miles}}{1 \text{ hour}}$

The unit rate is 63 miles per hour.

EXERCISES *Express each ratio as a fraction in simplest form.*

1. 6 strawberries out of 14 pieces of fruit $\frac{3}{7}$
2. 15 girls to 18 boys $\frac{5}{6}$
3. 12 blue marbles to 18 green marbles $\frac{2}{3}$
4. 21 red blocks out of 96 blocks $\frac{7}{32}$
5. 14 ounces to 35 pounds $\frac{2}{5}$
6. 15 puppies to 60 kittens $\frac{1}{4}$

Glencoe/McGraw-Hill 99 Course 2 Intervention

Student Workbook, p. 100

Express each ratio as a unit rate. Round to the nearest tenth, if necessary.

7. $10 for 5 loaves of bread **$2 per loaf**
8. 64 feet in 16 seconds **4 feet per second**
9. 132 miles on 6 gallons **22 miles per gallon**
10. $32 for 5 books **$6.40 per book**
11. 140 meters in 48 seconds **2.9 meters per second**
12. 1,400 miles in 4 days **350 miles per day**
13. $66 for 4 shirts **$16.50 per shirt**
14. 350 words in 8 minutes **43.8 words per minute**

APPLICATIONS

15. The table below shows the size, in ounces, and the cost of several brands of apple juice. Find the unit cost to determine which brand is the best buy. **Sweeties: 12¢ per ounce; Sunshine: 11¢ per ounce; Peter's: 8¢ per ounce; Peter's Apple Juice has the best buy.**

Brand	Size (ounces)	Cost
Sweeties Apple Juice	16	$1.89
Sunshine Apple Juice	32	$3.49
Peter's Apple Juice	64	$5.09

16. A runner training for a marathon ran 18 miles in 150 minutes. Find the length of time it takes the runner to cover 1 mile. Round to the nearest tenth. **8.3 minutes per mile**
17. Alyssa spent $780 on 40 square yards of carpeting for her family room. Find the cost per square yard for the carpet Alyssa selected. **$19.50 per square yard**
18. During a winter snow storm, a total of 14 inches of snow fell over a period of 8 hours. Find the rate of snowfall per hour. Round to the nearest tenth. **1.8 inches per hour**

Glencoe/McGraw-Hill 100 Course 2 Intervention

SKILL 51

TEACHER NOTES

Organizing Information

OBJECTIVE: Solve problems by organizing information in a list, table, or matrix. (Strand: Problem Solving)

USING THE TRANSPARENCY: Have students make a table that can be used to solve the problem. Have each student mark his or her own table after reading each bulleted item.

USING THE STUDENT WORKBOOK: Ask students how they know that all of the possible orders Omar can go to the locations are listed.

EXTENSION: Have students write a problem that can be solved by making a table and eliminating the possibilities.

Transparency, Skill 51

SKILL 51 WARM UP

Organizing Information

Amber, Bryan, Adam, and Antonio formed a band. The band has a lead guitar player, a rhythm guitar player, a keyboard player, and a drummer. Bryan does not play the drums. Adam and the keyboard player are brothers. Bryan and the lead guitar player are neighbors. Adam wants to learn to play the drums. What instrument does each person play?

Solve this problem by using a table.

- Write *no* to show Bryan does not play the drums.
- Since Adam and the keyboard player are brothers, write *no* to show Adam does not play the keyboard.
- Since Antonio must be Adam's brother, write *yes* to show Antonio plays the keyboard.
- Write *no* in each empty space of the row and column with the *yes*.
- Since Bryan and the lead guitar player are neighbors, write *no* to show Bryan does not play the lead guitar.
- Bryan must play the rhythm guitar. Write *yes* in the appropriate square and complete the column with *no*.
- Since Adam wants to learn to play the drums, write *no* to show Adam does not play the drums.
- Adam must play the lead guitar and Amber must play the drums. Complete the table.

	Lead Guitar	Rhythm Guitar	Keyboard	Drum
Amber	no	no	no	yes
Bryan	no	yes	no	no
Adam	yes	no	no	no
Antonio	no	no	yes	no

Amber plays the drums, Bryan plays the rhythm guitar, Adam plays the lead guitar, and Antonio plays the keyboard.

Student Workbook, p. 101

SKILL 51 Name ________________ Date ________

Organizing Information

Two possible ways to organize information to solve problems are listed below.

- Make a List
- Use a Matrix or Table

EXAMPLE ***On Saturday, Omar plans to go to the library, the discount store, and his grandmother's house. He cannot decide in which order to go to these locations. How many choices does he have?***

Make a list to show the different orders.

library, discount store, grandmother's house
library, grandmother's house, discount store
discount store, library, grandmother's house
discount store, grandmother's house, library
grandmother's house, library, discount store
grandmother's house, discount store, library

Omar has 6 choices for the order he can go to the locations.

EXAMPLE ***Kimi is offered two jobs. Job A has a starting salary of $24,000 per year with a guaranteed raise of $1,200 per year. Job B has a starting salary of $26,000 with a guaranteed raise of $800 per year. In how many years will both jobs pay the same amount of money?***

Make a table to show the effect of each option over a 6-year period.

Year	Job A	Job B
1	$24,000	$26,000
2	$25,200	$26,800
3	$26,400	$27,600
4	$27,600	$28,400
5	$28,800	$29,200
6	$30,000	$30,000

In 6 years, the two jobs will pay the same amount of money.

Student Workbook, p. 102

EXERCISES *Solve.*

1. How many different four-digit numbers can be formed using each of the digits 1, 2, 3, and 4 once? **24 numbers**
2. How many different two-digit numbers can be formed using 1, 2, 3, 4, and 5 if the digits can be used more than once? **25 numbers**
3. How many ways can you give a clerk 65¢ using quarters, dimes, and/or nickels? **14 ways**

APPLICATIONS

4. Rebecca, Lisa, and Courtney each have one pet. The pets are a dog, a cat, and a parrot. Courtney is allergic to cats. Rebecca's pet has two legs. Whose pet is the dog? **Courtney**
5. Mr. Ramos is starting a college fund for his daughter. He starts out with $700. Each month he adds $80 to the fund. How much money will he have in a year? **$1,660**
6. The Centerville Civic Association is selling pizzas. They can add pepperoni, green peppers, and/or mushrooms to their basic cheese pizzas. How many different kinds of pizzas can they sell? **8 pizzas**
7. Kyle, Gabrielle, Spencer, and Stephanie each play a sport. The sports are basketball, gymnastics, soccer, and tennis. No one's sport starts with the same letter as his or her name. Gabrielle and the soccer player live next door to each other. Stephanie practices on the balance beam each day. Gabrielle does not own a racket. Which student plays each sport? **basketball: Gabrielle,gymnastics: Stephanie, soccer: Kyle, tennis: Spencer**
8. A deli sells 5 different soft drinks in 3 different sizes. How many options does a customer have to buy a soft drink? **15 options**
9. In the World Series, two teams play each other until one team wins 4 games.
   a. What is the greatest number of games needed to determine a winner? **7 games**
   b. What is the least number of games needed to determine a winner? **4 games**

SKILL 52

TEACHER NOTES

Slope of a Line

OBJECTIVE: Determine the slope of a line. (Strand: Algebra)

USING THE TRANSPARENCY: Draw the graphs of the lines $y = \frac{1}{4}x$, $y = \frac{1}{2}x$, $y = 2x$, and $y = 4x$ on a coordinate grid on the chalkboard. Have students find the slopes.

USING THE STUDENT WORKBOOK: Give students a list of slopes to choose from for each graph in Exercises 1–3. Have them choose the correct slope.

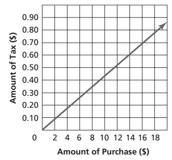
EXTENSION: Have pairs of students use a length of yarn to model slope. Have one student hold one end of the yarn to his or her forehead while the other student tapes the other end to a spot on the floor. Have each pair measure the rise and run and calculate the slope of the string.

Transparency, Skill 52

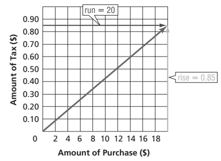
SKILL 52 WARM UP

Slope of a Line

The graph below shows the amount of sales tax charged on various purchases. What is the percent of sales tax?



You can find the percent of sales tax by finding the **slope** of the line. To find the slope, choose any two points on the line. Draw a vertical line and then a horizontal line to connect the two points. Find the length of the vertical line to find the rise. Find the length of the horizontal line to find the run. The slope is the rise divided by the run.



slope $= \frac{\text{rise}}{\text{run}}$

$= \frac{0.85}{20}$ or 0.0425

The sales tax is 4.25%.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 103

SKILL 52 Name ______________________ Date ________

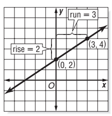
Slope of a Line

Slope describes the steepness of a line. The slope of a line can be expressed as a ratio of the **rise**, vertical change, to the **run**, horizontal change.

slope $= \frac{\text{rise}}{\text{run}}$ ⟵ $\frac{\text{vertical change}}{\text{horizontal change}}$

EXAMPLE ***Find the slope of the line.***

Choose two points on the line. The points chosen at the right have coordinates (0, 2) and (3, 4).



Draw a vertical line and a horizontal line to connect the points.

Find the length of the vertical segment to find the rise. The rise is 2 units up.

Find the length of the horizontal segment to find the run. The run is 3 units to the right.

slope $= \frac{\text{rise}}{\text{run}} = \frac{2}{3}$

The slope m of a line passing through points at (x_1, y_1) and (x_2, y_2) can be found using the formula $m = \frac{y_2 - y_1}{x_2 - x_1}$, where $x_1 \neq x_2$.

EXAMPLE ***Find the slope of the line that passes through A(−5, −3) and B(10, −6).***

Let $A(-5, -3) = (x_1, y_1)$ and let $B(10, -6) = (x_2, y_2)$.

$m = \frac{y_2 - y_1}{x_2 - x_1}$ *Definition of slope.*

$= \frac{-6 - (-3)}{10 - (-5)}$ $x_1 = -5, y_1 = -3, x_2 = 10, y_2 = -6$

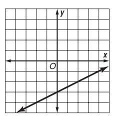
$= \frac{-3}{15}$ or $\frac{1}{-5}$ *Simplify.*

The slope is $\frac{1}{-5}$

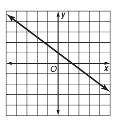
Glencoe/McGraw-Hill 103 Course 2 Intervention

Student Workbook, p. 104

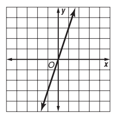
EXERCISES *Find the slope of each line.*

1. 

$\frac{1}{2}$

2. 

$-\frac{3}{4}$

3. 

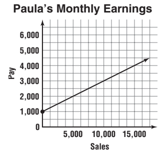
3

Find the slope of the line that passes through each pair of points.

4. $A(-2, -1)$, $B(3, 9)$ **2**
5. $C(0, -2)$, $D(3, -3)$ **$-\frac{1}{3}$**
6. $E(-5, 20)$, $F(-8, 32)$ **−4**
7. $G(-10, 2)$, $H(10, 8)$ **$\frac{3}{10}$**
8. $J(2, -1)$, $K(6, -11)$ **$-\frac{5}{2}$**
9. $M(-3, -14)$ $N(-9, -30)$ **$\frac{8}{3}$**

APPLICATIONS *Paula works as a sales representative for a computer store. She earns a base pay of $1,000 each month. She also earns a commission based on her sales. The graph at the right shows her possible monthly earnings. Use the graph to answer Exercises 10–13.*

Paula's Monthly Earnings



10. What is the slope of the line? **$\frac{1}{5}$**

11. What information is given by the slope of the line? **The rate of commission Paula earns is 15 or 20% of her sales.**

12. a. If Paula's base pay changed to $1,100, would it change the graph? Why or why not? **Yes, the entire graph would move up 100 units.**

    b. would it change the slope? Why or why not? **No, the rate of commission would not change.**

13. If Paula's rate of commission changed to 25%, would it change the graph? Why or why not? **Yes, the slope would be $\frac{1}{4}$.**

Glencoe/McGraw-Hill 104 Course 2 Intervention

SKILL 53

TEACHER NOTES

Graphing Functions

OBJECTIVE: Graph functions from function tables. (Strand: Algebra)

USING THE TRANSPARENCY: Draw two graphs on the chalkboard. One graph should be a function, and the other should not be a function. Have students describe the graphs and explain why one graph is a function and the other is not a function.

USING THE STUDENT WORKBOOK: Have students work in pairs. Have one student draw and label the axes and the other student draw the graph. Then have students reverse roles.

EXTENSION: Have students work in pairs. Have one student draw a graph of a function and the other student suggest data that the graph could possibly show.

Transparency, Skill 53

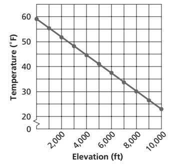
SKILL 53 WARM UP

Graphing Functions

The function table shows the average temperature at elevations above sea level. Graph the function.

Elevation Above Sea Level (ft)	Temperature (°F)
0	59.0
1,000	55.4
2,000	51.8
3,000	48.2
4,000	44.6
5,000	41.0
6,000	37.4
7,000	33.8
8,000	30.2
9,000	26.6
10,000	23.0

To graph the function, first label the axes and graph the points named by the data. Then connect the points to complete the graph of the function. The completed graph is shown below.



Student Workbook, p. 105

SKILL 53 Name ______ Date ______

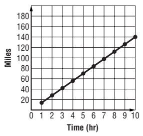
Graphing Functions

A function table can be used to graph a function.

EXAMPLE ***Chun is riding his bike at an average rate of 14 miles per hour. The function table at the right shows this relationship. Graph the function.***

To graph the function, first label the axes and graph the points named by the data. Then connect the points.

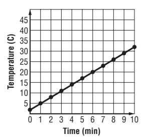
Time (Hours)	Miles
1	14
2	28
3	42
4	56
5	70
6	84
7	98
8	112
9	126
10	140



EXERCISES ***Graph each function.***

1.

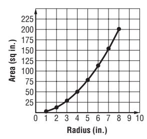
Time (min)	Temperature (°C)
0	2
1	5
2	8
3	11
4	14
5	17
6	20
7	23
8	26
9	29
10	32



Student Workbook, p. 106

2.

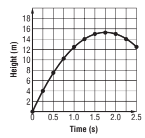
Radius (in.)	Area (sq in.)
1	3.14
2	12.57
3	28.27
4	50.27
5	78.54
6	113.10
7	153.94
8	201.06



APPLICATIONS ***The function table at the right shows the height of a golf ball above the ground after it is hit from ground level. Use the data to answer Exercises 3–6.***

Time (s)	Height (m)
0	0
0.25	4.0
0.5	7.5
0.75	10.25
1.0	12.5
1.25	14.0
1.5	15.0
1.75	15.25
2.0	15.0
2.25	14.0
2.5	12.5

3. Graph the function.



4. If the pattern continues, how high above the ground would you expect the golf ball to be after 3.25 seconds? **40 meters**

5. Where does the change in the function occur? Why do you think this change occurs? **The change occurs after 1.75 seconds. At this time the ball is at its maximum height.**

6. How long will it take for the ball to hit the ground? **3.5 seconds**

SKILL 54

TEACHER NOTES

Graphing Linear Equations

OBJECTIVE: Graph linear equations. (Strand: Algebra)

USING THE TRANSPARENCY: Have students write an equation with two variables. Then have them make a function table with at least four values for their equation and graph the equation on a coordinate plane.

USING THE STUDENT WORKBOOK: Have students name all the steps involved in graphing an equation with two variables.

EXTENSION: Have students identify a situation in their daily lives to model with an equation (taxi fare, cost of dinner for their family, or cost to go to a movie with friends). Have students write an equation, create a table, and draw the graph.

Transparency, Skill 54

SKILL 54 WARM UP

Graphing Linear Equations

To determine how much profit a business makes, the owner must consider the relationship between sales and expenses. A graph can be a useful tool to show this relationship.

Nathan's Flower Shop marks up each flower arrangement $5.00. The shop's daily operating expenses are $100.00. Write an equation that relates the profit to the number of flower arrangements sold. Then graph the relationship.

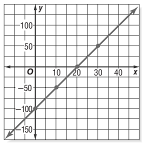
Let x represent the number of flower arrangements sold in a day and y represent the profit.

$$y = 5x - 100$$

To graph the equation, make a function table for the equation and graph the ordered pairs from the table.

x	$5x - 100$	y	(x, y)
0	5(0) − 100	−100	(0, −100)
10	5(10) − 100	−50	(10, −50)
20	5(20) − 100	0	(20, 0)
30	5(30) − 100	50	(30, 50)

Notice that the points are in a straight line. Draw the line. This line represents the equation $y = 5x - 100$.



Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 107

SKILL 54 Name ______________________ Date __________

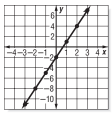
Graphing Linear Equations

Linear equations can be graphed in the same way that you graph functions.

EXAMPLE *Graph the equation y = 3x −2.*

Make a function table for $y = 3x - 2$. Then graph each ordered pair and complete the graph $y = 3x - 2$.

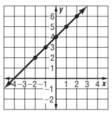
x	$3x - 2$	y	(x, y)
−3	3(−3) − 2	−11	(−3, −11)
−2	3(−2) − 2	−8	(−2, −8)
−1	3(−1) − 2	−5	(−1, −5)
0	3(0) − 2	−2	(0, −2)
1	3(1) − 2	1	(1,1)
2	3(2) − 2	4	(2,4)
3	3(3) − 2	7	(3,7)



EXERCISES *Complete each function table. Then graph the equation.*

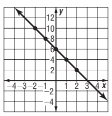
1. $y = x + 4$

x	$x + 4$	y	(x, y)
−2	**−2 + 4**	**2**	**(−2, 2)**
−1	**−1 + 4**	**3**	**(−1, 3)**
0	**0 + 4**	**4**	**(0, 4)**
1	**1 + 4**	**5**	**(1,5)**
2	**2 + 4**	**6**	**(2,6)**



2. $y = 6 - 2x$

x	$6 - 2x$	y	(x, y)
−2	**6 − 2(−2)**	**2**	**(−2, 2)**
−1	**6 − 2(−1)**	**3**	**(−1, 3)**
0	**6 − 2(0)**	**4**	**(0, 4)**
1	**6 − 2(1)**	**5**	**(1,5)**
2	**6 − 2(2)**	**6**	**(2,6)**

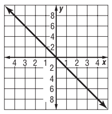


Glencoe/McGraw-Hill 107 Course 2 Intervention

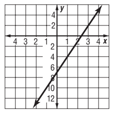
Student Workbook, p. 108

Graph each equation.

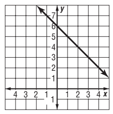
3. $y = -2x$



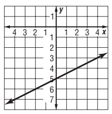
4. $y = 3x - 7$



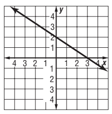
5. $y = -x + 6$



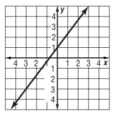
6. $y = \frac{1}{2}x - 5$



7. $y = -\frac{2}{3}x + 2$

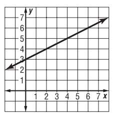


8. $y = \frac{4}{3}x + 1$

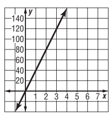


APPLICATIONS

9. A snow storm at Pine Tree Ski Resort deposited $\frac{1}{2}$ foot of snow per hour on top of a 3-foot snow base. Let x represent the number of hours and y represent the total amount of snow. Write an equation to represent the total amount of snow. Graph the equation. $\boldsymbol{y = \frac{1}{2}x + 3}$



10. Alaqua averages 40 miles per hour when she drives from Los Angeles to San Francisco. Let x represent the number of hours and y represent the distance traveled. Write an equation to represent the distance traveled. Graph the equation. $\boldsymbol{y = 40x}$



Glencoe/McGraw-Hill 108 Course 2 Intervention

SKILL 55

TEACHER NOTES

Solve Equations in Two Variables

OBJECTIVE: Find solutions of a linear equation in two variables. (Strand: Algebra)

USING THE TRANSPARENCY: Have students use the same equation to find the amount of yarn needed for a much larger amount of scarves, such as 100, 200, etc.

USING THE STUDENT WORKBOOK: Remind students to organize their work carefully using a table to avoid unnecessary mistakes.

EXTENSION: Ask students to think about what the graph might look like if they were to graph the solutions of a linear equation in two variables.

Transparency, Skill 55

SKILL 55 **WARM UP**

Solve Equations in Two Variables

Andrea knits scarves to sell at the annual Holiday Craft Fair. She is trying to determine how much yarn she needs to buy. Each scarf uses 4 yards of yarn and Andrea also likes to have an extra 5 yards of yarn available in case of mistakes. The equation $y = 4x + 5$ describes the number of yards of yarn Andrea needs (y) to make x scarves. Find the amount of yarn needed to make 10, 12, 14, and 16 scarves. Express your answers as ordered pairs.

The equation $y = 4x + 5$ is called a linear equation in two variables. Solutions of linear equations are ordered pairs that make the equation true. One way to find solutions is to make a table.

x	$y = 4x + 5$	y	(x, y)
10	$y = 4(10) + 5$	45	(10, 45)
12	$y = 4(12) + 5$	53	(12, 53)
14	$y = 4(14) + 5$	61	(14, 61)
16	$y = 4(16) + 5$	69	(16, 69)

So, the solutions are (10, 45), (12, 53), (14, 61), and (16, 69). Andrea should buy 45 yards of yarn if she plans to make 10 scarves, 53 yards of yarn if she plans to make 12 scarves, 61 yards of yarn if she plans to make 14 scarves, and 69 yards of yarn if she plans to make 16 scarves.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 109

SKILL 55 Name ____________ Date ______

Solve Equations in Two Variables

A **linear equation in two variables** is an equation in which the variables appear in separate terms and neither variable contains an exponent other than 1. **Solutions** of a linear equation in two variables are ordered pairs, (x, y) that make the equation true.

EXAMPLE *Find four solutions of $y = -3x + 2$. Write the solutions as ordered pairs.*

Choose four values of x. Then substitute each value into the equation and solve for y.

x	$y = -3x + 2$	y	(x, y)
−1	$y = -3(-1) + 2$	5	(−1, 5)
0	$y = -3(0) + 2$	2	(0, 2)
1	$y = -3(1) + 2$	−1	(1, −1)
2	$y = -3(2) + 2$	−4	(2, −4)

Four solutions are (−1, 5), (0, 2), (1, −1), and (2, −4).

EXERCISES *Find four solutions of each equation. Write the solutions as ordered pairs.*

1. $y = x - 3$ **Sample answer: (0, −3), (1, −2), (2, −1), (3, 0)**
2. $y = 2x$ **Sample answer: (−2, −4), (−1, −2), (0, 0), (1, 2)**
3. $y = 5 - x$ **Sample answer: (0, 5), (1, 4), (2, 3), (3, 2)**
4. $y = 4x - 3$ **Sample answer: (−1, −7), (0, −3), (1, 1), (2, 5)**
5. $y = -2x + 4$ **Sample answer: (−2, 8), (-1, 6), (0, 4), (1, 2)**

Glencoe/McGraw-Hill 109 Course 2 Intervention

Student Workbook, p. 110

6. $y = -x$ **Sample answer: (−2, 2), (−1, 1), (0, 0), (1, −1)**
7. $x + y = 5$ **Sample answer: (0, 5), (1, 4), (2, 3), (3, 2)**
8. $2x + y = 9$ **Sample answer: (−2, 13), (−1, 11), (0, 9), (1, 7)**
9. $y = -4$ **Sample answer: (−1, −4), (0, −4), (1, −4), (2, −4)**
10. $x = 3$ **Sample answer: (3, 0), (3, 1), (3, 2), (3, 3)**

APPLICATIONS

11. The equation $y = 3x$ describes the number of eggs (y) required to make x batches of brownies. Find the number of eggs required to make 1, 2, 3, and 4 batches of brownies. Express your answers as ordered pairs.
(1, 3), (2, 6), (3, 9), (4, 12)
12. The equation $y = 3x - 1$ describes the number of employees needed at a restaurant for every 10 customers (x). Find the number of employees required for 10, 20, 30, and 40 customers. Express your answers as ordered pairs.
(1, 4), (2, 7), (3, 10), (4, 13)
13. The equation $y = 4x + 9$ describes the expenses incurred by a pizza shop (y) when x pizzas are made. Find the expense for making 4, 5, 6, and 7 pizzas. Express your answers as ordered pairs. **(4, 25), (5, 29), (6, 33), (7, 37)**

Glencoe/McGraw-Hill 110 Course 2 Intervention

SKILL 56

TEACHER NOTES

Solve Equations Involving Addition and Subtraction

OBJECTIVE: Solve equations involving addition and subtraction. (Strand: Algebra)

USING THE TRANSPARENCY: Have students model addition and subtraction equations with cups and counters. Ask students why the goal is to get the cup by itself on one side of the mat.

USING THE STUDENT WORKBOOK: Divide students into groups of 3 or 4. Have one student write an equation and read it to the group. Each member must write a word problem that can be solved by solving the equation.

EXTENSION: Create a set of index cards for students to use to create equations. Then solve the equations.

Transparency, Skill 56

SKILL 56 WARM UP

Solve Equations Involving Addition and Subtraction

Christian is saving money to buy a new sound system that costs $389. He has already saved $175. Find out how much more money he must save by writing an equation and solving it.

Let *m* represent how much more money he must save.

Then use the equation $\$175 + m = \$389$ to solve the problem.

Since 175 is added to *m*, you must subtract 175 from each side to solve.

$$175 + m = 389$$
$$175 + m - 175 = 389 - 175$$
$$m = 214$$

Check:

$$175 + m = 389$$
$$175 + 214 \stackrel{?}{=} 389 \quad \textit{Replace m with 214.}$$
$$389 = 389 \quad ✓$$

Christian needs to save $214 to buy the sound system.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 111

SKILL 56 Name ______________ Date ________

Solve Equations Involving Addition and Subtraction

To solve an equation means to find a value for the variable that makes the equation true. To solve an equation, you need to get the variable by itself.

Addition Property of Equality: If you add the same number to each side of an equation, the two sides remain equal.

EXAMPLE *Solve $s - 46 = 12$.*

$$s - 46 = 12$$
$$s - 46 + 46 = 12 + 46 \quad \textit{Add 46 to each side.}$$
$$s = 58$$

Check: $s - 46 = 12$
$58 - 46 \stackrel{?}{=} 12$ *Replace s with 58.*
$12 = 12$ ✓
The solution is 58.

Subtraction Property of Equality: If you subtract the same number from each side of an equation, the two sides remain equal.

EXAMPLE *Solve $d + 22 = 60$.*

$$d + 22 = 60$$
$$d + 22 - 22 = 60 - 22 \quad \textit{Subtract 22 from each side.}$$
$$d = 38$$

Check: $d + 22 = 60$
$38 + 22 \stackrel{?}{=} 60$ *Replace d with 38.*
$60 = 60$ ✓
The solution is 38.

Glencoe/McGraw-Hill 111 Course 2 Intervention

Student Workbook, p. 112

EXERCISES *Solve each equation. Check your solution.*

1. $a - 91 = 20$ **111**
2. $1.5 + b = 3$ **1.5**
3. $c - 3.5 = 1.25$ **4.75**
4. $d + 140 = 300$ **160**
5. $5.6 + e = 7$ **1.4**
6. $f - 65 = 21$ **86**
7. $g + 35 = 62$ **27**
8. $h - 12 = 52$ **64**
9. $j + 16 = 47$ **31**
10. $k - 12 = 13$ **25**
11. $16 = m + 9$ **7**
12. $n + 16 = 34$ **18**
13. $20 + p = 40$ **20**
14. $22 = q - 12$ **34**
15. $r - 75 = 156$ **231**
16. $15.6 + s = 52.1$ **36.5**
17. $312 = t - 64$ **376**
18. $u - 71 = 23$ **94**

APPLICATIONS

19. Alexis sold 170 tickets for her school play. She has 290 tickets remaining. How many tickets were available? **460 tickets**
20. Hector owns 87 CDs and DVDs. If he has 41 CDs, how many DVDs does Hector own? **46 DVDs**
21. Brandon is saving to buy a new computer game that costs $49.98. He still needs to save $21.50. How much has Brandon saved so far? **$28.48**
22. There are 34 students in Ms. Kim's class. Twelve of the students wear braces. How many students do not wear braces? **22 students**
23. Taylor is downloading files from the Internet. She has transferred 8 of the 18 files she has selected. How many files have yet to be transferred? **10 files**
24. A recipe calls for $2\frac{1}{2}$ cups of flour. Terrence has $1\frac{1}{3}$ cups available. How much more flour does Terrence need? **$1\frac{1}{6}$ cups**

Glencoe/McGraw-Hill 112 Course 2 Intervention

SKILL 57

TEACHER NOTES

Solve Equations Involving Multiplication and Division

OBJECTIVE: Solve equations involving multiplication and division. (Strand: Algebra)

USING THE TRANSPARENCY: Give students copies of grocery ads. Have groups of students set up equations to compare various prices to find the best unit prices. Have them solve and discuss their results.

USING THE STUDENT WORKBOOK: Have students summarize the lesson by writing two equations, one which can be solved by using multiplication and one which can be solved using division. Then have students exchange equations and write a word problem that would go with the equations.

EXTENSION: Create a set of index cards for students to use in creating equations to solve.

Transparency, Skill 57

SKILL 57 WARM UP

Solve Equations Involving Multiplication and Division

Olivia went to the store to buy some soda for a party. The store offered a pack of 24 cans of soda for \$5.99, a pack of 12 cans for \$3.29, and a pack of 6 cans for \$1.99. Write and solve three equations to determine which pack has the lowest price per can of soda. Round to the nearest cent.

$24a = 5.99$	$12b = 3.29$	$6c = 1.99$
$\frac{24a}{24} = \frac{5.99}{24}$	$\frac{12b}{12} = \frac{3.29}{12}$	$\frac{6c}{6} = \frac{1.99}{6}$
$a = 0.25$	$b = 0.27$	$c=0.33$

The pack of 24 cans has the lowest price per can of soda at \$0.25.

If the cost per can of another brand of soda is \$0.24 and there are 20 cans in the pack, write an equation to determine the total cost of the pack of soda.

$20 = \frac{p}{0.24}$ *Write the equation.*

$(0.24)(20) = 0.24\left(\frac{p}{0.24}\right)$ *Multiply each side by 0.24.*

$4.80 = p$ *Simplify.*

The 20-can pack costs \$4.80.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 113

SKILL 57 Name ______________ Date ________

Solve Equations Involving Multiplication and Division

Division Property of Equality: If you divide each side of an equation by the same nonzero number, the two sides remain equal.

EXAMPLE *Solve 14x = 84.*

$14x = 84$

$\frac{14x}{14} = \frac{84}{14}$ *Divide each side by 14.*

$x = 6$

Check: $14x = 84$

$14 \times 6 \stackrel{?}{=} 84$ *Replace x with 6.*

$84 = 84$ ✓

The solution is 6.

Multiplication Property of Equality: If you multiply each side of an equation by the same number, the two sides remain equal.

EXAMPLE *Solve $15 = \frac{y}{7}$.*

$15 = \frac{y}{7}$

$7(15) = 7\left(\frac{y}{7}\right)$ *Multiply each side by 7.*

$105 = y$

Check: $15 = \frac{y}{7}$

$15 \stackrel{?}{=} \frac{105}{7}$ *Replace y with 105.*

$15 = 15$ ✓

The solution is 105.

Glencoe/McGraw-Hill 113 Course 2 Intervention

Student Workbook, p. 114

EXERCISES *Solve each equation. Check your solution.*

1. $99 = 3a$ **33**	2. $0.5b = 3$ **6**	3. $\frac{c}{6} = 12$ **72**
4. $4 = \frac{d}{22}$ **88**	5. $\frac{e}{0.3} = 150$ **45**	6. $5 = 4f$ **1.25**
7. $\frac{g}{12} = 16$ **192**	8. $1.2h = 3.6$ **3**	9. $19 = \frac{j}{0.4}$ **7.6**
10. $\frac{k}{14} = 39$ **702**	11. $\frac{m}{5} = 16.4$ **82**	12. $8n = 9.6$ **1.2**
13. $1.2p = 2.76$ **2.3**	14. $72 = \frac{q}{1.8}$ **129.6**	15. $9r = 729$ **81**
16. $21s = 147$ **7**	17. $18t = 3.6$ **0.2**	18. $\frac{u}{17} = 3.4$ **57.8**

APPLICATIONS

19. City Center Parking Garage charges \$0.75 an hour for parking. How long can Andrew park in the garage if he only has \$6 for parking? **8 hours**

20. Elena is 5 times older than her youngest brother. Elena is 15 years old. How old is her brother? **3 years**

21. Four friends split the cost of lunch equally. If each person pays \$7.50, what is the total cost of lunch? **\$30.00**

22. A bag of 20 oranges costs \$6.99. What is the cost of each orange? Round to the nearest cent. **\$0.35**

23. The area of a rectangle is 168 square centimeters. If the length of the rectangle is 12 centimeters, what is the measure of the width? **14 cm**

Glencoe/McGraw-Hill 114 Course 2 Intervention

SKILL 58

TEACHER NOTES

Solve Two-Step Equations

OBJECTIVE: Solve two-step equations. (Strand: Algebra)

USING THE TRANSPARENCY: Have students write an equation for and solve the following problem: *five more than half a number is 10.*

USING THE STUDENT WORKBOOK: Guide students to undo operations in reverse order of the order of operations. Point out how this is done in each of the examples.

EXTENSION: Have students work in pairs. Student one should write a two-step equation. Student two should state a situation that fits the equation, and then solve.

Transparency, Skill 58

SKILL 58 WARM UP

Solve Two-Step Equations

In 2004, the U.S. Postal Service charged \$0.37 to send a 1-ounce letter by first class mail. There was an additional charge of \$0.23 per ounce for any letters weighing more than 1 ounce. If Toni paid \$1.29 to send a letter to a friend, how many additional ounces, beyond the first ounce, did the letter weigh?

Write an equation to solve the problem. Let w = the additional weight of the letter.

$1.29 = 0.37 + 0.23w$

Solve the equation.

$1.29 = 0.37 + 0.23w$

$1.29 - 0.37 = 0.37 + 0.23w - 0.37$ *Subtract 0.37 from each side.*

$0.92 = 0.23w$

$\frac{0.92}{0.23} = \frac{0.23w}{0.92}$ *Divide each side by 0.23.*

$4 = w$

The letter weighed 4 ounces over the initial ounce.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 115

SKILL 58 Name ______________ Date ________

Solve Two-Step Equations

To solve two-step equations, you need to add or subtract first. Then you need to multiply or divide.

EXAMPLES *Solve each equation.*

$6x - 3 = 21$

$6x - 3 + 3 = 21 + 3$ *Add 3 to each side.*

$6x = 24$

$\frac{6x}{6} = \frac{24}{6}$ *Divide each side by 6.*

$x = 4$

The solution is 4.

$\frac{y}{10} + 2.5 = 7.5$

$\frac{y}{10} + 2.5 - 2.5 = 7.5 - 2.5$ *Subtract 2.5 from each side.*

$\frac{y}{10} = 5$

$10\left(\frac{y}{10}\right) = 10(5)$ *Multiply each side by 10.*

$y = 50$

The solution is 50.

EXERCISES *Solve each equation. Check your solution.*

1. $2a + 7 = 15$ **4**
2. $\frac{b}{7} + 10 = 40$ **210**
3. $8 - 1.2c = 2$ **5**
4. $\frac{d}{7} - 13 = 12$ **175**
5. $6e - 12 = 72$ **14**
6. $7f + 8.4 = 16.8$ **1.2**

Glencoe/McGraw-Hill 115 Course 2 Intervention

Student Workbook, p. 116

7. $\frac{g}{2} + 11 = 16$ **10**
8. $\frac{h}{0.2} + 0.5 = 10$ **1.9**
9. $8 + 5j = 53$ **9**
10. $50 - 3k = 35$ **5**
11. $\frac{m}{3} - 5 = 2$ **21**
12. $6n + 4 = 58$ **9**
13. $\frac{p}{4} - 2 = 0.8$ **11.2**
14. $7q - 9.4 = 11.6$ **3**
15. $4 = \frac{r}{5} - 16$ **100**
16. $15 + \frac{s}{8} = 27$ **96**
17. $8t - 4.6 = 68.2$ **9.1**
18. $0.93 = 0.15 + 0.4u$ **1.95**

APPLICATIONS

19. Austin's doctor recommended that he take 4 doses of antibiotics the first day and two doses per day until all the medicine was gone. If the prescription was for 24 doses, how many days did Austin take the medicine? **11 days**
20. A carpet store has carpet for \$13.99 per square yard and charges \$50 for installation. If a customer paid \$364.78, approximately how many square yards of carpet were purchased? **about 22.5 square yards**
21. To convert a temperature in degrees Celsius to degrees Fahrenheit you can use the formula $F = \frac{9}{5}C + 32$. If the outside temperature is 63°F, what is the temperature in degrees Celsius? Round to the nearest whole degree. **17°C**
22. A wireless phone company charges \$34.99 a month for phone service. They also charge \$0.48 per minute for long distance calls. If Vanessa's bill at the end of the billing period is \$64.75, how many minutes of long distance calls did she make? **62 minutes**

Glencoe/McGraw-Hill 116 Course 2 Intervention

SKILL 59

TEACHER NOTES

Solve Inequalities

OBJECTIVE: Solve and graph inequalities. (Strand: Algebra)

USING THE TRANSPARENCY: Have students write an inequality for the following problem: *five more than twice a number is at least 15.*

USING THE STUDENT WORKBOOK: Have students discuss the meaning of *at least* and *at most*. Have them give several examples of both types of inequalities using these phrases.

EXTENSION: Have students identify two or three items they would like to purchase. Have them write an inequality for how much money they would need to purchase these items.

Transparency, Skill 59

SKILL 59 WARM UP

Solve Inequalities

Mr. Bauman sells new cars. He earns \$400 for each car he sells plus a salary of \$20,000 per year. How many cars does Mr. Bauman need to sell in order to earn at least \$66,000 this year?

Write an inequality to represent this problem. Let *c* represent the number of cars Mr. Bauman sells in a year.

$20{,}000 + 400c \geq 66{,}000$

$20{,}000 + 400c - 20{,}000 \geq 66{,}000 - 20{,}000$ *Subtract 20,000 from each side.*

$400c \geq 46{,}000$

$\frac{400c}{400} \geq \frac{46{,}000}{400}$ *Divide each side by 400.*

$c \geq 115$

Mr. Bauman will need to sell 115 cars to earn at least \$66,000 in a year.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 117

SKILL 59 Name ______________ Date ________

Solve Inequalities

Inequalities are sentences that compare two quantities that are not necessarily equal. The symbols below are used in inequalities.

Symbol	Words
$<$	less than
$>$	greater than
$\leq$	less than or equal to
$\geq$	greater than or equal to

EXAMPLES *Solve each inequality. Show the solution on a number line.*

$2n + 1 > 5$

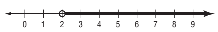
$2n + 1 - 1 > 5 - 1$ *Subtract 1 from each side.*

$2n > 4$

$\frac{2n}{2} > \frac{4}{2}$ *Divide each side by 2.*

$n > 2$

To graph the solution on a number line, draw an open circle at 2. Then draw an arrow to show all numbers greater than 2.



$2p - 3 \leq 15$

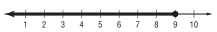
$2p - 3 + 3 \leq 15 + 3$ *Add 3 to each side.*

$2p \leq 18$

$\frac{2p}{2} \leq \frac{18}{2}$ *Divide each side by 2.*

$n \leq 9$

To graph the solution on a number line, draw a closed circle at 9. Then draw an arrow to show all numbers less than 9.



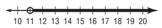
Glencoe/McGraw-Hill 117 Course 2 Intervention

Student Workbook, p. 118

EXERCISES *Solve each inequality. Graph the solution on a number line.*

1. $a + 7 < 12$ $\boldsymbol{a < 5}$

2. $b - \mathbf{3} > \mathbf{8}$ $\boldsymbol{b > 11}$

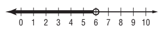


3. $2c - 7 \geq 9$ $\boldsymbol{c \geq 8}$

4. $5d + 7 \leq 32$ $\boldsymbol{d \leq 5}$

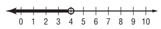
5. $e + 2 > 16$ $\boldsymbol{e > 14}$

6. $f + 12 < 18$ $\boldsymbol{f < 6}$



7. $\frac{g}{2} \geq 3$ $\boldsymbol{g \geq 6}$

8. $\frac{h}{2} + 6 < 8$ $\boldsymbol{h < 4}$



9. $\frac{j}{3} + 6 \leq 10$ $\boldsymbol{j \leq 12}$

10. $\frac{k}{4} + 2 > 3$ $\boldsymbol{k > 4}$

APPLICATIONS

19. Madison wants to earn at least \$75 to spend at the mall this weekend. Her father said he would pay her \$15 to mow the lawn and \$5 an hour to work on the landscaping. If Madison mows the lawn, how many hours must she work on the landscaping to earn at least \$75? **12 hours**

20. A rental car agency rents cars for \$32 per day. They also charge \$0.15 per mile driven. If you are taking a 5-day trip and have budgeted \$250 for the rental car, what is the maximum number of miles you can drive and stay within your budget? **600 miles**

21. Mr. Stamos needs 1,037 valid signatures on a petition to become a candidate for the school board election. An official at the board of elections told him to expect that 15% of the signatures he collects will be invalid. What is the minimum number of signatures he should get to help ensure that he qualifies for the ballot? **1,220 signatures**

Glencoe/McGraw-Hill 118 Course 2 Intervention

SKILL 60

TEACHER NOTES

Scale Drawings

OBJECTIVE: Find the actual length from a scale drawing. (Strand: Algebra)

USING THE TRANSPARENCY: Have students find the scale on several maps. Discuss the meaning of the scale. Ask students to list some examples of scale drawings.

USING THE STUDENT WORKBOOK: Tell the students that the wingspan of a model of an airplane is 3 inches. The scale is 1 inch equals 71 feet. Ask the students to describe how to find the actual length of the wingspan.

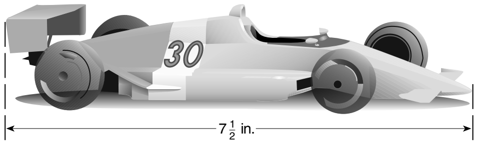
EXTENSION: Have students find a photograph in a magazine. Have them draw a 0.25-inch grid over the picture. Have the students copy the picture to a piece of paper with 1-inch grids.

Transparency, Skill 60

SKILL 60 WARM UP

Scale Drawings

At a gift shop at the Indianapolis Motor Speedway and Museum, Robert bought a model of a race car. The scale of the model is $\frac{1}{2}$ inch equals 1 foot. If the length of the model is $7\frac{1}{2}$ inches, what is the actual length of the car?



Think of $\frac{1}{2}$ inch as 0.5 inch and $7\frac{1}{2}$ inches as 7.5 inches.

Write a proportion to find the actual length.

model → / *actual car* → $\frac{0.5}{1} = \frac{7.5}{x}$ ← *model* / ← *actual car*

$0.5x = 7.5$ *Cross multiply.*

$\frac{0.5x}{0.5} = \frac{7.5}{0.5}$ *Divide each side by 0.5.*

$x = 15$

The length of the actual car is 15 feet.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 119

SKILL 60 Name ______ Date ______

Scale Drawings

A **scale drawing** is used to represent an object that is too large to be drawn or built at actual size.

EXAMPLE *Carlos is drawing plans for a new shopping center. The scale of the drawing is $\frac{1}{2}$ inch equals 5 feet. On the drawing, the front of the shopping center is $18\frac{1}{2}$ inches. What is the actual length of the front of the shopping center?*

Express $\frac{1}{2}$ inch as 0.5 inch and $18\frac{1}{2}$ inches as 18.5 inches. Use the scale 0.5 inch = 5 feet to write a proportion.

$\frac{\text{drawing}}{\text{actual length}}$ → $\frac{0.5}{5} = \frac{18.5}{x}$ ← $\frac{\text{drawing}}{\text{actual length}}$

$0.5x = (5)(18.5)$ *Cross multiply.*

$0.5x = 92.5$ *Simplify.*

$\frac{0.5x}{0.5} = \frac{92.5}{0.5}$ *Divide each side by 0.5.*

$x = 185$ *Simplify.*

The actual length of the front of the shopping center is 185 feet.

EXERCISES *On a map, the scale is 1 inch equals 40 miles. For each map distance, find the actual distance.*

1. $2\frac{1}{2}$ inches **100 miles**
2. 12 inches **480 miles**
3. $\frac{3}{4}$ inch **30 miles**
4. $7\frac{1}{4}$ inches **290 miles**
5. $8\frac{1}{2}$ inches **340 miles**
6. $4\frac{3}{8}$ inches **175 miles**

Glencoe/McGraw-Hill 119 Course 2 Intervention

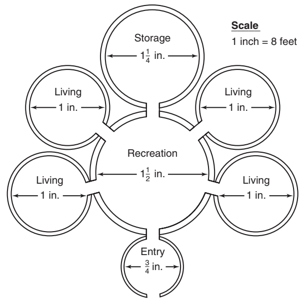
Student Workbook, p. 120

On a blueprint of a new house, the scale is $\frac{1}{4}$ inch equals 2 feet. Find the dimensions of the rooms on the blueprint if the actual measurements of the rooms are given.

7. 20 feet by $16\frac{3}{4}$ feet **$2\frac{1}{2}$ inches by $2\frac{3}{32}$ inches**
8. 17 feet by $12\frac{3}{4}$ feet **$2\frac{1}{8}$ inches by $1\frac{19}{32}$ inches**
9. $11\frac{1}{2}$ feet by $10\frac{1}{4}$ feet **$1\frac{7}{16}$ inches by $1\frac{9}{32}$ inches**
10. 11 feet by $9\frac{1}{2}$ feet **$1\frac{3}{8}$ inches by $1\frac{3}{16}$ inches**
11. 19 feet by 14 feet **$2\frac{3}{8}$ inches by $1\frac{3}{4}$inches**
12. $10\frac{3}{4}$ feet by $11\frac{1}{4}$feet **$1\frac{11}{32}$ inches by $1\frac{13}{32}$ inches**

APPLICATIONS *An igloo is a domed structure traditionally built of snow blocks by the Inuit people of Canada. Sometimes several families built a cluster of igloos connected by passageways. Use the scale drawing of such a cluster to answer Exercises 13–17.*

13. What is the actual diameter of each living chamber? **8 ft**
14. What is the actual diameter of the entry chamber? **6 ft**
15. What is the actual diameter of the recreation area? **12 ft**
16. What is the actual diameter of the storage area? **10 ft**
17. Estimate the actual distance from the entry chamber to the back ofthe storage chamber. **about 28 ft**



Glencoe/McGraw-Hill 120 Course 2 Intervention

SKILL 61 TEACHER NOTES

Similar Figures

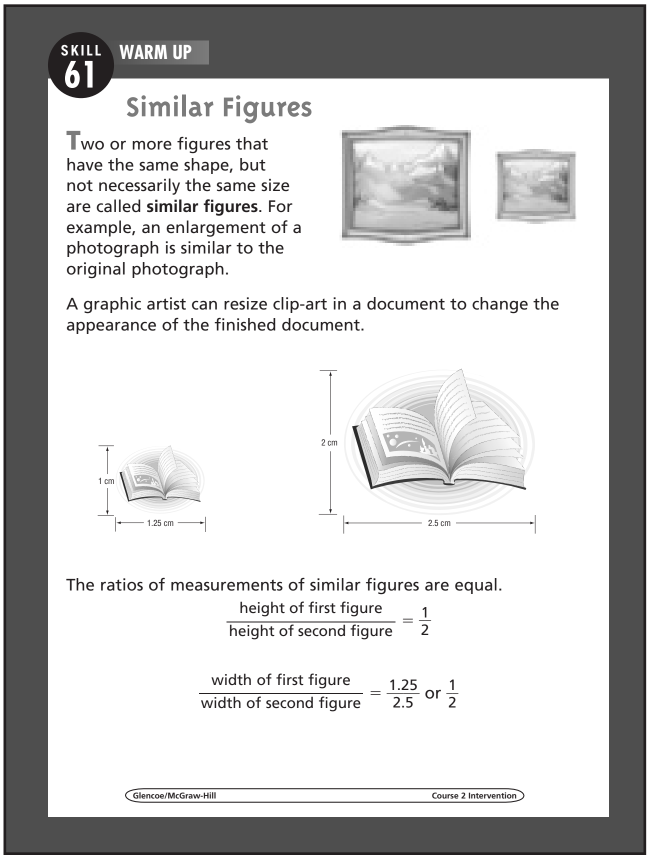
OBJECTIVE: Investigate similar figures. (Strand: Geometry)

USING THE TRANSPARENCY: Ask students what is meant by *similar*. Have students point out corresponding sides of similar figures on the transparency.

USING THE STUDENT WORKBOOK: Draw a right triangle with sides measuring 3 inches, 4 inches, and 5 inches on the chalkboard. Draw another right triangle with sides measuring 9 inches, 12 inches, and 15 inches. Ask the students to find the ratios of the corresponding sides.

EXTENSION: Have students identify similar objects in the classroom and justify how they are similar.

Transparency, Skill 61


SKILL 61 WARM UP

Similar Figures

Two or more figures that have the same shape, but not necessarily the same size are called **similar figures**. For example, an enlargement of a photograph is similar to the original photograph.

A graphic artist can resize clip-art in a document to change the appearance of the finished document.

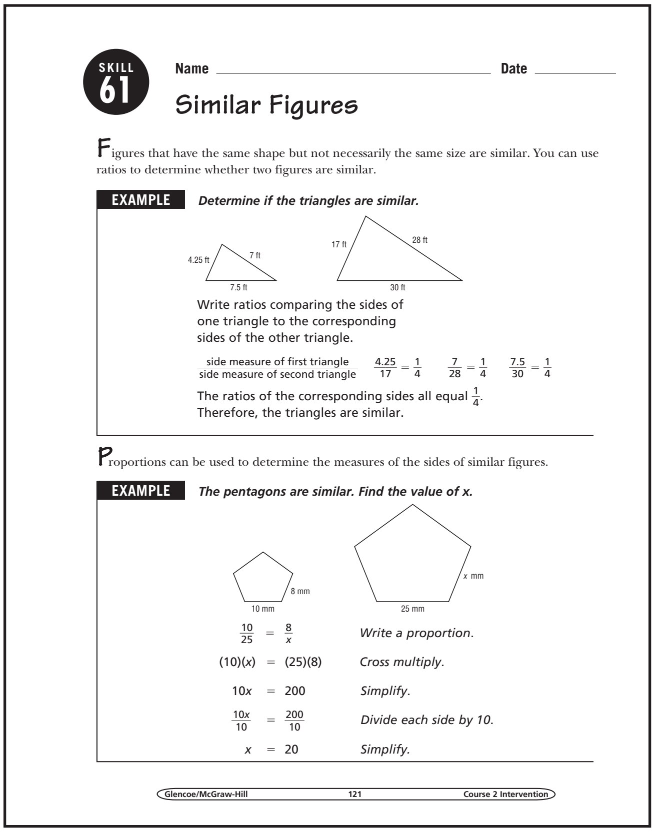
The ratios of measurements of similar figures are equal.

$$\frac{\text{height of first figure}}{\text{height of second figure}} = \frac{1}{2}$$

$$\frac{\text{width of first figure}}{\text{width of second figure}} = \frac{1.25}{2.5} \text{ or } \frac{1}{2}$$

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 121


SKILL 61 Name ____________ Date ______

Similar Figures

Figures that have the same shape but not necessarily the same size are similar. You can use ratios to determine whether two figures are similar.

EXAMPLE *Determine if the triangles are similar.*

Write ratios comparing the sides of one triangle to the corresponding sides of the other triangle.

$\frac{\text{side measure of first triangle}}{\text{side measure of second triangle}}$ $\frac{4.25}{17} = \frac{1}{4}$ $\frac{7}{28} = \frac{1}{4}$ $\frac{7.5}{30} = \frac{1}{4}$

The ratios of the corresponding sides all equal $\frac{1}{4}$. Therefore, the triangles are similar.

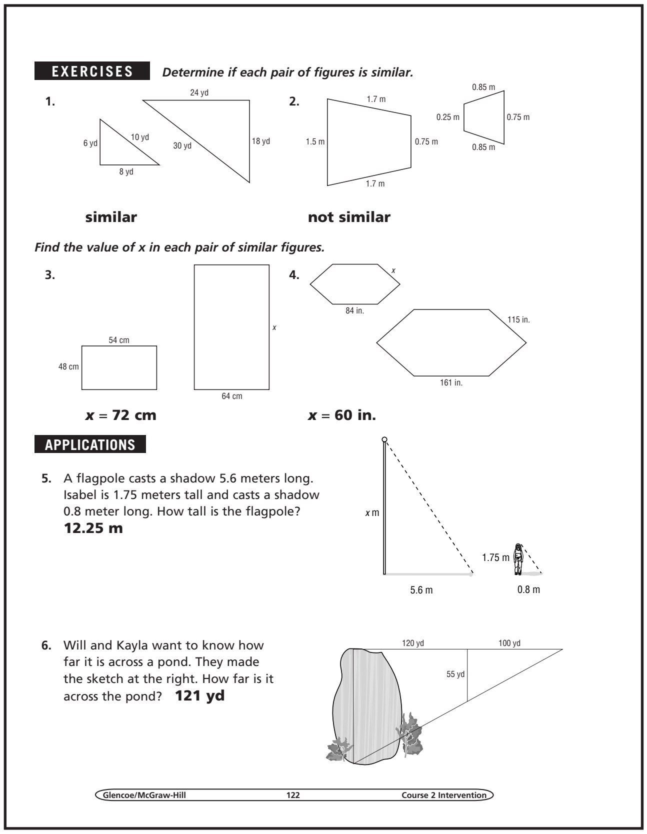
Proportions can be used to determine the measures of the sides of similar figures.

EXAMPLE *The pentagons are similar. Find the value of x.*

$\frac{10}{25}$	=	$\frac{8}{x}$	*Write a proportion.*
$(10)(x)$	=	$(25)(8)$	*Cross multiply.*
$10x$	=	200	*Simplify.*
$\frac{10x}{10}$	=	$\frac{200}{10}$	*Divide each side by 10.*
x	=	20	*Simplify.*

Glencoe/McGraw-Hill 121 Course 2 Intervention

Student Workbook, p. 122


EXERCISES *Determine if each pair of figures is similar.*

1.

similar

2.

not similar

Find the value of x in each pair of similar figures.

3.

***x* = 72 cm**

4.

***x* = 60 in.**

APPLICATIONS

5. A flagpole casts a shadow 5.6 meters long. Isabel is 1.75 meters tall and casts a shadow 0.8 meter long. How tall is the flagpole? **12.25 m**

6. Will and Kayla want to know how far it is across a pond. They made the sketch at the right. How far is it across the pond? **121 yd**

Glencoe/McGraw-Hill 122 Course 2 Intervention

SKILL 62 — TEACHER NOTES

Percents as Fractions and Decimals

OBJECTIVE: Express percents as fractions and decimals. (Strand: Number and Operation)

USING THE TRANSPARENCY: Write the percent 25% on the chalkboard. Have students describe how they would write this percent as a fraction in simplest form and as a decimal.

USING THE STUDENT WORKBOOK: Have students work in pairs. Have one student write the fraction of a percent in simplest form and the other student write the decimal. Then have the students reverse roles.

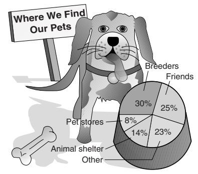
EXTENSION: Provide retail store circulars and have students convert discounts from percents to fractions or vice versa.

Transparency, Skill 62

SKILL 62 WARM UP

Percents as Fractions and Decimals

Many times you will see statistics that are expressed as percents. One example is a circle graph like the one shown at the right.



Percents can be expressed as fractions and decimals.

To express a percent as a fraction:
- Write a fraction with the percent as the numerator with a denominator of 100.
- Then write the fraction in simplest form.

To express a percent as a decimal:
- Express the percent as a fraction with a denominator of 100.
- Then express the fraction as a decimal.

Express $93\frac{3}{4}\%$ as a fraction.

$93\frac{3}{4}\% = \frac{93\frac{3}{4}}{100}$

$= \frac{\frac{375}{4}}{100}$

$= \frac{375}{4} \times \frac{1}{100}$

$= \frac{375}{400}$ or $\frac{15}{16}$

Therefore, $93\frac{3}{4}\% = \frac{15}{16}$.

Express 12.5% as a decimal.

$12.5\% = \frac{12.5}{100}$

$= \frac{12.5}{100} \times \frac{10}{10}$

$= \frac{125}{1,000}$

$= 0.125$

Therefore, 12.5% = 0.125.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 123

SKILL 62 Name ____________ Date ______

Percents as Fractions and Decimals

To write a percent as a fraction, write a fraction with the percent in the numerator and with a denominator of 100, $\frac{r}{100}$. Then write the fraction in simplest form.

EXAMPLES *Express each percent as a fraction.*

a. 40%

$40\% = \frac{40}{100}$

$= \frac{2}{5}$

Therefore, $40\% = \frac{2}{5}$.

b. $87\frac{1}{2}\%$

$87\frac{1}{2}\% = \frac{87\frac{1}{2}}{100}$

$= \frac{\frac{175}{2}}{100}$

$= \frac{175}{2} \times \frac{1}{100}$

$= \frac{175}{200}$

$= \frac{7}{8}$

Therefore, $87\frac{1}{2}\% = \frac{7}{8}$.

To express a percent as a decimal, first express the percent as a fraction with a denominator of 100. Then express the fraction as a decimal.

EXAMPLES *Express each percent as a decimal.*

a. 51%

$51\% = \frac{51}{100}$

$= 0.51$

Therefore, 51% = 0.51.

b. 90.2%

$90.2\% = \frac{90.2}{100}$

$= \frac{90.2 \times 10}{100 \times 10}$

$= \frac{902}{1,000}$

$= 0.902$

Therefore, 90.2% = 0.902.

Glencoe/McGraw-Hill 123 Course 2 Intervention

Student Workbook, p. 124

EXERCISES *Express each percent as a fraction.*

1. 75% $\frac{3}{4}$
2. 84% $\frac{21}{25}$
3. 90% $\frac{9}{10}$
4. $18\frac{1}{2}$ $\frac{37}{200}$
5. 38% $\frac{19}{50}$
6. $33\frac{1}{3}\%$ $\frac{1}{3}$
7. 56% $\frac{14}{25}$
8. 60% $\frac{3}{5}$

Express each percent as a decimal.

9. 82% **0.82**
10. 61.5% **0.615**
11. 8.9% **0.089**
12. $48\frac{1}{2}\%$ **0.485**
13. 70% **0.7**
14. $27\frac{1}{4}\%$ **0.2725**
15. 3% **0.03**
16. 0.25% **0.0025**

Write each percent as a fraction in simplest form and write as a decimal.

17. 18% $\frac{9}{50}$; **0.18**
18. 22% $\frac{11}{50}$; **0.22**
19. $82\frac{1}{2}\%$ $\frac{33}{40}$; **0.825**
20. $\frac{5}{8}\%$ $\frac{1}{160}$; **0.00625**
21. $91\frac{2}{3}\%$ $\frac{11}{12}$; **0.916**
22. 19.6% $\frac{49}{250}$; **0.196**
23. 0.5625% $\frac{9}{1,600}$; **0.005625**
24. 4.9% $\frac{49}{1,000}$; **0.049**

APPLICATIONS

25. The average household in the United States spends 15% of its money on food. Express 15% as a decimal.
0.15

26. Bananas grow on plants that can be 30 feet tall. A single banana may be 75% water. Express 75% as a fraction and as a decimal.
$\frac{3}{4}$; **0.75**

27. In the United States, showers usually account for 32% of home water use. Express this percent as a fraction and as a decimal.
$\frac{8}{25}$; **0.32**

28. Only 2% of earthquakes in the world occur in the United States. Express this percent as a fraction and as a decimal.
$\frac{1}{50}$; **0.02**

Glencoe/McGraw-Hill 124 Course 2 Intervention

SKILL 63

TEACHER NOTES

Percent of a Number

OBJECTIVE: Find the percent of a number. (Strand: Number and Operation)

USING THE TRANSPARENCY: Have students use a 10 × 10 grid to show various percents such as 50%, 30%, 45%, and so on.

USING THE STUDENT WORKBOOK: Have students explain what happens to a percent of a number as the percent decreases. Ask them what happens when the percent increases. Then ask what happens when the percent is greater than 100%.

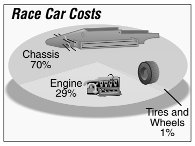
EXTENSION: Have students go through store circulars and find actual prices when given the percent of an original price.

Transparency, Skill 63

SKILL 63 WARM UP

Percent of a Number

The circle graph shows the breakdown of the cost of a race car. If the total cost of a race car is $750,000, what is the cost of the chassis and the cost of the engine?



To find the cost of the chassis you must find 70% of $750,000.

Change the percent to a decimal.

$70\% = \frac{70}{100} = 0.7$

Multiply the number by the decimal.

$750{,}000 \times 0.7 = 525{,}000$

The cost of the chassis is $525,000.

To find the cost of the engine, you must find 29% of $750,000.

Change the percent to a decimal.

$29\% = \frac{29}{100} = 0.29$

Multiply the number by the decimal.

$750{,}000 \times 0.29 = 217{,}500$

The cost of the engine is $217,500.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 125

SKILL 63 Name ______________ Date ________

Percent of a Number

To find the percent of a number, you can either change the percent to a fraction and then multiply, or change the percent to a decimal and then multiply.

EXAMPLE *Old Yankee Stadium in New York had a capacity of about 57,500. If attendance for one baseball game was about 90%, approximately how many people attended the game?*

Change the percent to a decimal.

$90\% = \frac{90}{100}$ or 0.9

Multiply the number by the decimal.

$57{,}500 \times 0.9 = 51{,}750$

About 51,750 people attended the game.

EXERCISES *Find the percent of each number.*

1. 50% of 48 **24**
2. 25% of 164 **41**
3. 70% of 90 **63**
4. 60% of 125 **75**
5. 55% of 960 **528**
6. 35% of 600 **210**
7. 15% of 120 **18**
8. 6% of 50 **3**
9. 200% of 13 **26**
10. 55% of 84 **46.2**
11. 16% of 48 **7.68**
12. 150% of 60 **90**
13. 45% of 80 **36**
14. 60% of 40 **24**
15. 18% of 300 **54**
16. 5% of 16 **0.8**
17. 15% of 50 **7.5**
18. 100% of 47 **47**
19. 12.5% of 60 **7.5**
20. 0.02% of 80 **0.016**

Glencoe/McGraw-Hill 125 Course 2 Intervention

Student Workbook, p. 126

21. 0.5% of 180 **0.9**
22. 0.1% of 770 **0.77**
23. 1.4% of 40 **0.56**
24. 1.05% of 62 **0.651**
25. $12\frac{1}{2}$% of 70 **8.75**
26. $5\frac{3}{8}$% of 200 **10.75**
27. $2\frac{1}{4}$% of 150 **3.375**
28. $33\frac{1}{3}$% of 45 **15**

APPLICATIONS *Sarah has a part-time job. Each week she budgets her money as shown in the table. Use this data to answer Exercises 29–31.*

Sarah's Budget	
Savings	40%
Lunches	25%
Entertainment	15%
Clothes	20%

29. If Sarah made $90 last week, how much can she plan to spend on entertainment? **$13.50**
30. If Sarah made $105 last week, how much should she plan to save? **$42.00**
31. If Sarah made $85 last week, how much can she plan to spend on lunches? **$21.25**
32. The population of the U.S. was about 290 million people in 2004. The population of the New York Metropolitan area was about 7.3% of the total. About how many people lived in the New York area in 2004? **about 21,200,000 people**
33. Ninety percent of the seats of a flight are filled. There are 240 seats. How many seats are filled? **216 seats**
34. Of the people Joaquin surveyed, 60% had eaten lunch in a restaurant in the past week. If Joaquin surveyed 150 people, how many had eaten lunch in a restaurant in the past week? **90 people**
35. A car that normally sells for $25,900 is on sale for 84.5% of the usual price. What is the sale price of the car? **$21,885.50**

Glencoe/McGraw-Hill 126 Course 2 Intervention

SKILL 64

TEACHER NOTES

Percent Proportion

OBJECTIVE: Solve problems using a percent proportion. (Strand: Number and Operation)

USING THE TRANSPARENCY: Surveys and polls often express results as percents. Have groups of students investigate various surveys using percents and then write a problem using the percents.

USING THE STUDENT WORKBOOK: Encourage students to estimate the answers first, and then write the percent proportion. Finally, have them use a calculator to solve the problem.

EXTENSION: Have students find a survey and results from a newspaper or the Internet and explain the percents.

Transparency, Skill 64

SKILL 64 WARM UP

Percent Proportion

Chase asked students where they buy music. The results of his survey, rounded to the nearest whole percent, are shown in the table.

Favorite Place to Buy Music	
General Merchandise Store	23%
Electronics Store	25%
Music Store	33%
Online Store	18%
Artist or Band	1%

If 84 students stated that their favorite place to buy music is from an online store, how many students did Chase survey?

$\frac{a}{b} = \frac{p}{100}$ *percent proportion*

$\frac{84}{b} = \frac{18}{100}$ $a = 84, p = 18$

$84 \cdot 100 = 18 \cdot b$ *Cross multiply.*

$8400 = 18b$ *Simplify.*

$466.67 \approx b$ *Divide each side by 18.*

Chase surveyed about 467 students.

Kevin asked eighth graders their favorite place to buy computer games. Seventy-two of the 132 students he asked said that they preferred to buy computer games at a computer store. What percent of the students surveyed said their favorite place to buy computer games is a computer store? Round to the nearest tenth.

$\frac{a}{b} = \frac{p}{100}$ *percent proportion*

$\frac{72}{132} = \frac{r}{100}$ $a = 72, b = 132$

$72 \cdot 100 = 132r$ *Cross multiply.*

$7200 = 132r$ *Simplify.*

$54.5 = r$ *Divide each side by 132.*

54.5% of the students surveyed prefer to buy computer games at a computer store.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 127

SKILL 64 Name ______________________ Date ________

Percent Proportion

You can use the percent proportion to solve problems involving percents.

$\frac{a}{b} = \frac{p}{100}$ a = part b = base p = percent

EXAMPLES

23.4 is what percent of 65?

The part is 23.4 and the base is 65.

$\frac{a}{b} = \frac{p}{100}$

$\frac{23.4}{65} = \frac{p}{100}$

$23.4 \cdot 100 = 65 \cdot p$

$2{,}340 = 65p$

$36 = p$

23.4 is 36% of 65.

55% of what number is 33?

The part is 33 and the percent is 55% or $\frac{55}{100}$.

$\frac{a}{b} = \frac{p}{100}$

$\frac{33}{b} = \frac{55}{100}$

$33 \cdot 100 = 55 \cdot b$

$3{,}300 = 55b$

$60 = b$

55% of 60 is 33.

EXERCISES *Tell whether each number is the part, base, or percent.*

1. What number is 25% of 20? **25%: percent; 20: base**
2. What percent of 10 is 5? **10: base; 5: part**
3. 14% of what number is 63? **14%: percent; 63: part**
4. 7 is what percent of 28? **7: part; 28: base**
5. 78% of what number is 50? **78%: percent; 50: part**
6. 72 is 24% of what number? **72: part; 24% percent**

Write a proportion for each problem. Then solve. Round answers to the nearest tenth.

7. What percent of 25 is 5? **20%**
8. 9.3% of what number is 63? **677.4**

Glencoe/McGraw-Hill 127 Course 2 Intervention

Student Workbook, p. 128

9. 30% of what number is 27? **90**
10. 126 is 39% of what number? **323.1**
11. 61.6 is what percent of 550? **11.2%**
12. 108 is 18% of what number? **600**
13. What percent of 84 is 20? **23.8%**
14. What percent of 400 is 164? **41%**
15. 29.7 is 55% of what number? **54**
16. 18% of 350 is what number? **63**
17. 61.5 is what percent of 600? **10.3%**
18. 72.4 is 23% of what number? **314.8**
19. What number is 31% of 13? **4.0**
20. $33\frac{1}{3}$% of what number is 15? **45**
21. Use a proportion to find $12\frac{2}{3}$% of 462. Round to the nearest hundredth. **58.52**
22. Use a proportion to determine what percent of 512 is 56. Round to the nearest hundredth. **10.94%**
23. Use a proportion to determine 23% of what number is 81.3. Round to the nearest hundredth. **353.48**

APPLICATIONS

24. There are 18 girls and 15 boys in Tyler's homeroom. What percent of Tyler's homeroom are boys? Round to the nearest tenth. **45.5%**
25. If 32% of the 384 students in the eighth grade walk to school, about how many eighth graders walk to school? **about 123 students**
26. At North Middle School, 53% of the students are girls. There are 927 students at the school. How many of the students are girls? **about 491 students**

Glencoe/McGraw-Hill 128 Course 2 Intervention

SKILL 65

TEACHER NOTES

Percent of Change

OBJECTIVE: Find the percent of increase or decrease. (Strand: Number and Operation)

USING THE TRANSPARENCY: Write the phrases "an increase from 40 to 50" and "a decrease from 50 to 40" on the chalkboard. Have students describe how they would find the percent of increase or decrease.

USING THE STUDENT WORKBOOK: Have students work in pairs. Have one student write the percent proportion and the other student solve the proportion. Then have the students reverse roles.

EXTENSION: Have students research and report on changes in the stock market over the course of a week.

Transparency, Skill 65

SKILL 65 WARM UP

Percent of Change

The value of the stock market is summarized daily by several organizations. One such summary is shown in the table. What was the percent of change from Monday to Tuesday? Round to the nearest tenth.

Stock Market Closing Value	
Monday	1,127.23
Tuesday	1,121.22
Wednesday	1,130.52
Thursday	1,132.05
Friday	1,139.83

Subtract to find the amount of change.

1,127.23 − 1,121.22 = 6.01 *original value − new value*

Solve the percent proportion. Compare the amount of increase to the original amount.

$\text{percent of change} = \frac{\text{amount of change}}{\text{original amount}}$

$= \frac{6.01}{4{,}127.23}$ *Substitution*

≈ 0.005

There was a 0.5% decrease in the value of the stock market from Monday to Tuesday.

What was the percent of change from Thursday to Friday? Round to the nearest tenth.

1,139.83 − 1,132.05 = 7.78 *new value − old value*

$\text{percent of change} = \frac{\text{amount of change}}{\text{original amount}}$

$= \frac{7.78}{1{,}139.83}$ *Substitution*

≈ 0.007

There was a 0.7% increase in the value of the stock market from Thursday to Friday.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 129

SKILL 65 Name ______ Date ______

Percent of Change

A **percent of change** tells the percent an amount has increased or decreased. When an amount increases, the percent of change is a **percent of increase.**

EXAMPLE ***According to the U.S. Department of Labor, there were approximately 126,708,000 people employed in 1996. In 2002, there were about 136,485,000 people employed. Find the percent of increase in the number of people employed.***

To find the percent of increase, you can follow these steps.

1. Subtract to find the amount of change.
   new − original
   136,485,000 − 126,708,000 = 9,777,000 *new* − original
2. Write a ratio that compares the amount of change to the original amount. Express the ratio as a percent.
   $\text{percent of change} = \frac{\text{amount of change}}{\text{original amount}}$
   $= \frac{9{,}777{,}000}{126{,}708{,}000}$ *Substitution*
   ≈ 0.0772

The number of people employed increased about 7.72%.

When the amount decreases, the percent of change is a **percent of decrease.** Percent of decrease can be found using the same steps.

EXAMPLE ***A handheld computer that originally sells for $249 is on sale for $219. What is the percent of decrease of the price of the computer?***

original price − new price

249 − 219 = 30

$\text{percent of change} = \frac{\text{amount of change}}{\text{original amount}}$

$= \frac{30}{249}$ *Substitution*

≈ 0.12

The percent of decrease in the price of the handheld computer is about 12%.

Glencoe/McGraw-Hill 129 Course 2 Intervention

Student Workbook, p. 130

EXERCISES ***Find the percent of change. Round to the nearest tenth.***

1. old: $14.50
   new: $13.05
   10% decrease
2. old: 237 students
   new: 312 students
   31.6% increase
3. old: 27.4 inches of snow
   new: 22.8 inches of snow
   16.8% decrease
4. old: 12,000 cars per hours
   new: 14,300 cars per hour
   19.2% increase
5. old: 2.3 million bushels
   new: 3.1 million bushels
   34.8% increase
6. old: $119.50
   new: $79.67
   33.3% decrease
7. old: $7,082
   new: $10,189
   43.9% increase
8. old: 37.5 hours
   new: 42.0 hours
   12% increase
9. old: 74.8 million acres
   new: 67.5 million acres
   9.8% decrease
10. old: 5.7 liters
    new: 4.8 liters
    15.8% decrease

APPLICATIONS

11. At the beginning of the day, the stock market was at 10,120.8 points. At the end of the day, it was at 10,058.3 points. What was the percent of change in the stock market value?
    0.7% decrease
12. An auto manufacturer suggests a selling price of $32,450 for its sport coupe. The next year it suggests a selling price of $33,700. What is the percent of change in the price of the car?
    3.9% increase
13. The U.S. Consumer Price Index in 1990 was 391.4. By 2000 the Consumer Price Index was 515.8. Find the percent of change.
    31.8% increase
14. During the past school year, there were 2,856 students at Main High School. The next year there were 3,042 students. What was the percent of change? **6.5% increase**
15. During a clearance sale, the price of a television is reduced from $1,099 to $899 the first week. The next week, the price of the television is lowered to $739. What is the percent of change each week? What is the percent of change from the original price to the final price? **18.2%; 17.8%; 32.8%**

Glencoe/McGraw-Hill 130 Course 2 Intervention

SKILL 66

TEACHER NOTES

Unit Rate

OBJECTIVE: Find unit rates in various situations. (Strand: Algebra)

USING THE TRANSPARENCY: Have students discuss instances where they have heard prices described in unit rates.

USING THE STUDENT WORKBOOK: Engage students in a discussion about cell phone plans. They are likely familiar with a rate per text message or a rate per minute.

EXTENSION: Have students use grocery store circulars to compare the prices of the same item between different stores. Use fruits, vegetables, or canned goods.

Transparency, Skill 66

SKILL 66 **WARM UP**

Unit Rate

Meisha is getting a new cell phone and plan for her birthday. She is trying to determine which company provides the best price for text messages.

To compare the companies, you need to have a common "unit" to use for comparison. In this case, find the *unit rate*, or cost per text message.

Company	Number of Text Messages	Price
Cell Phone A	50	$4.99
Cell Phone B	100	$8.50
Cell Phone C	250	$18.50

Company A	Company B	Company C
$4.99 for 50 messages	$8.50 for 100 messages	$18.50 for 250 messages
$4.99 *per* 50 messages	$8.50 *per* 100 messages	$18.50 *per* 250 messages
$4.99 ÷ 50	$8.50 ÷ 100	$18.50 ÷ 250
$0.10 per message	$0.085 per message	$0.074 per message

Now that each price is stated in a unit rate (per message), it is easy to compare. Company C offers the best plan on text messages.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 131

SKILL 66 Name ______ Date ______

Unit Rate

EXAMPLE ***Mr. Lee's car burned 6 gallons of gas when he drove 120 miles. Ms. Mendoza drove her car 100 miles and used 4 gallons of gas. Which car gets more miles per gallon of gas?***

Miles per gallon is a *unit rate*. This unit rate means how many miles a car can drive using 1 gallon of gas.

To find the unit rate for each, set up a ratio.

miles driven/gallons of gas

Mr. Lee's Car	Ms. Mendoza's Car
120 miles/6 gallons	100 miles/4 gallons

Divide the numerator by the denominator to find how many miles the car can drive on 1 gallon of gas.

Mr. Lee's Car	Ms. Mendoza's Car
120 miles/6 gallons	100 miles/4 gallons
120 ÷ 6 = 20 miles/ gallon	100 ÷ 4 = 25 miles/gallon

Now you can compare the unit rates. Ms. Mendoza's car gets 25 miles per gallon, while Mr. Lee's car gets only 20 mile per gallon. So Ms. Mendoza's car gets more miles per gallons than Mr. Lee's.

EXERCISES ***Calculate a unit rate for each situation.***

1. 5 pounds of apples cost $7.25. How much do apples cost per pound? **$1.45 per pound**
2. 245 busses carried 8575 students to school. How many students were there per bus? **35 students per bus**
3. An airplane flew 1692 miles in 3 hours. What was the plane's speed in miles per hour? **564 miles per hour**
4. T-shirts are on sale at 5 for $33. What is the unit rate per shirt? **$6.60 per shirt**

Glencoe/McGraw-Hill 131 Course 2 Intervention

Student Workbook, p. 132

EXERCISES ***Use unit rates to solve each problem.***

5. The SuperLaser printer prints 13 pages in 3 minutes. The PhotoFlash printer prints 26 pages in 5 minutes. Find the unit rate per page. Which printer prints faster? **The PhotoFlash (5.2 pages/minute vs. 4.33 pages/minute)**
6. At QuickShop, 6 cans of cat food cost $10. At Hopper's Grocery, cat food costs $7.50 for 4 cans. Find the price per can at each store. Which store gives you a better deal? **QuickShop ($1.67/can vs $1.88/can)**
7. Jane walked 3 miles in 45 minutes. Alexis walked 5 miles in 1 hour and 40 minutes. Find the rate for each walker. Who walked faster? **Jane, 15 minutes / mile; Alexis 20 minutes / mile; Jane walked faster.**
8. SonicBoom is having a sale on CDs. Buy any 8 CDs for $46. What is the unit rate of each CD? **$5.75 per CD**

APPLICATIONS ***At Sheffield Farms, you can pick your own fruit. Strawberries cost $3/quart, raspberries cost $4.50/quart, and blueberries cost $2.50/quart. Mark picked 4 quarts of each kind of berry.***

9. Which cost more: 4 quarts of strawberries, or 4 quarts of raspberries? **Raspberries**
10. How much did all 12 quarts cost together? **$40.00**
11. What was the average (mean) price per quart that Mark paid for his berries? **$3.33 per quart.**

Mark mixed all the berries together and put them in the blender with milk and ice to make smoothies. Each quart of berries made 1.5 quarts of smoothie. He sold the smoothies at his town's Summer Fair. He wanted to make a profit, so he sold the smoothies for more than it cost to make them.

12. How much did it cost Mark to make 1 quart of smoothie? **$2.22**
13. What price should Mark charge for the smoothies in order to make a profit? **It cost him $2.22 per quart, so he needs to charge at least $2.23 per quart to make a profit**
14. If Mark sells 3 quarts of smoothie for $7.35, will he make or lose money? Explain your reasoning. **He will make money. The 3 quarts sold for $2.45/quart, and only cost him $2.22 to make.**

Glencoe/McGraw-Hill 132 Course 2 Intervention

SKILL 67

TEACHER NOTES

Using Rates to Convert Currencies

OBJECTIVE: To use proportions to convert between currencies. (Strand: Algebra)

USING THE TRANSPARENCY: If Internet access is available, have students find the current exchange rate. See how the price of the souvenirs varies from the numbers given in the example.

USING THE STUDENT WORKBOOK: Have students share any experiences they have with using different currencies or discuss the current exchange rates for some of the countries shown in the worksheet.

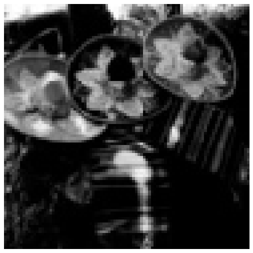
EXTENSION: Have students plan a vacation to a country outside the U.S. Have them find a hotel, meal, and an amusement activity and convert all the prices to U.S. dollars to determine how much they must save to take the vacation.

Transparency, Skill 67

SKILL 67 **WARM UP**

Using Rates to Convert Currencies

Latisha is on vacation with her parents in Mexico. She found some souvenirs she would like to purchase but wants to know what the price is in U.S. dollars. The tags show 190 pesos. What is this equal to in U.S. dollars?



$$\frac{\text{(number of pesos in 1 dollar)}}{\text{(1 dollar)}} = \frac{\text{(price in pesos)}}{\text{(price in dollars)}}$$

$$\frac{10.345 \text{ pesos}}{1 \text{ dollar}} = \frac{190 \text{ pesos}}{x \text{ dollars}}$$

Now, solve for x to determine the price in dollars.

$$x \text{ dollars} \cdot 10.345 \text{ pesos} = 190 \text{ pesos per dollar}$$

$$x \text{ dollars} = \frac{190 \text{ pesos per dollar}}{10.345 \text{ pesos}}$$

$$x = \frac{190}{10.345} = 18.36$$

So the souvenirs cost about $18.36.

Glencoe/McGraw-Hill Course 2 Intervention

Student Workbook, p. 133

SKILL 67 Name ______________________ Date __________

Using Rates to Convert Currencies

EXAMPLE

Karen lives in the U.S. and is planning a trip to Denmark. She used the Internet to look up the prices of Danish hotels. One hotel in Copenhagen listed its price as 1,095.00 krone per night. When Karen checked the exchange rate of U.S. dollars to Danish krone, it was:

$1 = 4.798 DKK.

If Karen books a room right away, what amount in U.S. dollars will be charged to her credit card?

To convert the price in krone to a price in dollars set up a proportion. The exchange rate between krone and dollars is the proportional relationship between the price in krone and the price in dollars. That is, it tells you how many dollars each krone in the hotel's price is worth.

$$\frac{\text{(number of krone in 1 dollar)}}{\text{(1 dollar)}} = \frac{\text{(price in krone)}}{\text{(price in dollars)}}$$

$$\frac{4.798 \text{ DKK}}{1 \text{ dollar}} = \frac{1{,}095 \text{ DKK}}{x \text{ dollars}}$$

Now, solve for x to determine the price of the hotel in dollars.

$$x \text{ dollars} \bullet 4.798 \text{ DKK} = 1{,}095 \text{ DKK per dollar}$$

$$x \text{ dollars} = \frac{1{,}095 \text{ DKK per dollar}}{4.798 \text{ DKK}}$$

$$x = \frac{1{,}095}{4.798}$$

$$= 228.22.$$

So the hotel room costs $228.22 per night.

Glencoe/McGraw-Hill 133 Course 2 Intervention

Student Workbook, p. 134

EXERCISES *Use this table of exchange rates to solve the following problems. For each problem, convert the given price into the new currency.*

	1 U.S. Dollar	1 Brazilian Real	1 Chinese Yuan	1 Euro	1 Hong Kong Dollar
U.S. Dollar	1	0.60	0.14	1.55	0.13
Brazilian Real	1.66	1	0.24	2.57	0.21
Chinese Yuan	6.98	4.17	1	10.74	0.9
Euro	0.64	0.39	0.09	1	0.08
Hong Kong Dollar	7.79	4.65	1.12	11.98	1
Indian Rupee	40.8				
Thai Baht	31.67				

1. A shirt costs 450 rupees. What is the price in U.S. dollars? **11.03 dollars**
2. A meal in a restaurant costs 20 euros. What is the price in yuan? **214.8 yuan**
3. A train ticket costs 155 Hong Kong dollars. What is the price in real? **32.55 real**
4. A pair of sneakers costs 280 yuan. What is the price in real? **67.2 real**
5. A book costs 50 yuan. What is the price in U.S. dollars? **7 dollars**
6. A haircut costs 30 U.S. dollars. What is the price in Hong Kong dollars? **233.7 dollars**
7. A CD costs 25 real. What is the price in euros? **9.75 euros**
8. Washing and drying a load of laundry costs 3 U.S. dollars. What is the price in real? **4.98 real**
9. A cab ride costs 42 real. What is the price in yuan? **175.14 yuan**

APPLICATIONS *The exchange table in the Exercises section is incomplete. It does not include columns to show how to convert from Rupees or Baht to other currencies.*

10. Explain how you could use the information you have to figure out how many U.S. dollars 1 Rupee is worth.
Sample answer: I know that 1 U.S. dollar = 40.8 rupees. So I can set up a proportion: $\frac{1 \text{ dollar}}{40.8 \text{ rupees}} = \frac{x \text{ dollars}}{1 \text{ rupee.}}$ **Solving that proportion shows that 1 dollar = 0.0245 rupees.**

Glencoe/McGraw-Hill 134 Course 2 Intervention