1-1 Word Problem Practice

Using a Problem-Solving Plan

1. THEATER SEATING The number of seats in the first 5 rows of the Majestic Theatre is as follows: 10, 14, 18, 22, and 26. Assuming the pattern continues, how many seats are in the next row?

2. COMMUTING Aisha's first summer job requires her to travel downtown. She is interested in finding out how most people get to work each day, so she finds the results of an online survey. According to the survey below, what percent of the workers walk to work?

Workers Ages 16 and Over	Number
Drive alone	7,862,418
Carpool	1,120,982
Take public transit	144,959
Walk	138,496
Other means	149,641
Work at home	346,626

3. BEST BUY Roger likes to eat Crunchy Flakes cereal for breakfast every morning. Crunchy Flakes comes in a 20-ounce box that costs $4.20 and a 30-ounce box that costs $6.00. Explain which box of cereal is the better buy.

4. SHOPPING Paula has $25 to spend at the mall. After shopping, she counts her money and finds she has $2.65 left. How much money did Paula spend at the mall?

HOCKEY STANDINGS For Exercises 5–7, use the information in the table below.

In the National Hockey League, wins (W) are worth 2 points, while ties (T) and overtime losses (OTL) are each worth 1 point. The table shows team standings at the end of a recent hockey season.

PACIFIC	GP	W	L	T	OTL
Anaheim	82	29	35	10	8
Los Angeles	82	28	29	16	9
Phoenix	82	22	36	18	6
Dallas	82	41	26	13	2
San Jose	82	43	21	12	6

Source: NHL Final Standings–2003–2004

5. How many points did Anaheim earn in all?

6. Which team finished with the most points?

7. List the teams in order from greatest to least points earned during the season.

Lesson 1–1

1-2 **Word Problem Practice**

Numbers and Expressions

1. **COMIC BOOKS** Malcolm has 62 comic books and his friend Meg has 49 comic books. What numerical expression represent the total number of comic books they have together?

2. **MUSEUM** The Simpson family visited the local museum one afternoon. Ticket prices are shown below.

Ticket	Price
Adult (19–64)	$17.50
Student (12–18)	$9.00
Child (3–11)	$6.00
Senior Citizen (65+)	$7.00

Write an expression that can be used to calculate the total price the Simpson family paid for 2 adult, 2 student, 1 child and 1 senior citizen ticket.

3. **TEMPERATURE** One city's warmest day of the year reached 107°F. The coldest day of the year fell to 17°F. Write a numerical expression to represent the difference in temperature on those two days.

4. **DIMENSIONS** Marco is drawing a rectangle with a length of 12 inches and width of 10 inches. Write an expression to represent the perimeter of the rectangle.

BASEBALL For Exercises 5 and 6, use the information in the table below.

Both the American League and the National League in Major League Baseball select a most valuable player (MVP) each year. Twenty-eight sports journalists rank order five players that they think deserve the honor. The points are awarded according to the table below. The player with the highest total receives the award.

Rank Order	Points
First place	14
Second place	9
Third place	8
Fourth place	7
Fifth place	6

5. Player A received 21 votes for first place, 5 votes for second place, 1 vote for third place, and 1 vote for fourth place. Write an expression to represent the number of points Player A earned.

6. Player B received 1 vote for first place, 14 votes for second place, 9 votes for third place, 2 votes for fourth place, and 2 votes for fifth place. Write an expression to represent the number of points Player B earned.

7. Did Player A or Player B win the award? Explain.

Lesson 1–2

1-3 Word Problem Practice

Variables and Expressions

1. DROUGHT The farmers in Ravin's town complained about the lack of rain during the growing season. Ravin did some research to find out how much rain typically falls during the growing season compared to the amount of rain during this growing season. She learned that it had rained 7 inches less than normal this season. Write an expression that represents the amount of rain this growing season.

2. REPAIRS Deidre's car needs to be repaired. The cost of the repair is going to be $40 per hour for labor and an additional $120 for parts. Write an expression that would represent the cost of getting the car repaired if a mechanic works on it for h hours.

3. RETAIL SALES Amara works in his parents' clothing shop after school. Sometimes, he prices new merchandise for sale. He uses the table below to determine what the retail price of a piece of clothing should be. Based on the prices in the table, write an expression that Amara could use to calculate the retail price (R) given the cost price (C).

Cost	Retail
14	21
18	27
24	36
30	45
100	150

4. TEMPERATURE The formula that is used to convert Fahrenheit (F) to Celsius (C) is C = (F − 32) ÷ 1.8. Convert 77°F to degrees Celsius.

NUTRITION For Exercises 5–7, use the information in the table below.

Mr. Jacobs is teaching a unit on nutrition. The class has learned that each gram of fat contains 9 Calories, each gram of carbohydrates has 4 Calories, and each gram of protein has 4 Calories. He has his students research the nutritional facts of sandwiches served in the school lunch room.

Nutrition Facts	Fat (g)	Total Calories
Hamburger	29	580
Grilled chicken sandwich	7	360
Tuna wrap	32	440
Meatball sub	24	560
Veggie wrap	8	390
Turkey breast wrap	6	190

Source: http://www.fatcalories.com/results/

5. Write an expression to determine the grams of protein and carbohydrates of a grilled chicken sandwich.

6. How many Calories of fat are in a meatball sub?

7. What percent of the total Calories in a veggie wrap come from fat?

Lesson 1–3

1-4 Word Problem Practice

Properties

1. **TRAVEL** Mike and his family are driving from Dallas to Fort Worth, a distance of 30 miles, to visit a cousin. Then, they will drive from Fort Worth to San Antonio, a distance of 229 miles, to visit his grandparents. On the way back, Mike reverses his trip and travels from San Antonio to Dallas through Forth Worth. Write one equation to show the distance traveled from Dallas to San Antonio, and a second equation to show the distance traveled from San Antonio to Dallas. What do you notice about the distance traveled each way?

2. **SHOPPING** Sara is buying some new clothes for school. She buys a pair of shoes for $65, a blouse for $42, jeans for $58 and a skirt for $35. Using the Associative and Commutative Properties of Addition, add the prices so that the total cost can be found easily with mental arithmetic.

3. **CLOTHES** Most people wear both socks and shoes when they go to work. When getting dressed, is putting on socks and shoes a commutative process? Explain.

4. **COMBINATIONS** A special lock has a unique combination lock. A value is assigned that opens the lock, and any combination of single-digit numbers and operations, with or without parentheses, will open the lock. For example, if 40 is the value assigned to the lock, then 8×5 or $12 + 28$ will open the lock. Find 3 different ways to unlock the lock if the combination is 17.

BASEBALL For Exercises 5 and 6, use the information in the table below.

One statistic used in baseball is percent (PCT) or the number of games a team has won of all of the games played to date. Alfie plays for the Lions in his town league. The table below shows the standing at the end of the season.

Team	Wins	Losses	PCT
Lions	15	5	0.75
Bears	14	6	0.7
Bullhorns	8	12	6

5. Alfie used the Commutative Property and divided 20 by 8 to find the percent for the Bullhorns. What error did Alfie make?

6. Alfie knows that the Mavericks have won 11 out of 20 games. He subtracts to find that the Mavericks lost -9 games. What error did Alfie make?

1-5 Word Problem Practice

Variables and Equations

1. AGE RELATIONSHIPS Gail's mother is 4 years older than 3 times Gail's age. Write an equation to show the relationship between Gail's age g and Gail's mother's age m.

2. CURRENCY EXCHANGE Suppose one U.S. dollar is worth 10.67 Mexican pesos. Write an equation that can be used to find the value of 500 pesos in U.S. dollars d.

3. ALL IN A DAY'S WORK Elise mows lawns during the summer to earn money. She charges an hourly rate to mow a lawn. The table below shows some amounts she charges. How much does Elise charge per hour?

Hours	Pay
3	$18.15
5	$30.25
8	$48.40
12	$72.60

4. GOING FOR A RIDE Orange Cab, a local cab company, charges a flat fee of $2.50 plus $0.40 for every quarter mile a passenger travels. How much would an 8-mile cab ride cost?

PUBLIC TRANSIT For Exercises 5–7, use the information in the table below.

The Area rapid transit system charges the following fees for riding buses and trains.

Bus (single fare)	$1.25
Train (single fare)	$1.25
Monthly Pass (bus and train)	$40.00

5. Samuel averages 6 bus and 2 train trips per week. Write and solve an equation to determine his weekly transportation cost.

6. Write and solve an equation to determine the number of bus and train trips Samuel needs to take in a month in order to make it worthwhile to purchase a monthly pass.

7. If the transit system holds a sale on bus passes and charges $20.00 for unlimited rides for 4 weeks, would it benefit Samuel to buy one? Explain.

1-6 Word Problem Practice

Ordered Pairs and Relations

1. **NEIGHBORS** Kate lives at the home found at the origin of the grid below. Each grid line represents one block. Her friend Hector lives 4 blocks east and 6 blocks north of Kate. Place his house on the grid.
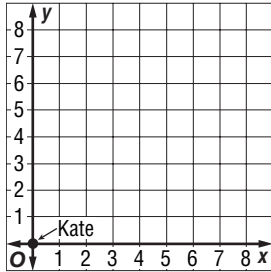
2. **NEIGHBORS** In the grid for Exercise 1, Gail lives 3 blocks west and 2 blocks south of Hector. Where is Gail's house in relation to Kate's?

3. **FENCING** Henry is building a fence in his backyard for his new puppy. He has 36 feet of fencing and wants a fence in a rectangular area. What is one set of whole number dimensions of the fenced-in area?

4. **PARK LOCATIONS** Hannah is taking her younger sister, Shania, to the park. Shania wants to go to the petting zoo. What is the location on the petting zoo on the grid?
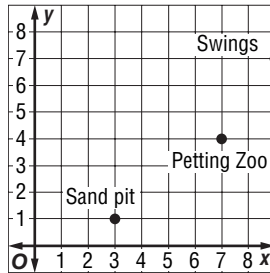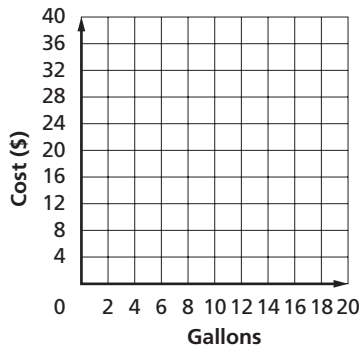
ENERGY COSTS For Exercises 5 and 6, use the information in the table below.

Maya is researching energy costs. She made a table of the cost for different numbers of gallons of gasoline.

5. Find the missing values to complete the table.

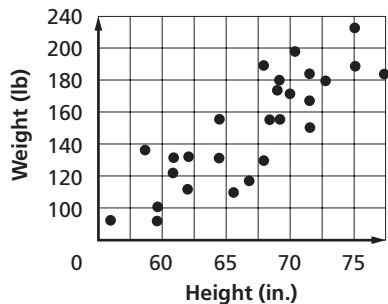| Gallon (*g*)	Cost (*c*)
4	
8	$15.60
12	
	$39.00

6. Graph the data on the grid and connect the points in a straight line.

1-7 Word Problem Practice

Scatter Plots

1. HEIGHT AND WEIGHT The school nurse recorded the height and weight of the students in Brigitte's class. The nurse made a scatter plot of the data. What kind of relationship does the scatter plot show?

2. RELATIONSHIPS Rodney has collected data about his classmates' height and the month and day of their birthday. He will plot the data in a scatter plot. What relationship should Rodney expect to find between the two variables?

3. ARE THEY RELATED? Explain in your own words whether a scatter plot of height vs. intelligence would show a positive, negative, or no relationship.

CARS For Exercises 4 and 5, use the following table.

Ann did a study of the weghts and fuel economy of different cars. She put the information she collected into a table.

Make	MPG (highway)	Weight (lb)
Acura	24	3155
Buick	30	3640
Chevrolet	30	3135
Dodge	32	2730
Honda	40	2810
Hyundai	32	2980
Mazda	34	2815
Nissan	28	3545
Pontiac	32	2605
Toyota	38	2595
Volkswagon	30	3330

Source: www.consumerreports.com

4. Make a scatter plot of the information in the table.
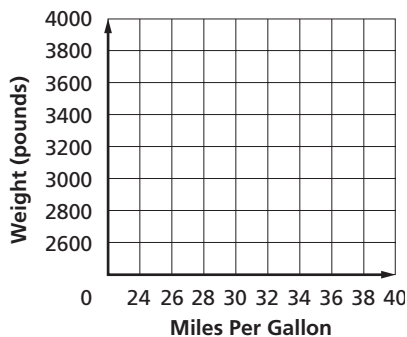
5. What type of relationship, if any, exists between the plotted data values? Explain.

2-1 Word Problem Practice

Integers and Absolute Value

1. ELEVATION The surface of the Dead Sea is 1312 feet below sea level. Use an integer to express the surface of the Dead Sea in relation to sea level.

2. FOOTBALL During a football game between the Eagles and the Bears, the quarterback of the Eagles was tackled for a loss of six yards. Use an integer to express the Eagles' new location on the football field in relation to their previous location.

3. WINDCHILL The windchill factor, shown in the table below,indicates how much colder the wind feels than the actual outdoor temperature. How much colder does it feel when the outdoor temperature is 10°F and the wind is blowing at 10 miles per hour?

Windchill Factor								
Wind	Temperature (°F)							
(mph)	20	15	10	5	0	−5	−10	−15
5	13	7	1	−5	−11	−16	−22	−28
10	9	3	−4	−10	−16	−22	−28	−35
15	6	0	−7	−13	−19	−26	−32	−39
20	4	−2	−9	−15	−22	−29	−35	−42
25	3	−4	−11	−17	−24	−31	−37	−44
30	1	−5	−12	−19	−26	−33	−39	−46
35	0	−7	−14	−21	−27	−34	−41	−48
40	−1	−8	−15	−22	−29	−36	−43	−50

4. BANKING One page in Joe's check register looks like the following table. How do the total deposits compare with the total withdrawals?

Description	Deposit	Withdrawal	Balance
Movies		$15	$360
Paycheck	$300		$660
Gas		$25	$635
Groceries		$50	$585
Car		$150	$235

GOLF For Exercises 5–7, use the following information.
Joe is a golfer. He keeps track of his scores by noting the difference between his score and par, the number of swings it should take the ball to descend into the hole. The scorecard below shows Joe's scores from a recent round of golf.

Big Lake Country Club									
Hole	1	2	3	4	5	6	7	8	9
Par	4	4	5	4	4	3	3	4	5
Score	2	−1	−1	1	0	−2	1	0	2
Hole	10	11	12	13	14	15	16	17	18
Par	4	4	4	3	3	4	5	4	5
Score	1	0	0	−1	2	1	−2	1	−1

5. Compare Joe's scores on the 7th and 13th holes.

6. Compare Joe's scores on the 6th and 18th holes.

7. Write the scores for the 1st, 3rd, 4th and 8th holes in the order from least to greatest.

Lesson 2–1

2-2 Word Problem Practice

Adding Integers

1. **DIVING** Submarine descended 32 feet below the surface. It rose 13 feet to look at a coral reef. Write an addition sentence to find its current depth.

2. **WEATHER** In January, the temperature at the summit of Mt. Everest averages −36°C and can drop as low as −60°C. In July, the average summit temperature is 17°C warmer. What is the average temperature at the summit of Mt. Everest in July?

3. **EARTH SCIENCE** Yosemite Falls is the highest waterfall in North America and the fifth highest in the world. When viewed from the valley, it appears to be a single waterfall. However, it actually has three parts. The upper fall has the longest drop of 1430 feet. The middle cascade is 675 feet long, and the lower fall drops another 320 feet. What is the total length that the water falls?

4. **ROLLER COASTER** The platform of a roller coaster is 5 feet off the ground. The first hill rises an additional 122 feet. The first drop is 118 feet. How far off the ground is the roller coaster after the first drop?

STOCKS For Exercises 5–7, use the table below.

The Dow Jones Industrial Average Index is an index that tracks the performance on the New York Stock Exchange of 30 of the largest companies in the United States. The table below shows the change in the DJIA on a given trading day.

Dow Jones Industrial Average	
Time	Change (Dollars)
10:00	+3.00
12:00	−5.00
2:00	−2.00
4:00	+6.00

5. Write an expression to show the change in value of the Average during the day.

6. The Average closed the day before at 10,812. What was the index at noon?

7. By the end of the day, did the Average gain or lose value? Explain your reasoning.

Lesson 2-2

2-3 Word Problem Practice

Subtracting Integers

1. **SWIMMING** The diving board at Mike's pool is 3 feet above the water level. Mike stepped off the diving board and sank until his feet touched the bottom of the pool, which is 12 feet deep. How many feet did Mike descend from the diving board to the bottom of the pool?

2. **TEMPERATURE** During a 24-hour period, the high temperature was 18°F. The low temperature was −4°F. What was the temperature range for the day?

3. **PETS** The American Kennel Club (AKC) is the largest and second oldest purebred dog registry in the world. The table below shows some breeds registered with the AKC. Describe the changes in the number of beagles and chihuahuas registered from 2003 to 2004.

Breed	2003	2004
Golden Retriever	52,520	52,550
Beagle	45,021	44,555
Dachshund	39,468	40,770
Poodle	32,162	32,671
Chihuahua	24,923	24,850
Siberian Husky	10,660	10,566

Source: www.akc.org/reg/dogreg_stats.cfm

4. **GOLF** Jim and Tom played against each other in a golf tournament. Jim's final score was 6 under par, the average number of swings it should take a golfer to get his ball in the hole. Tom's score was 1 under par. Describe the outcome of their match.

BIRDS For Exercises 5–7, use the following information.

An osprey was flying at an altitude of 80 feet above the ocean surface. The osprey spotted a fish and dove to a depth of 3 feet below the surface of the water to capture the fish. Once the osprey caught the fish, it ascended to a tree branch that was 25 feet above the ground.

5. What was the change in altitude from where the osprey stated to where it landed?

6. How far did the osprey descend to catch the fish?

7. What was the total change in altitude, both up and down, of the osprey from first spotting the fish to landing on the branch?

Lesson 2–3

2-4 **Word Problem Practice**

Multiplying Integers

1. **BUSINESS** Many companies sell shares in the company in order to raise additional money to invest in new projects. Mr. Monroe purchased 10,000 shares of a new company at $3.12 per each share. How much money did Mr. Monroe spend to purchase the shares?

2. **AVIATION** An airplane is approaching its destination has begin its final descent into the airport. If the plane descends at a rate of 300 feet per minute, what is the change in altitude of the plane after four minutes?

3. **FLOODS** Heavy snows and rains caused the river near Harvey's house to flood. When the river crested, it was 5 feet above its normal level. The water started to recede at a rate of 2 inches per day. How many feet did the river recede after 14 days?

4. **WATER PRESSURE** For every 33 feet a scuba diver descends below the surface of the water, the water pressure increases by about 15 pounds per square inch. A diver reaches the bottom of a lake that is 99 feet deep. What is the water pressure?

STOCKS For Exercises 5–7, use the information in the table below.

Company Z is selling stock in its company for the first time. The initial selling price for the stock was $33.00. The table below shows the selling price throughout the morning of the first day.

Stock Z	
Time	**Price**
9:00 A.M.	$33.00
10:00 A.M.	$30.00
11:00 A.M.	$27.00
12:00 P.M.	$24.00

5. How would you describe the rate of change in price per hour?

6. If this rate stays constant, how much would the stock lose in 5 hours?

7. If this rate stays constant, how many more hours will it take for this stock to be worthless?

Lesson 2-4

2-5 Word Problem Practice

Dividing Integers

1. ELEVATOR Hans is at the observatory of the Empire State Building in New York City. The observatory is on the 86th floor of the building. Hans will take the elevator down from the 86th floor to the first floor, a distance of 320 meters. If the ride takes 50 seconds to descend, what is the rate of descent in meters per second?

2. TEMPERATURE Lydia and her family live in Canada. During the month of February, Lydia recorded the average daily temperature for one week. Her results are shown in the table below. What was the average for that week?

Sun	Mon	Tue	Wed	Thu	Fri	Sat
−3°C	−4°C	0°C	−2°C	0°C	3°C	−1°C

3. ENERGY Most energy produced in the industrialized world comes from fossil fuels. The table below shows the energy production from fossil fuels in the United States for 2000. What was the average total energy produced from fossil fuels per month? Round to the nearest tenth.

Source	British thermal units (Btu) (in quadrillions)
Coal	23
Natural Gas	20
Crude Oil	12

Source: www.eia.doe.gov/emeu/aer/eh/frame.html

4. SKYDIVING The time an object is in freefall is given by the formula $t = \dfrac{v}{2g}$ where v is the final velocity, g is gravitational constant of 32 ft/sec^2 and t is the time of the fall. A skydiver jumps out of a plane at 6000 feet. How long did it take to reach the final velocity of −96 feet per second?

TESTS For Exercises 5–7, use the following information.

Jessica received these scores on her first four tests in math class.
86, 88, 93, 90

5. What is Jessica's average score on the four math tests?

6. Jessica wants to earn at least a 90 in her class. She has one more test before the end of the marking term. What must she score on that test in order to have an average of 90 for the grading period?

7. Based on the scores Jessica has earned to date, is it possible for her to have an average of 95 for the grading period? Explain. Assume that each test is worth a maximum of 100 points.

Lesson 2–5

2-6 Word Problem Practice

The Coordinate System

1. **MAPS** Brenda noticed that the reptile building at the zoo was located at the point $(-3, 4)$ on the zoo map. Name the quadrant of the map that the reptile building is in.

2. **DIRECTIONS** Joe and his family are visiting their cousins who have just moved to a new house. Joe and his family are located at the origin of the map and their cousins' house is located at $(-3, -5)$. Assuming that each interval on the map is one city block, how many city blocks in each direction do Joe and his family need to go to get to their cousins' new house?

3. **SCALE DRAWINGS** Jimmy made a scale drawing of his back yard on a coordinate grid. The corners of his pool are located at $(4, 2)$, $(4, -2)$, $(-1, -2)$, and $(-1, 2)$. Name the quadrant in which each point is located.

4. **CITY PLANNING** On the map of Janine's hometown, the movie theater is located at $(-4, 2)$. The bowling alley is located at $(4, 2)$. What would be a good location for a restaurant that would be the same distance from the theater and the bowling alley? Explain.

MAPS For Exercises 5–7, use the following information.

Lashawn and his friends are planning a trip to an amusement park. They use the map below to plan out their trip to the park.
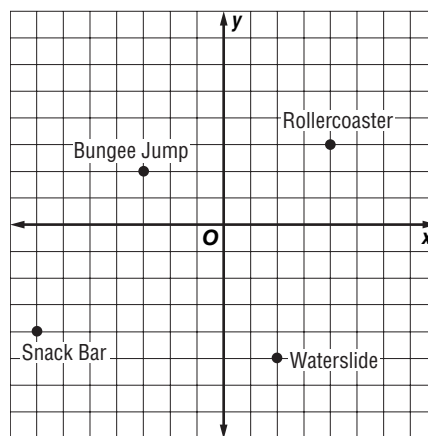
5. What are the coordinates of the roller coaster and water slide?

6. Which amusement is located at $(-3, 2)$?

7. If you are located at $(-2, -1)$, which amusement are you closest to? Explain.

## 3-1 Word Problem Practice

The Distributive Property

1. **FARMING** Mr. Johannsen has a farm with 3 cows, 8 chickens, and some ducks. If the total number of farm animal legs is 40, how many ducks does Mr. Johannsen have on his farm?

2. **STAMPS** Amy buys retired stamps from the U. S. Postal Service catalog. Last month, she bought 8 $0.37 Candy Hearts, 8 $0.48 Niagara Falls, and 8 $0.80 Special Olympics stamps. How much did Amy spend on stamps in all?

3. **FUND-RAISING** The table shows the cookie sales for Tina's troop. If each box costs $3.50, show two ways that Tina could find the troop's total cookie sales.

Kind of Cookie	Number of Boxes
Mint	60 boxes
Vanilla sandwich	42 boxes
Peanut butter	56 boxes

4. **GEOMETRY** Jonah drew two squares with the same dimensions. He then added 2 inches to the length of one square to make it a rectangle. He also added 2 inches to the width of the other square to make it a rectangle. Write an equation that compare the perimeters of the two rectangles.

SAVINGS For Exercises 5 and 6, use the following information.

Daniel wants to buy a bicycle that costs $200.00. He saves the same amount each month from the money he earns mowing lawns. He also saves $15.00 of his monthly allowance.

5. If x represents the amount he earns mowing lawns each month, write an expression to show Daniel's total savings after 8 months.

6. If Daniel earns $25 each month mowing lawns, how long will it take him to save enough money to buy his bicycle?

Lesson 3–1

3-2 Word Problem Practice

Simplifying Algebraic Expressions

1. **ANIMAL SHELTER** There are 15 dogs, 22 cats, and 4 rabbits at a shelter. Each dog needs a collar, a bowl, and a toy. Each cat needs a collar and a bowl. In addition, one scratching post is needed for all of the cats. Each rabbit needs a bowl. Write an expression is simplest form to show the total number of collars c, bowls b, and toys t, that the animal shelter needs for its resident animals.

2. **GEOMETRY** Rangley's father is making a walkway in the back yard. He will use large tiles for the walkway like the one shown below. Write an expression in simplified form for the perimeter of the pentagon.
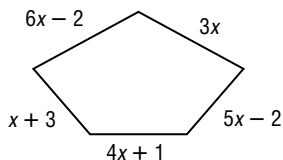
3. **SCHOOL SUPPLIES** Mr. Raphael needs to buy notebooks for his children to start the school year. His son Manny needs some notebooks. His daughter Daphne needs twice as many as does Manny. His other daughter Ophelia says she needs one fewer than 3 times as many as Manny needs. If Mr. Raphael buys x notebooks for Manny, how many notebooks will he need to buy in all? Write an expression in simplified form to show how many notebooks Mr. Raphael needs to buy.

4. **SHOPPING** Three families recently ordered jeans from a catalogue. The Rodriguez family ordered twice as many jeans as the Gomez family, and the Jimenes family ordered 4 times as many jeans as the Gomez family. Write an expression to show how many jeans each family bought.

AMUSEMENT PARKS For Exercises 5 and 6, use the following information.

Three families went to Six Flags together. The number of people in each family is listed in the table.

| Family	Adults	Children	Seniors
McGraw	2	3	1
Churchill	1	2	2
Sanchez	2	1	1

The admission tickets cost was $40 for adults, $25 for children, and $27 for seniors.

5. Write an expression in simplest form to show how much it costs all adults a, children c, and seniors s from the three families to attend the amusement park.

6. Write an expression to find how much the three families spent in all for admission tickets.

3-3 **Word Problem Practice**

Solving Equations by Adding or Subtracting

1. **DISTANCE** Route 27 runs from Bakersville to Malden through Smilyville. The distance from Bakersville to Smilyville is 81 miles, and the distance from Bakersville to Malden is 204 miles. What is the distance from Smilyville to Malden?

Malden

27

Smilyville

Bakersville
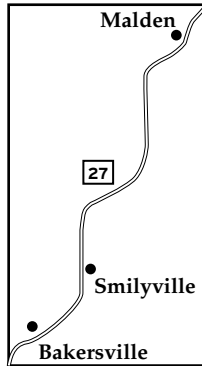
4. **MOUNTAIN CLIMBING** Mt. McKinley in Alaska is the highest mountain in North America at 20,320 feet. A climbing team starts its ascent from a base camp at 2000 feet and ascends 15,235 feet. The team then descends 183 feet before ascending 398 feet. How many more feet must the team ascend to reach the summit?

WEIGHTLIFTING For Exercises 5–7, use the following information.

Eve and Jason have an exercise routine that they do together three days a week. Together, they can lift 225 pounds.

2. **BASEBALL** After $8\frac{1}{2}$ innings, the Cubs are winning the baseball game. How many runs must the Mariners score in the bottom of the ninth inning if they want to win the game?

	Innings				
	1–5	6	7	8	9
Cubs	1	2	0	5	3
Mariners	4	1	2	2	

5. If Eve can lift 113 pounds, how many pounds can Jason lift?

6. If Eve can lift 87 pounds, how many pounds can Jason lift?

3. **SHOPPING** Katie has $200 to buy supplies for her camping trip to Moran State Park. She buys dried food for $49, 2 sleeping bags for $55.95 each, and 3 disposable cameras for $8.25 each. How much money, if any, does Katie have left?

7. What expression can be used to find p, how many pounds Jason can lift if Eve can lift x pounds?

Lesson 3–3

3-4 Word Problem Practice

Solving Equations by Multiplying or Dividing

1. **GEOGRAPHY** The state of Texas has an area of approximately 266,806 square miles. Its area is approximately 220 times the area of the state of Rhode Island. What is the area of Rhode Island?

2. **DISTANCE** Josh and his brother will drive from Boston to New York, a distance of 220 miles. If they drive an average speed of 55 miles per hour, how long will it take Josh and his brother to arrive in New York?

3. **ASTRONOMY** The table shows the mean distances in kilometers from the Sun to several planets. If a rocket is traveling at 32,000 kilometers per hour, how long would it take the rocket to travel from Earth to Saturn?

Planet	Mean distance to the Sun (kilometers)
Earth	149,600,000
Mars	227,900,000
Saturn	2,870,000,000

Source: NASA Solar System Exploration

4. **RESTAURANT** Kurt and four friends are eating in the food court at South Center Mall. They will divide the bill equally among the five of them. Two friends order hamburgers and two order pizza. All of them order soda. Kevin has only $3.75 with him. What can Kurt order to so that each will pay only $3.75?

Hot dog	Pizza	Hamburger	Soda
$2.50	$1.75	$3.25	$1.25

COOKING For Exercises 5 and 6, use the following information.

The holiday dinner is at the Milton's house this year. Mrs. Milton will do most of the cooking.

5. Cooking time for a turkey is determined using the rate of $\frac{1}{3}$ hour per pound. Mrs. Milton figures she will have at most four hours to cook the turkey. What is the largest turkey she should buy?

6. Mrs. Milton will make 6 pounds of yams. If one person eats $\frac{1}{2}$ pound of yams, how many people can Mrs. Milton serve with 6 pounds of yams?

Lesson 3–4

3-5 **Word Problem Practice**

Solving Two-Step Equations

1. **POPULATION** The population of Laredo is 176,576, which is 29,888 greater than twice the population of Longview. What is the population of Longview?

2. **SIZE** A ranch in Wyoming is approximately 825,000 acres. If 8,684 zoos could fit inside the ranch, with 20 acres of ranch left over, how many acres does each zoo cover?

3. **ZOOS** Sasha researched the size of zoos in her state. She found that the zoo in the north part of the state is almost twice as large as the zoo in the south. She also found that the zoo in the south part of the state has 200 fewer than twice the number of animals as the northern zoo. How many animals per acre does each zoo have?

Zoo	Acres	Number of Animals
North	64	?
South	35	3800

4. **DOG PARK** The perimeter of a local dog park measures 156 feet. If the length of the park is 2 feet less than 3 times the width, what are the dimensions of the dog park?

TRAVEL For Exercises 5 and 6, use the following information.

Four members of the Kaplan family will take a river trip down the Colorado River in Colorado State Park. The rafting company charges $10 per day to rent the raft and $15 per person for a half-day river trip, or $100 flat rate for a half-day river trip. The raft can hold up to 10 people.

5. How much will the trip cost the Kaplan family at the per person rate?

6. How many people must be on the river trip to make the flat rate less expensive than the per person rate?

Lesson 3–5

3-6 Word Problem Practice

Writing Two-Step Equations

1. **SHOPPING** Toni and Tricia spend the day at the mall. At the end of the day, the two added up their purchases and found that they spent a total of $107.50. Toni spent $10.00 more than Tricia. Write an equation that can be used to find how much each girl spent.

2. **AGES** All of the girls in Danielle's cabin at camp are the same age. Their counselor is 6 years younger than 3 times their age. Danielle's age and her counselor's ages add up to 30. Write an equation that can be used to find the ages of Danielle and her counselor.

3. **FOOTBALL** The New Orleans Saints scored 7 fewer points than twice the points scored by the Pittsburgh Steelers. The two teams together scored a total of 32 points. Write and solve an equation to show how many points each team scored.

4. **MINIATURE GOLF** Juan, José, and Belinda played a round of miniature golf. Juan scored 5 points more than José, and José scored 3 points less than Belinda. The sum of their scores was 203. How many points did each one score?

PHILANTHROPY For Exercises 5 and 6, use the following information.

Three businesses donated money to charity. The chart shows the pledges and payments made by the businesses.

Business	Amount Pledged (in millions)
Business A	x
Business B	
Business C	

5. Business B pledged $20 million less than twice the amount pledged by Business A. Business C pledged $200 million less than twice the amount pledged by Business B. If x represents the amount pledged by the Business A, write expressions to show the amounts pledged by Business B and Business C in terms of x.

6. The combined pledges of Business A, Business B, and Business C totaled $1035 million. Write an equation that can be used to determine how much each business pledged.

3-7 Word Problem Practice

Sequences and Equations

1. **GAS CONSUMPTION** Mr. Haskell kept track of how much gasoline his car was using. He displayed the data collected in a table.

Gallons Used	1	2	3	n
Miles Driven	23	46	69	?

Write an equation that Mr. Haskell can use to find how many miles he can drive with 15 gallons of gas in his car.

2. **HOBBIES** Shannon collects charms for her charm bracelet. Her charm bracelet had 4 charms on it when she bought it. Each year on her vacation she buys 2 more charms to add to her bracelet. Assume that Shannon continues to buy the same number of charms each year. Write an equation that can be used to find how many charms Shannon will have on her bracelet after 6 years?

3. **PYRAMIDS** When climbing an ancient Mayan pyramid, the Johnson family noticed that the bottom of each side of the pyramid started with 50 large stones. The next step up had 45 large stones, the next step up had 40 stones, and so on. Write an equation to represent the number of stones on each level. How many levels can the pyramid have?

Step	1	2	3	
Stones	45	40	35	?

4. **TRIANGULAR NUMBERS** By arranging bowling pins in their proper order, a triangle is created. The table below shows the number of rows of bowling pins and the total number of pins in the triangle.

The formula $t = \dfrac{n \times (n + 1)}{2}$ can be used to find t, the total number of items in n rows. How many bowling pins would there be if 10 rows of pins were set up?

Rows	1	2	3	4	
Pins	1	3	6	10	

PASCAL'S TRIANGLE For Exercises 5 and 6, use the following information.

Blaise Pascal is known for a special triangular arrangement of numbers, called Pascal's Triangle.. Each number in successive rows of the triangle is created by adding the two numbers in the row above the number.

$$
\begin{array}{c}
1 \\
1 \; 1 \\
1 \; 2 \; 1 \\
1 \; 3 \; 3 \; 1 \\
1 \; 4 \; 6 \; 4 \; 1 \\
1 \; 5 \; 10 \; 10 \; 5 \; 1
\end{array}
$$

5. Starting with the second row from the top, what is the sequence of the diagonal (1 2 3 4 5 6 7)?

6. The sum of each row represents 2^n, starting with the first row, which is $2^0 = 1$. Write an exponential expression for the sum of the values in the sixth row. Simplify the expression.

3-8 Word Problem Practice

Using Formulas

1. **DISTANCE** Cara will move from her hometown of Seattle, Washington, to Portland, Oregon, which is 175 miles away. Cara wants to make the drive in 3 hours or less. Use the distance formula, $d = rt$ where d is the total distance, r is the speed of travel, and t is the length of time, to determine the minimum average speed Cara must drive to arrive in Portland in 3 hours.

2. **INTEREST** For Adam's tenth birthday, his grandparents opened a savings account in his name. They made an initial deposit of $750. During the year, Adam made no additional deposits and no withdrawals. At the end of the first year, Adam's money had earned $26.25. Use the formula $I = Prt$, where I is the amount of interest earned, P is the principal, or the original amount deposited, r is the interest rate, and t is the time for which the money is invested to determine what the interest rate is on his savings account.

3. **TEMPERATURE** Lisa looks at her outdoor thermometer and finds it is 12°C. Her brother asks her what 12°C is in degrees Fahrenheit. Use the formula $F = \frac{9}{5}C + 32$, where F is degrees Fahrenheit and C is degrees Celsius to find the equivalent temperature in degrees Fahrenheit. Round to the nearest whole number.

4. **FARMING** A farmer has plans to leave part of his cornfield as grass for erosion control. The grass section will be a 12-foot square. The dimensions of the cornfield are 60 feet long by 40 feet wide. What is the actual square footage planted in corn?
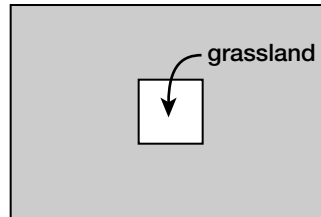
CONSTRUCTION For Exercises 5 and 6, use the following information.

The City of Detroit wants to put a fence around part of the city park to make a playground. The city has 120 feet of fencing for the playground.

5. What dimensions of the playground will give the maximum area?

6. What is the area of the playground with the dimension found in Exercise 5?

7. The City of Detroit will add 1 foot of new top soil to the entire fence area. Use the formula $V = \ell \times w \times h$ to find how cubic feet of top soil will need to be purchased.

4-1 Word Problem Practice

Powers and Exponents

1. **GEOMETRY** Mr. Daniels is building a clubhouse for his children. He has decided that the floor will be a square with an area of 64 square feet. Write this number using a power greater than 1 and a lesser base.

2. **STOCK MARKET** The Nikkei 225 is a stock market index that records the progress of 225 Japanese companies. Write this number using a power greater than 1 and a lesser base.

3. **NUMBER SENSE** A *googol* is a very large number expressed as 10^{100}. Ms. Rogers asked her students to determine which number is larger, a googol or 100^{10}. Explain how her students might use the idea of repeated factors in order to find the solution.

4. **LIFE SCIENCE** A scientist is studying bacterial growth in the laboratory. She starts her experiment with 1 bacterium and then counts the bacteria at regular intervals and records them in the table below. If the pattern continues, how long will it take to have over 1000 bacteria?

Time (hours)	0	3	6	9
Number of cells	1	2	4	8

GEOMETRY For Exercises 5 and 6, use the following information.

The sides of right triangles have a special relationship. The longest side of a right triangle, always located opposite the right angle, is related to the shorter side lengths by the formula $c = \sqrt{a^2 + b^2}$, where c is the length of the longest side and a and b are the lengths of the sides that intersect to form the right angle.

5. The following diagram shows a ladder leaning against a wall. The bottom of the ladder is 5 feet from the base of the wall, and the ladder reaches 12 feet up the wall. Find the length of the ladder.

12 ft

5 ft
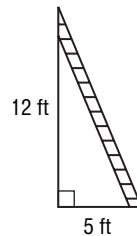
6. Paula exercises regularly by power walking around a rectangular field. She usually begins at one corner of the field and walks the full perimeter. One day, she takes a shortcut home by walking across the diagonal of the field. How far does she walk across the field?

30 yd

c

40 yd

Lesson 4–1
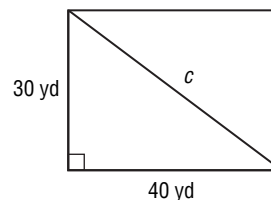
4-2 Word Problem Practice

Prime Factorization

1. **ADDRESSES** On the block where Liza lives, the house numbers of all the two-story homes are prime numbers. Liza's block contains house numbers between 40 and 60. List all of the house numbers of the houses that you know have two stories.

2. **PACKAGING** Renata's tool cabinet is a rectangular box with a volume of 105 cubic feet. Find the dimensions (length, width, and height) of the cabinet if each dimension is a whole number greater than 1.

3. **CLASS PROJECT** Amad and Lynette were researching prime numbers for a class project. Each discovered an expression relating to prime numbers. Amad found that all prime numbers greater than 2 can be expressed as $4a \pm 1$ where a is a natural number. Lynette found that all primes greater than 3 can be expressed as $6b \pm 1$ where b is a natural number. Find the values of a and b for the prime number 113.

4. **LANDSCAPING** A tiled area next to Gerard's house has an area of $6rs$.
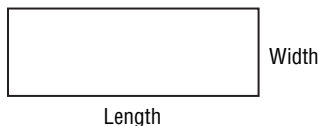
Width
Length

Write two possible pairs of expressions that could represent the length and the width of the tiled area.

5. **BIRTHDAY** Darnell was born in October. Rather than tell his friends on what day he was born, he tells them that his birthday has three distinct prime factors. On what day was Darnell born?

NUMBER THEORY For Exercises 6–8, refer to the following information.

In order to determine if a number is prime or composite, it is helpful to test whether prime numbers are factors of the number, starting with the lowest prime number.

David wants to determine whether or not the number 73 is a prime number. He has already determined that the prime numbers 2, 3, 5, and 7 are not factors of 73.

6. How does David know that 4 and 6 can not be factors of 73?

7. Does David need to test any other numbers to see if 73 is a prime number? (Hint: $7 \times ? = 73$.)

8. Use this method to determine if 437 is a prime number. List all the potential factors you tested.

4-3 Word Problem Practice

Greatest Common Factor (GCF)

1. **SCIENCE** There are 36 freshmen and 56 sophomores on the Garfield High School science team. Mr. Lee, the science team coach, wants to divide the team into groups while ensuring there are the same number of freshmen and sophomores on each team. What is the greatest number of groups that Mr. Lee can divide the students into?

2. **GARDENING** Ben's vegetable garden is 24 feet wide and 40 feet long. He wants to divide the garden into equally sized squares. If the squares are the largest size possible, how many squares can Ben make without wasting any of his garden space?

3. **FLOWERS** Petal and Leaf florists currently have 30 roses, 36 carnations, and 54 tulips. How many equal-sized bouquets can be made using all of the flowers if the florists make sure that each bouquet has the same number of each type of flower?

4. **WALLPAPER** A decorative wallpaper strip has an area of $50 + 20r$. If the width of the strip is 5 inches, what expression represents the length of the strip?

5 in.

PARTY PLANNING For Exercises 5–7, refer to the following information.

Joey is having a party during the Major League Soccer championship game. In order to make sure his guests are happy, he ordered the following appetizers from a nearby restaurant.

15 egg rolls
3 10-slice pizzas
120 chicken wings
30 cheese sticks

5. What is the greatest number of guests that Joey can have at the party so that each person (including Joey) gets the same amount of each appetizer with nothing left over?

6. What will each guest have to eat?

7. At the last minute, Joey finds out that there will be a total of 25 guests at his party. What is the least amount of each appetizer Joey must order so that everyone gets the same amount of each appetizer with nothing left over?

4-4 **Word Problem Practice**

Simplifying Algebraic Fractions

1. **STUDENTS** There are 600 students enrolled at Central High School and 120 of them are freshmen. What fraction of the student body are freshmen? Write your answer in simplest form.

2. **SLEEP** Most people need an average of 8 hours of sleep per 24-hour day. What fraction of a day should be spent sleeping? Write your answer in simplest form.

3. **FASHION** Every day Stan picks out a T-shirt to wear. He owns 5 red, 6 black, 3 green, 4 white, and 2 yellow T-shirts. What fraction of Stan's T-shirts are not red? Write your answer in simplest form.

4. **HOMEWORK** Marcie and Julia simplified an algebraic fraction. Each girl found a different answer:

Marcie's work: $\dfrac{2gr^2}{14gr^3} = \dfrac{2}{14gr} = \dfrac{1}{7gr}$

Julia's work: $\dfrac{2gr^2}{14gr^3} = \dfrac{2}{14r} = \dfrac{1}{7r}$

Identify the error and explain why the other solution is correct.

POPULATION For Exercises 5–7, refer to the following information. Write your answers as fractions in simplest form.

The following graph is called an **age structure graph** because it shows the portion of the population in each age category. This age structure graph represents the estimated population of the United States in 2007. The estimated total population for the United States in 2007 is 300 million.

United States: 2007

Population (in millions)
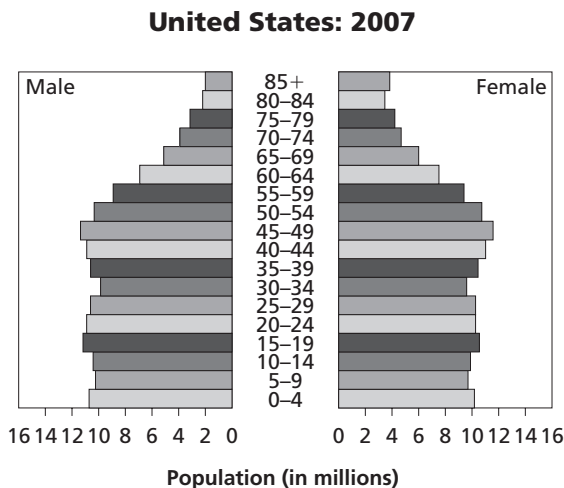
5. In 2007, approximately what fraction of the U.S. population will be females aged 35–39?

6. In 2007, approximately what fraction of the entire U.S. population will be under 20 years of age?

7. In 2007, approximately what fraction of the entire U.S. population will be males over 85? Females over 85?

4-5 Word Problem Practice

Multiplying and Dividing Monomials

1. **BIOLOGY** Ms. Masse's biology class is conducting an experiment to record the growth of a certain kind of bacteria. Each student has a lab dish containing 2 bacteria which are able to double every day. How many bacteria will be present in a student's lab dish after two weeks?

2. **COMPUTERS** In 1995, the average home computer had a speed of about 10^6 cycles per second. In 2004, the average home computer had a speed of about 10^9 cycles per second. How many times faster were the computers in 2004 as compared to those in 1995?

3. **CATERING** A gourmet meal catering company is planning an event for 2^7 people. One week before the event, they find out that the number of people has doubled. Will there be 2^8 or 2^{14} people at the event? Explain.

4. **HOMEWORK** Vance and Ko are trying to simplify the expression $3^8 \times 3^7$. Their answers are different:

   Ko's work: $3^8 \times 3^7 = (3 \times 3)^{(8+7)} = 9^{15}$

   Vance's work: $3^8 \times 3^7 = 3^{(8+7)} = 3^{15}$

   Which student is correct? Identify the mistake made by the other student.

SOUND For Exercises 5–7, refer to the following information.
Levels of audible sound are measured in decibels (dB). An increase in 10dB is considered a doubling of perceivable sound to the human ear. The table below lists the decibel level of some common sounds.

Sound Level (dB)	Source	Distance (m)
10	Human breathing	3
30	Theater, no talking	–
70	Busy traffic	5
80	Vacuum cleaner	1
110	Accellerating motorcycle	5
120	Rock concert	–
150	Jet engine	30
250	Inside a tornado	–

Source: wikipedia.org

5. Karen was walking on a sidewalk about 5 meters away from a road with busy traffic. She noticed that an accelerating motorcycle seemed much louder than the traffic. How many times louder was the motorcycle than the busy traffic?

6. Most people do not wear hearing protection when vacuuming their home. However, airport workers often wear ear protection because of the sound produced by jet engines. How many times louder is a jet engine at 30 meters than a vacuum cleaner at 1 meter?

7. How many times louder is the inside of a tornado than a human breathing at 3 meters?

34

4-6 Word Problem Practice

Negative Exponents

1. **SOLAR SYSTEM** The distance between Earth and the Sun is about $\dfrac{1}{100,000}$ the diameter of the solar system. Express this number using a negative exponent other than -1.

2. **PAPER** The paper used by the students at Hopkins Middle School is approximately $\dfrac{1}{216}$ inch thick. Express this number using a negative exponent other than -1.

3. **TIME** A microsecond is a measure of time that is equal to one millionth of a second. Express this number as a power of 10 with a negative exponent.

4. **MEASUREMENT** There are 10^{-2} meters in 1 centimeter. At the site of an automobile accident, a state trooper uses a measuring tape to determine that the width of a tire track is 20 centimeters. Express this number as a fraction of a meter in simplest form.

5. **HOMEWORK** As Libby was working on her math homework, she computed 2^{-3} by writing the following equation.

$$2^{-3} = -8$$

What was Libby's error? Explain. Then give the correct answer.

INSECTS For Exercises 6–9, refer to the following information.

Kevin's father is an entomologist. He studies insects. The table below shows the mass of four common insects.

Insect	Mass (g)
Honeybee	8^{-2}
Ant	16^{-2}
Housefly	9^{-2}
Moth	4.5^{-2}

Source: wikipedia.org

6. Determine which of these insects weighs the most by first expressing each of the masses in decimal form. Round your answers to the nearest thousandth.

7. How many times heavier is the heaviest insect than the lightest insect? Round your answer to the nearest tenth.

8. What percent greater than a housefly's mass is the mass of a honeybee? Round your answer to the nearest tenth.

9. It is estimated that an ant can lift approximately 20 times its own body mass. How many grams can the average ant lift? Write your answer as a fraction in simplest form.

4-7 Word Problem Practice

Scientific Notation

1. **EARTH SCIENCE** Mr. Bell's class is studying the solar system. The circumference of Earth at the equator is about 24,900 miles. Express this number in scientific notation.

2. **LIGHT SPEED** The speed of light is approximately 6.71×10^8 miles per hour. Express this number in standard form.

3. **EARTH SCIENCE** If it takes light 8.3 minutes to reach the Sun from Earth, use the light speed from Exercise 2 to determine the distance from Earth to the Sun. Write your answer in scientific notation.

4. **EARTH SCIENCE** The students in Mr. Bell's class have learned that the mass of Earth is approximately 5.97×10^{24} kilograms. They have also found that mass of an electron is approximately 9.11×10^{-31} kilograms. How many times greater than the mass of an electron is the mass of Earth?

5. **AIRCRAFT** The SR-71 "Blackbird" is one of the world's fastest airplanes. It is capable of traveling at a cruising speed of Mach 3, or three times the speed of sound. The speed of sound is approximately 7.6×10^2 miles per hour. What is Mach 3 in miles per hour? Write your answer in scientific notation.

POPULATION For Exercises 6–9, refer to the following information.

Geographers keep track of how many people live in different areas of the world. They are especially interested in how the populations of certain areas change. The table below shows the population of different regions in 1985 and in 2005.

Place	Population 1985	Population 2005
Earth	4.9×10^9	6.4×10^9
China	1.1×10^9	1.3×10^9
India	7.6×10^8	1.1×10^9
United States	2.4×10^8	3.0×10^8

Source: U.S. Census Bureau, 2004

6. In 2005, how many times greater than China's population is the population of the world?

7. How many more people inhabited Earth in 2005 than in 1985?

8. What was the percentage increase in population in India from 1985 to 2005? Round your answer to the nearest percent.

9. Was India's percent increase in population greater than or less than the percent increase of the whole world for the same time period? Explain.

5-1 Word Problem Practice

Writing Fractions as Decimals

1. **TAX** Ted pays $\frac{2}{7}$ of his salary in taxes, while Carl pays $\frac{5}{16}$ of his salary in taxes. Who pays more of his salary in taxes?

2. **ROCKS** Jan and Bob are classifying rocks in geology class. They begin the classification by finding the weight of each rock. Jan's rock weighs $\frac{6}{100}$ kg while Bob's weighs 0.016 kg. Whose rock is heavier?

3. **BUILDING LOT** The two one-acre lots in the diagram below are subdivided equally by the lines shown. The shaded areas in each lot have been set aside for housing.

Northfield   Southfield
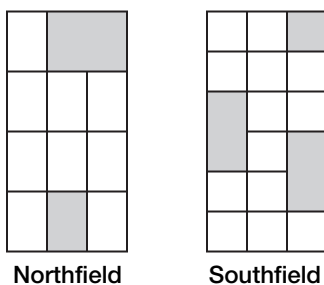
Which of the two lots, Northfield or Southfield, has the greater area of land set aside for housing? To the nearest hundredth, what is the total acreage of land within both lots that is set aside for housing?

4. **TESTS** Petra earned scores of $\frac{30}{32}$, $\frac{29}{31}$, and $\frac{28}{30}$ on her last three English quizzes. Find each score as a decimal rounded to the nearest thousandth. Arrange the fractions in order from least to greatest.

PAINT For Exercises 5–7, use the following information.

Angie is mixing together yellow paint and blue paint to make 2 shades of green paint. She will mix the paint in two 5-liter canisters. In canister A, she will pour $2\frac{4}{9}$ liters of yellow paint; in canister B, she will pour 2.46 liters of yellow paint. She fills the rest of each can with blue paint.

5. In which canister will Angie pour more yellow paint?

6. To the nearest hundredth of a liter, how much more blue paint than yellow paint does Angie use in all?

7. Angie can paint one room with $3\frac{2}{3}$ liters of one shade of green paint. She will need $1\frac{5}{8}$ liters of the same shade of green paint for a second room. Does Angie have enough of this shade of green paint to finish the second room? If not, how much additional paint will she need? Express your answer in decimal form.

Lesson 5–1

5-2 Word Problem Practice

Rational Numbers

1. **HOMEWORK** One weekend, Nate compared his history homework to his younger sister Caroline's social studies homework. He found that for every $2\frac{1}{3}$ pages he had to read for homework, Caroline had to read one page for homework. How many pages did Nate read for every three pages Caroline read?

2. **MEASUREMENT** One foot is equivalent to 30.48 centimeters. Write this value as a mixed number in simplest form.

3. **LAND** Earth has a surface area of approximately 197,000,000 square miles and a total land area of approximately 58,000,000 square miles. What fraction of the Earth's surface is land? Write another fraction that is close to your answer and has a denominator of 10.

4. **SHOPPING** Use the table of 6-ounce yogurt prices to answer the questions below.

Yogurt A	7 for $4.00
Yogurt B	$0.55 each

What is the unit price for Yogurt A expressed as a fraction? Which yogurt is the better deal?

PATTERNS **For Exercises 5–7, use the following information.**

Jade is studying fractions and decimals in her math class. While working on homework one night, she noticed a pattern when she wrote each of the following decimals as fractions: $0.\overline{5}$, $0.\overline{7}$, $0.\overline{28}$, and $0.\overline{71}$.

5. Write each of Jade's decimals as fractions.

6. Jade was looking at the numerators and denominators of her answers when she noticed the pattern. What was the pattern that Jade noticed?

7. Use Jade's pattern to predict how to write $0.\overline{416}$ as a fraction. Check your answer using a different method.

5-3 Word Problem Practice

Multiplying Rational Numbers

1. **SURVEYS** In a school survey, Randy found that $\frac{5}{12}$ of the students normally wear sneakers, and that $\frac{8}{25}$ of those who wear sneakers normally wear white sneakers. What fraction of the student body normally wears white sneakers?

2. **MAPS** The Darling Downs Rabbit Board fence was built to prevent the spread of rabbits into southern Queensland, Australia. On a map drawn to a scale of $\frac{1}{2,500,000}$, the fence measures $8\frac{3}{4}$ inches. How long is the actual fence?

3. **FARMING** A farmer has a 420-acre farm. He planted $\frac{7}{12}$ of it with corn, but later found that $\frac{3}{14}$ of the crop was diseased. How many acres of healthy corn did the farmer have?
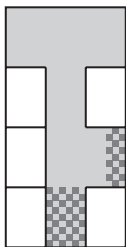
4. **CONCRETE** A $62\frac{1}{2}$-pound bag of concrete mix has $\frac{3}{5}$ of its weight made up of sand and small stones. The stones make up $\frac{1}{4}$ of the weight. What is the weight of the stones in the bag of concrete?

DISPLAYS For Exercises 5–7, use the following information.

A wall in a museum measures 3 meters high by 6 meters wide. One quarter of the wall is dedicated to displays.

5. What is the area of the wall that is dedicated to displays?

6. Three paintings, each measuring $1\frac{3}{4}$ meters high by $\frac{4}{5}$ meter wide, are hung in the display space. What is the total area of the three paintings?

7. What fraction of the wall is still available for displays?

5-4 Word Problem Practice

Dividing Rational Numbers

1. **COINS** In the 16th century, Spain had a silver coin called a peso. The coin was divided into 8 reals. Reals were stamped with an 8, and became known as pieces of eight. How many pesos would have been equivalent to 26 pieces of eight?

2. **COINS** An anna is an Indian coin equivalent to one sixteenth of a rupee. How many rupees equal 45 annas?

3. **MEASUREMENT** Two paintings, each $2\frac{1}{2}$ feet wide, are hung on a gallery wall that is 10 feet long. They are hung the same distance apart as the distance from the end of each wall.
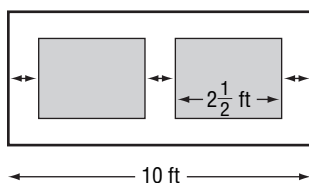
What is the distance between the paint-ings? Express your answer as inches and then as feet.

4. **MOTIONS** In order to vote on any decision, a club requires the presence of $\frac{3}{16}$ of all club members. To be approved, a proposal needs $\frac{2}{3}$ of the votes cast. A club has a membership of 224. What is the minimum number of votes needed for a motion to be approved?

TILES For Exercises 5 and 6, use the following information.

A design for a walkway calls for a pattern made by alternating red tiles with green tiles. Both the red and green tiles are squares, with the red tiles having a side length of $\frac{3}{4}$ foot and the green tiles having a side length of $\frac{2}{3}$ foot.

5. If the walkway is 34 feet long, how many times will the pattern repeat?

6. Each stack of tiles is $17\frac{1}{2}$ inches tall. If each tile is $1\frac{1}{4}$ inches thick, how many tiles are in a stack?

5-5 Word Problem Practice

Adding and Subtracting Like Fractions

1. **ICE CREAM** A $3\frac{3}{8}$-ounce scoop of strawberry ice cream was stacked on top of $2\frac{7}{8}$-ounce scoop of chocolate ice cream. What is the total weight of ice cream on the cone?

2. **SUNSHINE** The following table shows the amount of civil twilight (length of time you can see without artifical illumination) for Seattle, Washington, for several dates throughout the year.

Date	Civil Twilight (h)
March 20	$13\frac{13}{20}$
June 21	$17\frac{11}{20}$
September 22	$13\frac{13}{20}$
December 21	$9\frac{19}{20}$

Source: www.mountaineers.org

For how much more time can a person in Seattle see without artificial illumination on June 21st than on December 21st?

3. **FENCES** A picket fence has slats that are $\frac{5}{12}$ foot wide separated by gaps that are $\frac{7}{12}$ foot wide. How long is a fence with 30 slats?

4. **MEASUREMENT** When Danny, who is $57\frac{7}{8}$ inches tall, stands on a ledge $9\frac{5}{8}$ inches off the ground, he remains hidden behind a wall $70\frac{3}{8}$ inches tall. What is the distance between the top of Danny's head and the top of the wall?

BAKING For Exercises 5 and 6, use the following information.

Jean and Fred are making apple crisp. The recipe calls for 8 apples to be peeled and cut into pieces. However, as Fred and Jean work, they eat pieces of apple. Fred eats $\frac{2}{9}$ of each apple he peels, and Jean eats $\frac{1}{9}$ of each apple she peels.

5. Assuming they each peel and cut four apples, how many apples will they have left over for the recipe after they peel eight apples?

6. If Jean peels and cuts two more apples, will they have enough for the recipe? If so, how much extra is there? If not, how much more do they need?

5-6 Word Problem Practice

Least Common Multiple

1. BEACONS A beacon flashes every 12 seconds, and another beacon flashes every 16 seconds. How often do the two beacons flash in unison?

2. PETS A pet owner buys a supply of dog food every 6 days, and a supply of cat food every 14 days. How often does the pet owner buy both dog and cat food at the same time?

3. STAIRS Three friends are walking up the front stairs of the Philadelphia Museum of Art. Each person is going at a different pace. They all stop at the same time because they heard a loud noise. Ambrosia has walked up $\frac{3}{5}$ of the stairs, Bernard has walked up $\frac{2}{3}$ of the stairs, and Carol has walked up $\frac{5}{8}$ of the stairs. Place the friends in order from the friend who has walked up the least number of steps to the friend who has walked up the greatest number of steps.

4. A tailor cuts $\frac{3}{4}$ foot of cloth from a roll that has a pattern repeat every 5 feet. How often does the cut coincide with the beginning of the pattern?

SCHOOL DANCE For Exercises 5–8, use the following information.

Prize tickets are being given out at the door of the school dance. Every 12th, 18th, and 30th student to walk through the door will be awarded prizes as shown in the table.

Prize Frequency	Prize
12th student	free beverage
18th student	free snack
30th student	free ticket to the next dance

5. Which student will receive both a free beverage and a free snack?

6. Suppose 285 students attend the dance. If every 10th student at the dance makes a special song request, how many students make a special song request and receive a free snack?

7. If 360 students attend the dance, how many have been awarded all three prizes?

8. If students are numbered consecutively starting with 1, 2, 3, … as they enter the dance, which students, by number, are awarded all three prizes?

5-7 Word Problem Practice

Adding and Subtracting Unlike Fractions

1. **MILK** A jug contains $3\frac{1}{6}$ pints of milk. Ashley's family poured out $1\frac{2}{3}$ pints of milk during breakfast. How much milk remains in the jug?

2. **WOODWORKING** Jane is building a basic stand using wooden blocks. A wooden block that is $\frac{5}{8}$ inch thick is glued to a wooden block that is $\frac{3}{4}$ inch thick. What is the combined thickness of the two blocks of wood?

3. **TILING**   A designer places four identical tiles on a surface and spaces them $3\frac{5}{16}$ inch apart. Each tile is $7\frac{1}{4}$ inches wide.

   What is the length from the outside edge of the first tile to the outside edge of the last tile?

4. **RUNNING**   Ron wants to run 6 miles this week. He ran $1\frac{2}{3}$ miles on Monday, $1\frac{2}{5}$ miles on Tuesday, and $1\frac{3}{4}$ miles on Wednesday. How many more miles does he need to run to reach his goal for the week?

MONEY MANAGEMENT   For Exercises 5 and 6, use the following information.

Sandy worked extremely hard at her job and earned a large bonus at the end of the year. She wanted to share her bonus with her family. She decided to give her children $\frac{2}{5}$ of her bonus and her grandchildren $\frac{1}{4}$ of her bonus.

5. How much of her bonus is Sandy keeping for herself?

6. Sandy has a childhood friend who is like a sister to her. If she gives her friend $\frac{1}{8}$ of her bonus, how much will she be keeping for herself?

5-8 Word Problem Practice

Solving Equations With Rational Numbers

1. **SHOPPING** Justine bought a new scarf on sale for $8.50. She got it for $2.75 less than the original price. What was the original price of the scarf?

2. **ART** Simone took some paintings to an art show to sell. She sold 18 paintings during the show. That number represents $\frac{2}{3}$ of the paintings that she brought to the show. How many paintings did she take to the show?

3. **CONSUMERISM** Corey had $\frac{3}{8}$ of a tank of gas in his car. He just bought $14 worth of gas and now he has $\frac{2}{3}$ of a tank of gas. What fraction of the tank did Corey fill with gas?

4. **GEOMETRY** The width of a rectangle is 3.4 meters longer than the height of the rectangle. The width is 5.5 meters. What is the height of the rectangle?

h [rectangle]

$(h + 3.4)$ m
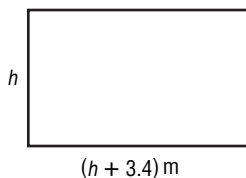
INTERIOR DESIGN For Exercises 5–8, use the following information.

Kevin decided to decorate his bedroom, which is $9\frac{1}{2}$ feet long and $7\frac{1}{4}$ feet wide. The ceiling is 8 feet high. He found a new area rug to put on the floor. The rug would leave $1\frac{1}{3}$ feet of bare floor on all four sides of it.

5. What is the width of the rug?

6. What is the length of the rug?

7. Kevin noticed that the floor in his bedroom needed to be replaced. Kevin decided to cover the entire floor with new wood flooring. What is the area of the entire floor? What amount of that area is covered by the rug?

8. Kevin found a border that he wants to put around the top of the walls. How many feet of border does Kevin need to buy?

Lesson 5–8

5-9 Word Problem Practice

Measures of Central Tendency

1. MARATHON Martin is training for a marathon. The table below shows the total number of miles he has run each week for the first 6 weeks of his training. What is the mode distance that Martin has run?

Date	Miles Run
Week 1	47
Week 2	35
Week 3	53
Week 4	52
Week 5	47
Week 6	56

2. WAGES Each state in the U.S. has its own minimum wage. The table below shows the minimum wage for 6 states. What is the median minimum wage for these 6 states?

State	Wage
Alaska	$7.15
California	$6.75
Florida	$6.15
Illinois	$6.50
New York	$6.75
Texas	$5.15

Source: www.dol.gov/esa/minwage/america.htm

3. HEIGHTS David measured the heights of 10 classmates. He found the mean of their heights to be 54.8 inches. He then added in his own height and found the mean again. With David's height, the mean was 55 inches. What is David's height?

4. ACADEMICS The class average for the first social studies test in Molly's class was 85%. 23 students took the test. When the 24th student joined the class and took the same test, the class average went up to 85.5%. What grade did the new student earn on the exam?

ADVERTISING For Exercises 5–7, use the following information.

Shawn kept track of the lengths of the television commercials during a 1-hour program. He found that 5 commercials were 30 seconds long, 10 commercials were 15 seconds long, 2 commercials were 60 seconds long, and 1 commercial was 90 seconds long.

5. What is the mean number of seconds that a commercial lasted?

6. What is the median time length for a commercial?

7. Which measure is a more accurate representation of the lengths of the commercials Shawn recorded?

Lesson 5–9

6-1 Word Problem Practice

Ratios and Rates

1. **ACADEMICS** There are 15 girls and 12 boys in Mrs. Johnson's math class. Express the ratio of boys to girls in simplest form.

2. **SPORTS** The table lists the medal count for the five countries with the most medals in the 2004 Summer Olympics. Write a ratio of the number of gold medals won for the USA to the total number of medals won for the USA.

Country	Gold	Silver	Bronze	Total
USA	35	39	29	103
Russia	27	27	38	92
China	32	17	14	63
Australia	17	16	16	49
Germany	14	16	18	48

3. **SHOPPING** Darla decides to buy a sports drink. Her choices are a 20-ounce bottle for $1.49 or a 32-ounce bottle for $2.49. Which is the better value? Explain.

4. **RACING** Greg Biffle won the Samsung/Radio Shack 500 NASCAR race at the Texas Motor Speedway in April 2005. His average speed was 130 miles per hour. How many feet per second is this?

RECYCLING For Exercises 5–6, use the following information.

In 1974, 23 crushed beverage cans weighed one pound. In 2005, beverage cans were lighter and 33 crushed beverage cans weighed one pound. Every minute of every day, an average of 123,097 beverage cans are recycled.

5. About how many pounds of beverage cans are recycled in an hour?

6. About how many tons of beverage cans are recycled in an average day?

Source: www.dnr.state.oh.us/recycling/awareness/facts/ factsheets/aluminum.htm

Lesson 6-1

6-2 Word Problem Practice

Proportional and Nonproportional Relationships

1. WEATHER The National Weather Service has a Wind Chill Temperature (WCT) index. The table shows how cold people and animals feel when the temperature outside is 20°F. Determine whether the set of numbers in the pattern forms a proportion.

Wind Chill (°F)	13	9	6	4
Wind (mph)	5	10	15	20

2. PAINTING The table shows the coverage for a brand of interior paint when it is applied on primed walls. Determine whether the set of numbers in the pattern forms a proportion.

Paint (gal)	1	2	3	4
Area (square ft)	360	720	1080	1440

3. EXERCISE Walking at 4 miles per hour, Sue burns about 283 Calories per hour. Write an equation and describe the proportionality.

4. CRUISE SHIPS After receiving new engines in 1987, the Queen Elizabeth 2 moves 49.5 feet for every gallon of fuel that it burns. Previously, it moved 36 feet per gallon. Write an equation and describe the proportionality.

RECYCLING For Exercises 5–7, use the following information.

Micah did some research on paper consumption and recycling efforts. She found that for every ton of paper that is recycled, 17 trees are saved.

5. Complete the table.

Tons of Paper Recycled	1			
Trees Saved				

6. Make a graph of the situation.
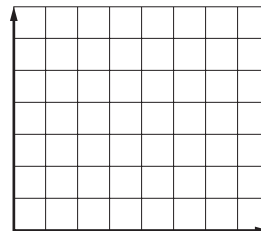
7. Does the pattern form a proportion?

Lesson 6-2

6-3 Word Problem Practice

Using Proportions

1. **RUNNING** Donna is planning to run a 13.1-mile half marathon. She tells of her plans to her European friend, who asks how many meters she will run. There are approximately 1609 meters in 1 mile. Write a proportion that could be used to find the distance of the marathon in meters.

2. **FLOWERS** The Tyler Municipal Rose Garden and Center in Tyler, Texas, is the nation's largest rose garden. It contains 38,000 rose bushes representing 500 varieties of roses set in a 14-acre park. Write a proportion that could be used to find the average number of rose bushes per acre.

3. **RECYCLING** Ohio is the home of two of the world's largest aluminum smelters, in which metal is separated for recycling. Together, these two facilities process an average of 15 million pounds of aluminum each month. How many pounds of aluminum do the Ohio smelting plants average per week?

4. **TECHNOLOGY** Elton just bought a new flash drive for his computer. He read in the literature that 7 flash drives can hold 1792 megabytes of data. Write and solve a proportion to find the number of megabytes of data that 5 flash drives can hold.

COOKING For Exercises 5 and 6, use the following information.

Ashley is planning breakfast for a family event. She wants to serve Deltan Waffles. She found this recipe, which serves 8 people.

Deltan Waffles	
$1\frac{3}{4}$ cups flour	$1\frac{1}{4}$ cups milk
$\frac{1}{2}$ teaspoon salt	$\frac{1}{2}$ cup shortening, melted
1 tablespoon baking powder	
2 egg yolks	2 egg whites

5. How much salt does she need if she uses 3 eggs?

6. How much baking powder does she need if she wants to serve 12 people?

Lesson 6-3

6-4 Word Problem Practice

Scale Drawings and Models

1. INTERIOR DESIGN Jane is planning the furniture layout of her living room. On the scale drawing of the living room below, 1 inch represents 2 feet. What measurement does 8 inches represent?
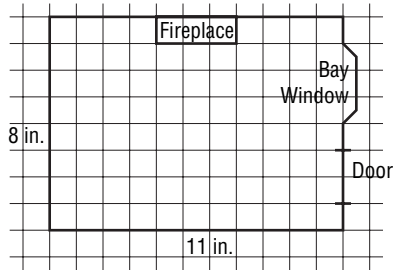
2. TOYS The diameter of the sweep of the main rotor of the EH101 helicopter is 18.6 meters. A toy model of it has a sweep of 31 centimeters. What is the scale of the model?
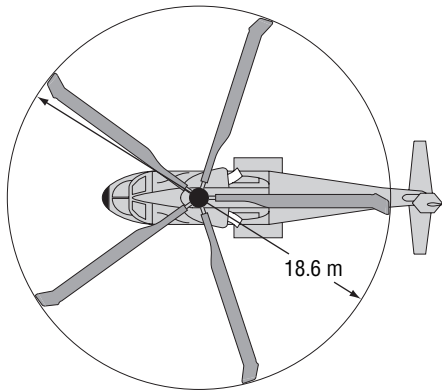
3. ARCHITECTURE The Freedom Tower will sit at the northwest corner of the 16-acre World Trade Center site in New York City. The height of the tower is set to be 1776 feet. Suppose that 1 inch represents 74 feet on a scale model of the tower. What is the height of the model?

4. MODEL RAILROADING Mr. Miller's model railroad layout is in HO scale. The scale factor of HO is 1:87. How high is the smokestack of the actual engine if the model is 2 inches high? Express your answer in feet.

BLUEPRINTS For Exercises 5 and 6, use the following information.
John and Julie are planning to have a new house built. The architect designed a house and sent them the blueprints. The scale that the architect used on the blueprints is $2\frac{1}{2}$ inches equals 10 feet.

5. The living room will have the actual dimensions of 12 feet by 16 feet. What are its dimensions on the blueprints?

6. Julie notices that the bedroom closet on the blueprint is 0.25 inch by 1 inch. She told the architect that she wanted a walk-in closet that is 6 feet long. Did the architect follow her instruction?

7. What is the scale factor?

Lesson 6-4

6-5 Word Problem Practice

Fractions, Decimals, and Percents

1. ADVERTISING In 1998, outdoor advertisements amounted to 2.2% of all advertising dollars spent in the U.S. What fraction is this?

2. GEOGRAPHY The area of continental United States is about 1.9 billion acres. Texas makes up seven percent of this area. What fraction is this?

3. ELECTRONICS An online poll posted the following question. "How many personal electronic devices do you carry around at any one time?" One-twentieth of the respondents said zero, 21% said one, 0.27 said two, $\frac{6}{25}$ said three and 23% claimed to carry four or more. How many personal electronic devises do most people carry?

4. CARS In an online poll, car owners were asked what type car they would buy if they were to buy a new car today. Two-fifths of the respondents said they would buy a gasoline-powered car, 0.13 selected a diesel engine car, and 43% chose a hybrid car. Which type of car did the largest group choose?

SPORTS For Exercises 5–7, use the information in the graph below.
A survey conducted by a national marketing group compared teens' sports preferences in recent years.
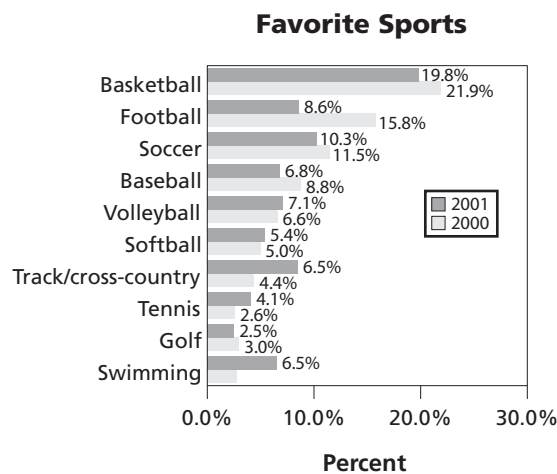
Favorite Sports

5. Which sport(s) did about 0.1 of those surveyed say was their favorite in 2001?

6. Which sport(s) was the favorite of about $\frac{1}{5}$ of those surveyed in 2000?

7. Which sport(s) was the favorite of about 5% of those surveyed in 2000?

6-6 Word Problem Practice

Using the Percent Proportion

1. CHORES A local Mothers group conducted a survey of 1074 youths age 19 and under about chores. 66% of those surveyed said they do not clean their rooms because they do not like to. How many of the 1074 youths gave that response?

2. RECYCLING The table shows the recent number of curbside recycling programs in four geographical regions of the United States. What percent of the country's recycling programs are in the Midwest?

Curbside Recycling Programs	
Region	**Number**
Northeast	3421
South	1677
Midwest	3572
West	1034
Total	9704

3. MARATHON The 2004 Boston Mayor's Cup races boasted the largest number of finishers in the history of the event with 825 finishers. 290 of the finishers were from the youth division. What percent of the finishers were not from the youth division? Round your answer to the nearest tenth.

4. EDUCATION Trevor received a score of 96% on his social studies test. If he answered 24 of the questions correctly, how many questions were on the test?

HEALTH For Exercises 5–7, use the following information.

The U.S. Food and Drug Administration requires food packagers to provide nutritional information about the food in the packaging. The label shown at the right is from a small package of chicken tenderloins, brown rice, and mixed vegetables.

Nutrition Facts
Serving Size 1 Package (265 g)
Servings Per Container 1

Amount Per Serving
Calories 240   Calories from Fat 50

	% Daily Value*
Total Fat 6 g	8%
Saturated Fat 3.5 g	18%
Trans Fat 0 g	
Polyunsaturated Fat .5 g	
Monounsaturated Fat .5 g	
Cholesterol 30 mg	9%
Sodium 660 mg	28%
Potassium 500 mg	14%
Total Carbohydrats 29 g	9%
Dietary Fiber 4 g	17%
Sugars 4 g	
Protein 18 g	

5. According to the label, the package contains 6 grams of fat, which is 8% of the daily value recommended for a 2000-Calorie diet. How many grams of fat are recommended for a 2000-Calorie diet?

6. What percent of the total Calories in this package come from fat?

7. The potassium in the package is 14% of the recommended daily value. What is the recommended daily value of potassium?

6-7 Word Problem Practice

Finding Percents Mentally

1. GEOGRAPHY The state of Pennsylvania covers almost 29 million acres. Of the total acreage, about 53% is forest land. About how many acres of forest land are in the state of Pennsylvania?

2. ENVIRONMENT In 2004, there were 320 endangered mammals in the world. About 75% of these mammals reside outside of the United States. About how many endangered mammals are not in the United States?

3. GAMES The figures below represent two game boards. The object of the game is to toss a bean bag so that it lands on a shaded region. Which game board gives a player the best chance of throwing a bean bag so that it lands on a shaded region? Explain.
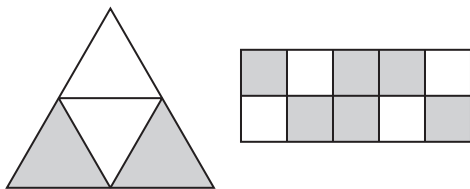
4. SHOPPING Sydney has $20 and wants to buy a CD of her favorite group. She finds a two-disc set of greatest hits that costs $18.99. The sales tax in her state is 5%. Does she have enough money to buy the CD? Explain.

GEOGRAPHY For Exercises 5–7, use the information in the table.
The table shows the total area of eight states in square miles and the area of the state that is covered by water.

State	Area of state (square miles)	Water Area (square miles)
Michigan	96,716	39,912
Hawaii	10,931	4508
Rhode Island	1545	500
Massachusetts	10,555	2715
Delaware	2489	536
Maryland	12,407	2633
Florida	65,755	11,828
Wisconsin	65,498	11,188

5. Which state has a water area that is about 25% of the area of the state?

6. Which state has about one-third of its area covered by water?

7. Which two states have about the same percent of area covered by water?

6-8 Word Problem Practice

Using Percent Equations

1. **ONLINE SHOPPING** Bob is looking to buy a new baseball cap with his favorite team's logo on it. He finds one that normally sells for $17.99 on sale for 20% off. Find the discount to the nearest cent.

2. **BASEBALL CARDS** Harold is interested in selling his father's baseball card collection. A local sports card dealer will sell the collection for Harold, but will collect a fee equal to 18% of the selling price. If the card dealer sells the baseball card collection for $325, what is the amount of the fee?

3. **TAXES** Martina bought a pair of shoes for $39.90. The total cost for the shoes was $41.50. What is the sales tax rate in Martina's state?

4. **SHOPPING** Bria has a coupon for an additional 25% off the purchase of any sale item at a garden store. She finds a birdbath that is on sale at 10% off the original price of $79. What is the price of the birdbath after both discounts are applied? Round your answer to the nearest cent.

BANKING For Exercises 5–7, use the information in the table below.
Marine Bank just changes the interest rates it pays on certificates of deposits for five different terms. The rates are simple interest rates. For each question, assume no additional deposits or withdrawals.

Marine Bank	
Term	Rate
6 months	3.15%
1 year	4.20%
2 years	4.40%
3 years	4.55%
5 years	4.70%

5. Tom invested $1500 in one of the plans. How long did he invest it if he earned $66 in interest at the end of the term?

6. Maria invested money for 6 months. How much money did she invest if she earned $25.20 in interest?

7. Ricardo invested in a certificate of deposit at a different bank. He deposited $2500, and after 18 months, he had earned $161.25 in interest. What was the interest rate on his certificate of deposit?

6-9 Word Problem Practice

Percent of Change

1. **DVD** Bill paid $20 for a new DVD three years ago. Yesterday he paid $15 for a new DVD. Find the percent of change.

2. **TRAINING** When Jan began training for a marathon, she could run 3 miles in the same amount of time she can now run 5 miles. What is the percent of change in Jan's running speed?

3. **CENSUS** According to the United States Census Bureau, the state of Texas had a population of 16,986,510 in 1990. Census data shows that in 2000, the population of Texas was 20,851,820. Find the percent of change.

4. **INVESTMENT** Jack bought a coin for $200, which he later sold for $175. Find the percent of change. Did Jack make a good investment? Explain.

TRAVEL For Exercises 5–7, use the following information.
The following table shows the number of visitors to Yellowstone National Park from 2000 to 2004.

Year	Number of Visitors
2000	2,838,233
2001	2,758,526
2002	2,973,677
2003	3,019,375
2004	2,868,317

Source: nps.gov

5. What was the percent of change in the number of tourists between 2000 and 2001?

6. Determine between which years Yellowstone National Park experienced the highest percent of decrease of visitors and find the percent of change.

7. Determine between which years Yellowstone National Park experienced the highest percent of increase in visitors and find the percent of change.

6-10 Word Problem Practice

Using Sampling to Predict

1. **SHOPPING** The managing group of a local shopping mall surveyed their customers to determine which stores bring in the most patrons. They surveyed every 15th person to enter all entrances to the mall. What type of sample did the group use?

2. **PRODUCTION** A candy company inspects a sampling of its production by checking the first 10 and the last 10 candies produced each hour. Identify this sample as *biased* or *unbiased*.

3. **SCHOOL LUNCH** A survey of 50 randomly selected students showed that 38 students buy lunch at school and 12 students bring lunch from home each day. About how many of the school's 524 students buy lunch at school each day?

4. **CUSTOMER SATISFACTION** Johnson's Hardware randomly selects 125 of its customers and questions them to determine their overall customer satisfaction rating. The poll indicates 100 were completely satisfied, 15 were satisfied, and 10 were not satisfied at all. What percent of customers were either satisfied or completely satisfied? About how many of the 5000 customers were not satisfied at all?

POLLING For Exercises 5–7, use the following information.
A local newspaper conducts a telephone survey before the upcoming mayoral election. Of the 185,000 registered voters, 500 are randomly chosen and asked, "If the election were held today, who would get your vote for mayor?" The results are shown in the table below.

Mayoral Candidate	Number of Polled Supporters
Smith	140
Wong	115
Sanchez	134
Blom	111

5. Is the sampling method valid? Explain.

6. How many votes can Sanchez expect to receive in the election?

7. How many voters are not expected to vote for Smith?

Lesson 6-10

7-1 **Word Problem Practice**

Functions

1. **BEACONS** Below are shirt sizes found in a department store, listed as (neck circumference, arm length). $\{(13\frac{1}{2}, 33), (14\frac{1}{2}, 35), (14\frac{1}{2}, 36), (15, 34),$ $(15, 35), (16, 34), (17, 35), (17, 36)\}$ Does the relation (neck size, arm length) represent a function? Explain.

2. **GASOLINE** The table below lists the average price of gasoline per gallon in the United States at the end of each month of 2004.

Month	Price	Month	Price
January	$1.60	July	$1.86
February	$1.64	August	$1.83
March	$1.72	September	$1.90
April	$1.77	October	$1.98
May	$2.00	November	$1.90
June	$1.86	December	$1.75

Source: fueleconomy.gov

Does the relation (month, price) represent a function? Explain.

3. **TAXI FARE** The information listed shows the cost of a cab ride across town:

Distance (miles)	Price ($)
0.5	5.50
1.3	6.50
2.7	8.00
3.1	8.50
3.4	8.50
3.6	9.00

Does the relationship between the distance traveled and the cost represent a function? Explain.

4. **BOOKS** The table below shows the price of a book and its page content.

Price ($)	Pages
10.45	135
24.38	170
23.54	180
23.54	272
22.61	300

Does the relation (price, pages) represent a function? Explain.

EARTH'S ATMOSPHERE For Exercises 5 and 6, refer to the table that shows the typical air temperature at various altitudes.

Altitude (ft)	Air Temperature (°F)
0	59.0
10,000	23.3
20,000	−12.3
30,000	−48.0
40,000	−69.7
50,000	−69.7
60,000	−69.7
70,000	−69.7
80,000	−69.7
90,000	−56.6
100,000	−40.1

5. Explain whether or not this relationship represents a function.

6. Describe the relationship between altitude and air temperature.

Lesson 7-1

7-2 **Word Problem Practice**

Linear Equations in Two Variables

1. **CURRENCY** On October 11, 2005, the equation $1.75p = d$ represented the relationship between the U. S. dollar, d, and the British pound sterling, p. Complete following table.

UK Pounds	US Dollars
1	
	1
3.4	
	140

Source: xe.com

2. **MEASUREMENT** The equation $c = 2.54i$ can be used to convert between inches i and centimeters c. Complete the three ordered pairs (i, c) below. Round your answers to the nearest hundredth.
$(19.2, \_\_\_), (\_\_\_ , 84.2), (68.5, \_\_\_)$.

3. **GEOMETRY** Jerry bought material for a fence to put around the garden shown in the drawing.
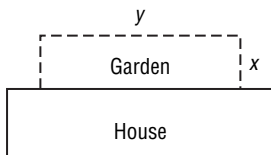
The equation $2x + y = 80$ describes the relationship between x the width and y the length of his garden in feet. Find one ordered pair solution that makes sense in the situation and one that does not. Explain your choices.

4. **CAR RENTAL** The cost of renting a car from the Frugal Car Rental Company includes a $20 non-refundable deposit and a travel cost of 4¢ per mile. Find an equation to represent the total cost, C, if a car is rented and driven n miles. Then, find two ordered pairs that satisfy this condition.

CARNIVAL PRIZES For Exercises 5 and 6, refer to the following information.

Melissa is buying prizes for a school carnival. At the store, she finds colorful note paper sold in packs containing 4 sheets and stickers sold individually. She needs 50 prizes altogether.

5. Melissa uses the equation $4p + s = 50$ to help plan her purchase. Find three ordered pairs (p, s) that satisfy this condition, and use them to graph the relationship.
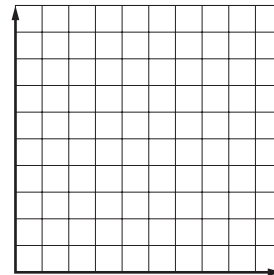
6. Complete the following ordered pair: $(\_\_\_ , 40)$. Does this make sense for Melissa's purchase? Explain.

Lesson 7-2

7-3 **Word Problem Practice**

Rate of Change

1. **AVIATION** An airplane was at an altitude of 12,000 feet 40 minutes before landing, and at an altitude of 2000 feet 15 minutes before landing. What was the rate of change of the plane's altitude per minute?

2. **TICKET SALES** A ticket sales representative at a local water park had $175.50 in his cash register at the end of his first hour at work. If each ticket to the park cost $1.75, and he sold an average of one ticket per minute, how much was in his register to start?

3. **POPULATION** The table shows how residential patterns in the United States have changed over the past 200 years.

Year	Urban Population (per 1000)	Rural Population (per 1000)
1840	108	892
1880	282	718
1920	512	488
1960	631	369
2000	790	210

Source: census.gov

Compare the rates of change for each time interval, and describe how the population has changed since 1840.

4. **STAMPS** Kyuri needs $0.81 in postage to mail some photographs to a friend. She has 3¢ and 9¢ stamps. The table shows some combinations of 3¢ and 9¢ stamps that she could use to mail the letter. Find the rate of change between the numbers of 3¢ stamps and 9¢ stamps.

9¢ stamps	3¢ stamps
2	21
3	18
4	15
5	12
6	9

BASEBALL For Exercises 5 and 6, refer to the following information.

This graph shows the total number of runs that the Boston Red Sox scored during the 1996–2004 seasons.

5. Find the greatest rate of change between two seasons.
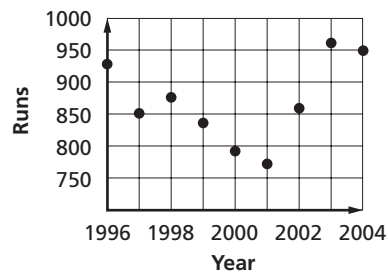
Source: baseball-reference.com

6. Find the average rate of change from 1996 to 2004.

Lesson 7-3

7-4   Word Problem Practice

Constant Rate of Change and Direct Variation

1. **WATER USE** The graph shows the number of quarts of water the typical person needs in a certain number of days. Find the constant rate of change for the relationship and interpret its meaning.
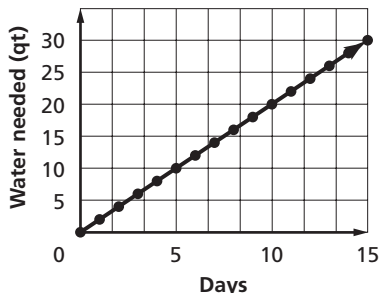
Source: www.nps.gov/rivers/waterfacts.html

2. **BAKING** The amount of flour needed for a recipe varies directly with the number of servings planned. Three servings require $4\frac{1}{2}$ cups of flour. Write a direct variation equation relating the number of servings s and the required number of cups of flour f.

3. **SCUBA DIVING** Fresh Air Scuba Company leases scuba diving equipment. The following table shows the cost of renting equipment for different lengths of time. Determine if there is a proportional relationship between the cost of the rental and the number of days the equipment is rented. Explain.

Days	Cost ($)
3	30
6	50
9	70
12	90

4. **TRANSPORTATION** The distance a bus travels varies directly with time. A Red Lines bus has been traveling for 4.5 hours and has traveled a distance of 281.25 miles. The total distance it must cover on a particular route is 520 miles. How long will the bus take to cover this distance?

HIKING For Exercises 5 and 6, refer to the following information.

Jennifer and a group of her friends are planning a hiking trip. Jennifer is in charge of making trail mix that will provide the group a total of 4000 Calories. The graph shows the amount of peanuts and raisins she would have to buy in order to make the trail mix as planned.
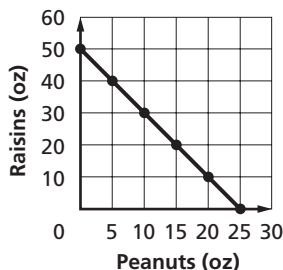
5. Find the constant rate of change for this linear function and interpret its meaning.

6. Determine if a proportional relationship exists between ounces of peanuts and ounces of raisins. Explain.

7-5 Word Problem Practice

Slope

1. CIVIL ENGINEERING Lewis County, Washington, has a guideline that new roads should not exceed a 15% grade, or a 15 foot rise over a horizontal distance of 100 feet. A proposed roadway rises 41 feet over 254 feet horizontally. Find the grade of the proposed roadway. Does it meet the county's guideline?

2. CLIMBING A party of trekkers left a staging hut, at an elevation of 465 feet, and arrived at their destination at an elevation of 2347 feet. According to the map, the camps were 3000 feet apart. What was average slope between the two camps?

3. LABOR The following graph shows the unemployment rate for the United States from 1987 to 2004.
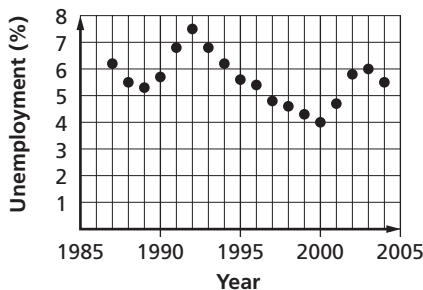
In what section of the graph did unemployment rise the most? Describe the slope.

4. SUBWAY A straight section of subway track passes under the intersection of 3rd and 8th Streets, and also under the intersection of 5th Street and 12th Streets. Identify the next intersection under which the line passes.

DRAINAGE For Exercises 5–7, refer to the following information.

To function properly, a water outflow pipe must drop 1 inch for every 22 inches of horizontal distance.

5. Calculate the slope for this drain pipe.

6. A rainwater pipe 30 feet long must run under the edge of a roof. What is the minimum vertical distance the pipe must drop between its ends?

7. A design calls for a drainage pipe to cross a building 45 feet wide as it drops 25 inches. Is this pipe steep enough to function properly? Explain.

7-6 **Word Problem Practice**

Slope-Intercept Form

1. **OVERTIME** Rod is paid an overtime rate of $25 per hour after he earns his basic wage of $600 per week. Write an equation in slope-intercept form for the total pay p if he works h hours of overtime.

2. **PHONE PLAN** The monthly cost C of Marge's phone plan is given by $C = 40 + m$, where m is the number of extra minutes she uses in that month. Name the slope and y-intercept in this situation, and explain what each represents.

3. **ELEVATOR** An elevator travels vertically in a building that has 32 floors, each 11 feet tall. The height h above the first floor after t seconds is given by $h = 297 - 4.4t$. How long will it take for the elevator to reach the second floor?

BANK ACCOUNT For Exercises 4–6, refer to the following information.

Pete's bank account showed a balance at the beginning of the month of $180. He spent $2.50 each day on bus tokens. The amount A left in his bank account after d days can be given by $A = 180 - 2.5d$.

4. Graph the equation using the slope and y-intercept.
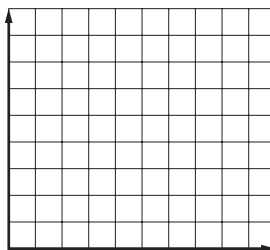
5. State the slope and y-intercept of the graph, and describe what each represents.

6. Find the x-intercept and describe what it represents.

7-7 Word Problem Practice

Writing Linear Functions

1. FALCON FLIGHT The progress of a Peregrine Falcon in a head-first dive is shown in the following table.

Time (s)	Distance (ft)
0	0
1	295
2	590
3	885

Source: dep.state.pa.us

Write an equation to represent the distance d traveled by a falcon in t seconds. How many seconds would it take the falcon to travel a mile at this rate?

2. SAVINGS Susana has $32 in a jar to which she adds her weekly allowance of $8. Write a linear equation in slope-intercept form to show how much she saves y after x weeks. How much will she have saved after 5 weeks?

3. ARCHITECTURE The following diagram shows the design for a symmetrical roof.
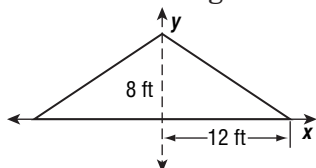
Write two equations to represent the two sides of the roof.

4. WATER A steady stream of water flows into a partially-filled rectangular tank. After 6 minutes, there are 87 gallons of water in the tank. After 21 minutes, there are 222 gallons. Write an equation to represent the volume of water in the tank y after x minutes. How much water was in the tank to begin?

ARCADE For Exercises 5–7, refer to the following information.

Justin goes to a local arcade one weekend. He starts out with a certain number of tokens and spends them on games at a consistent rate. Three times, Justin counted how many tokens he had left.

Time (min)	Tokens left
15	50
30	20
40	0

5. What is the slope of the relationship between time and tokens left?

6. What is the y-intercept?

7. Write an equation in slope-intercept form to show the number of tokens left y after x minutes at the arcade.

7-8 Word Problem Practice

Best-Fit Line

1. CYCLING Philippe and Clarice are on a three day bicycle tour. The following graph shows the distance from their home on the last day.
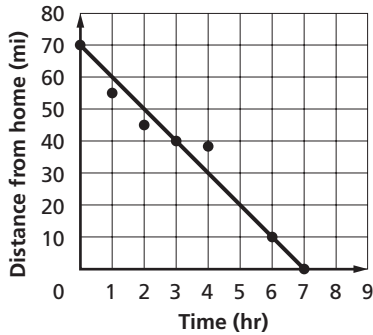
Find the equation for the line of fit and use it to estimate their distance from home after 5 hours.

2. MECHANICS Jeanne and Martin were investigating how a metal spring stretches when they add a weight to the end of it. They collected data and created the following graph:
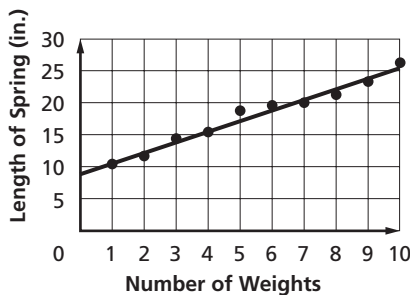
Use the labeled points to write an equation for the line of fit.

3. NUTRITION The table shows the fat and Calorie content for several snack foods. Make a scatter plot of the data and find a line that best fits the data.

Fat (g)	Cal
1	200
6	222
6.5	239
8	274
12	338
18	339
20	385
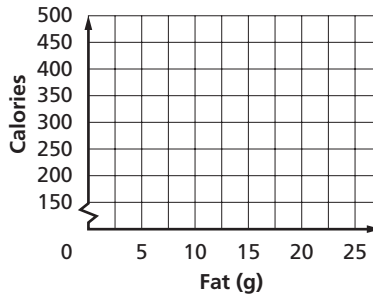
POSTAGE For Exercises 4 and 5, refer to the following information.

The table shows United States Postal Service rate increases for mailing a first-class envelope.

Year	Rate (¢)
1985	22
1988	25
1991	29
1995	32
1999	33
2001	34
2002	37

Source: usps.gov

4. Make a scatter plot of the data.
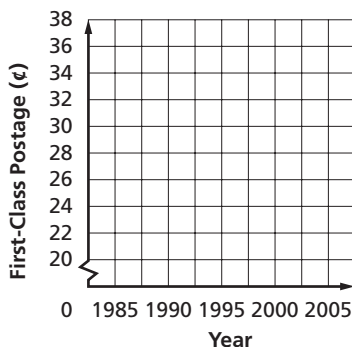
5. Write an equation for a line of fit and use it to predict the postage rate in 2010.

8-1 Word Problem Practice

Solving Equations with Variables on Each Side

1. **BALLOONING** One hot air balloon is 15 meters above the ground, and is rising at a rate of 20 meters per minute. A second balloon is 195 meters above the ground, and is descending at a rate of 16 meters per minute. In how many minutes will the two balloons be at the same height?

2. **TRANSPORTATION** A commuter train pulling 8 cars had room for another 84 passengers. Halfway through the commute, the train had to be taken out of service. All of the passengers were transferred to another commuter train that had 6 cars with the same capacity as those in the first train. After all of the passengers transferred to the replacement train, there was room for only 10 more people. What is the maximum number of passengers that each car can transport?

3. **CAR RENTALS** The table below shows what two rental companies charge for an intermediate 4-door sedan. How many miles must a driver drive in one day to make First Choice a less expensive option?

	First Choice Car	Best Rent-A-Car
Daily charge	$65	$48
Cost per mile	$0.06	$0.10

4. **TRAVEL** Cindy is saving for a trip to Hawaii. Each week, she puts aside the same amount of money for her airfare. After 9 weeks of saving, she needs $390 more for her airfare. After 14 weeks, she still needs $240. How much is the airfare to Hawaii? How much does Cindy put aside each week for her airfare?

PLUMBING **For Exercises 5 and 6, use the following information.**

Josh has two leaking pipes in his basement. While waiting for the plumber to come, Josh puts a bucket under each leak. The two buckets have the same capacity. The bucket under the first leak fills in 20 minutes. The bucket under the second leak fills in 35 minutes.

5. Josh's brother takes away one of the buckets and places the one bucket under the two leaks. About how long will it take for the one bucket to fill completely?

6. Josh wraps a cloth around the first leak, which cuts the rate of that leak in half. At the same time, it doubles the rate of the second leak. How will this affect the time it takes to fill the bucket?

Lesson 8-1

8-2 **Word Problem Practice**

Solving Equations with Grouping Symbols

1. **FUEL** In September 2005, the average price of gasoline was $3.07 a gallon. This price represented an increase of $0.57 less than twice the price the previous year. Use the equation $307 = 2x - 57$ to determine the price of gasoline in September 2004.

2. **GEOMETRY** The length of one side of a regular hexagon is x. A regular pentagon also has a side length of x. A square is constructed with a side length of x. What is the total perimeter of all three figures?

3. **GEOMETRY** A triangle and a rectgangle have the same perimeter. What is the width of the rectangle?
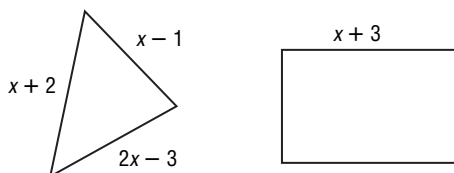
4. **HIKING** A group of friends went on a three-day hike. During the second day of the hike, the group hiked twice as far as they did on the first day. One the third day, they hiked twelve miles farther than the combined distance of the first two days. Write an expression to show the total distance the group of friends hiked over three days?

POSTERS For Exercises 5 and 6, use the following information.

Brian wants to put six posters on his bedroom wall. The posters are all the same size.

The width of each poster is $8\frac{1}{2}$ inches more than half its height.

5. Brian arranges the posters so they are side by side in two rows of three. Write an expression for the height and width of the large rectangle formed by the posters in terms of the height of a poster.
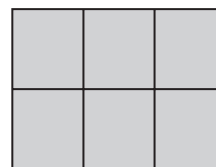
6. The space between the top of the posters and the top of the wall is 11 inches. The space between the bottom of the posters and the bottom of the wall is also 11 inches. If the wall measures 12 feet long by 7 feet 6 inches high, what are the dimensions of one poster?

Lesson 8-2

8-3 Word Problem Practice

Inequalities

1. **HIGHWAY SAFETY** The Texas Transportation Commission can establish a daytime speed limit of 75 miles per hour in counties with a population density of less than 10 persons per square mile. Write an inequality to describe the population density.

2. **AIR BAGS** The front passenger seat of an SUV is equipped with weight sensors that determine the appropriate amount of deployment force of the air bag. If the weight on the front seat is less than 66 pounds, the air bag will not deploy. Write an inequality to show the minimum weight on the passenger seat that would lead to the deployment of the air bag.

3. **SAFETY** An amusement park ride cannot safely restrain people under 50 inches tall or over 78 inches tall. Write two different inequalities that shows the safe height limits for riders.

```
     Too Tall
78"  ◄─
     You
     Can
     Ride!
50"  ◄─
     Too Short
```

4. **MACHINERY** One model of a lift truck, often called a forklift, can raise a maximum of 1750 kilograms. Write an inequality to describe the maximum number of 40-kilogram boxes that this forklift truck can raise.

AGRICULTURE For Exercises 5 and 6, use the following information.

Agri-Crop sells a system that uses satellites to determine the appropriate amount of fertilizer to dispense on crops. The equipment for the system costs $6000. In addition, there is a yearly fee of $950 for signal reception.

5. How much additional crop revenue would the system have to generate so that the investment is profitable for a farmer over a five-year period?

6. A representative from Agri-Corp estimates that the system would yield an additional $100 per acre each year of a certain crop. How large a farm should a farmer have in order to expect to make a profit using the system over a ten-year period?

Lesson 8-3

8-4 **Word Problem Practice**

Solving Inequalities by Adding or Subtracting

1. **ENTERTAINMENT** Gabrielle went to the movie theatre with her friends. She had $20.00 to spend. The movie ticket cost $6.25. Write an inequality to determine how much money she had to spend on snacks.

2. **LICENSE** To get a driver's license in most states in the United States, a driver must be at least 16 years old. Jonas is $14\frac{1}{2}$ years old. Write an inequality to show how much longer Jonas must wait before he can get his diver's license.

3. **QUARTER HORSE** The American Quarter Horse is the most popular riding horse in the world. The average weight of an American Quarter Horse at birth is 85 pounds. They grow to a maximum weight of 1300 pounds. Write and solve an inequality to find how many pounds an American Quarter Horse may gain from birth to adulthood.

4. **SPORTS** A big league pitching coach tries to limit his pitchers to 110 pitches per game. If the pitcher has already thrown 52 pitches, write and solve an inequality to find how many more pitches he can throw before reaching the limit.

FERRIS WHEEL For Exercises 5–7, use the following information.

David went to the Texas State Fair with a group of friends. Before going, he found the following information about the Texas Star, the largest Ferris wheel in North America.

Height	212 feet
Weight	678,554 pounds
Maximum Capacity	264 riders
Length of Ride	12–15 minutes

5. David is waiting in line for a ride on the Texas Star. He counts the people ahead of him and determines that he will be able to board the Texas Star on the next ride. Write an inequality to find the number of people ahead of him.

6. David gets on the ride and as his car reaches the top of the wheel, notices how small the people on the ground look. Write an expression to show how they maximum distance that David is from the ground while riding the Texas Star.

7. David has been on the ride for 6 minutes and starts to feel dizzy. Write and solve an inequality to show the maximum amount of remaining time that David will be on the Texas Star.

8-5 Word Problem Practice

Solving Inequalities by Multiplying or Dividing

1. **BABY-SITTING** Susan bought $65 worth of new clothes for school. That amount was at least half of the money she earned baby-sitting this summer. At least how much did Susan earn baby-sitting?

2. **FLEAS** An adult female flea lays more than 25,000 eggs every month. What is the minimum number of eggs laid by an adult female flea in one week. Let 1 month = 4 weeks.

3. **JUICE** Tyrone has invited 15 friends to his birthday party. His mother bought 3 dozen bottles of juice drink for the party. Tyrone wants each person at the party to get the same number of bottles of juice drink. Write and solve an inequality to show how many bottles of juice each person at the party will get.

4. **CRAFT FAIR** The students in the seventh grade are sponsoring the school craft fair. They want to set up 15 tables, but must have at least 3 adult volunteers for each table they set up. Write and solve an inequality to find the minimum number of adult volunteers the seventh graders must have in order to set up the 15 tables.

TOY MANUFACTURING For Exercises 5–7, use the following information.

Winona Toy Company makes many kinds of toys. The table shows average production times.

Toy	Average Production Time (hours)
fire truck	2
train	$3\frac{1}{3}$
stuffed bear	$2\frac{1}{4}$
doll	4

5. Stella is a stuffed bear maker. She works 10 hours a day. Write and solve an inequality to determine the maximum number of bears Stella may make in a day.

6. Winona Toy Company received an order for 45 bears. Stella will have to make these bears on her own. Write and solve an inequality to find how long it may take her to complete the order.

7. Winona Toy company hopes to sell a lot of trains during the holiday season, so the managers hire another worker to make trains. What is the maximum number of trains that two workers can make in a 40-hour work week?

8-6　Word Problem Practice

Solving Multi-Step Inequalities

1. **CONSTRUCTION** An excavation crew is digging a tunnel under a bay. The crew has dug 573 meters of the tunnel, which is 34 meters past the halfway point. What will be the length of the tunnel when the crew has finished digging?

2. **BACKPACKS** To avoid injury to your back, your body weight should be more than three times the weight of your backpack and its contents. Write an inequality that shows the relationship between body weight and a total backpack weight that falls within these guidelines. Use p for the backpack and c for the contents of the backpack.

3. **TRUCKING** An open-bed delivery truck has a maximum cargo capacity of 473 cubic feet before the load is higher than the bed of the truck. The truck driver has a load of 12 equally sized boxes that needs to be transported. Unfortunately, the load exceeds the cargo capacity by $44\frac{1}{2}$ cubic feet. Write and solve an inequality to determine the maximum number of boxes that the truck can carry without exceeding the height of the truck bed.

4. **SALARY** After receiving her yearly bonus of $5000 for the current year, Clare noticed that if she added her bonus to her current salary, her total income for the current year was more than double her salary of $32,750 from the previous year. What is the minimum salary that Clare is earning?

CAR LEASING For Exercises 5–7, use the information provided in the table below.

Nathan is interested in leasing a new SUV. He collected this information from two leasing companies.

Leasing Company	Monthly Payment	Mileage Limit	Extra Mileage Charge
ABC	$463	10,000	$0.25/mi
XYZ	$473.50	12,000	$0.10/mi

5. Nathan's drive to and from work each day is about 45 miles. If he goes to work about 226 days in a given year, what is the minimum amount he would have to pay in excess mileage if he leased from the ABC Leasing Company?

6. If Nathan leases from XYZ Company, how many miles can he drive after work or on the weekend without being charged for excess mileage?

7. Which leasing program would be a better deal for Nathan if he estimates that his after-work and weekend driving would total about 2500 miles annually?

9-1 **Word Problem Practice**

Squares and Square Roots

1. **LIFEGUARDS** Maria is a lifeguard in Port Aransas. When she sits in her chair, her eyes are 10 feet off the ground. On a clear day, how far can Mary see from her chair? Use the equation $D = 1.22 \times \sqrt{A}$ where D is the distance in miles to the horizon at a height of A feet.

2. **CONSTRUCTION** José is building a square deck off of the back of his house. José has a building permit for a 432-square foot deck. How long will each side of the deck be?

3. **GARDENING** Jordan wants to fill a square flower bed with 24 perennials. The landscaper recommends that he allow 1.5 square feet per plant. What should the length of one side of the flower bed be?

4. **BASEBALL** The area of a little league diamond is 3600 square feet. The infield for a regulation-sized baseball diamond is 8100 square feet. How much farther is it from first base to second base on the regulation-sized field than on a little league field?

PHYSICS For Exercises 5–7, use the following information. Round your answers to the nearest hundredth.

The time it takes for a pendulum of a grandfather clock to swing back and forth one time is called the period of the pendulum. For a pendulum of length L (in feet), the period T (in seconds) is given by the equation $T = \frac{1}{2}\pi\sqrt{\frac{L}{2}}$.
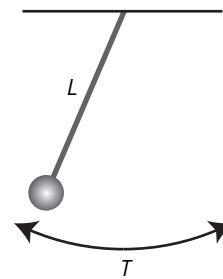
5. What is the period of a pendulum that is 2 feet long?

6. What is the period of a pendulum that is 4 feet long?

7. What do you think will happen to the period of a pendulum if the length of the pendulum is quadrupled? Explain.

Lesson 9–1

9-2 Word Problem Practice

The Real Number System

1. **GARDENING** Betty wants to plant a circular garden in her backyard. The garden is going to have an area of 150 square feet. Use the formula $r = \sqrt{\dfrac{A}{\pi}}$ to find the radius of the garden.

2. **ELECTRICITY** Ralph is studying electricity in his science class. He recently learned that the formula for determining the electrical power delivered to a light bulb is $P = I^2 \times R$ where P is electrical power in watts, I is the current in amperes, and R is resistance in ohms. Ralph wants to determine how much current is needed to light a 60-watt bulb if the resistance in the wire is 2.15 ohms. What answer will he find?

3. **PHYSICS** Billy is going to drop three water balloons, one at a time, out of his tree house onto a target below. His tree house is 25 feet above the ground. If Billy waits to drop the next balloon until the previous one hits the ground, how long will it take for all three balloons to hit the ground? Use the formula $h = 16t^2$ where h is the height (in feet) and t is the time (in seconds).

4. **REMODELING** Ashley is going to retile a part of a wall in her shower. She will use white and red tiles to make a checkerboard pattern. The area of the square section to be retiled is 36 square feet. If each square tile covers an area of 0.25 square feet, how many red tiles will Francine need?

WEATHER For Exercises 5 and 6, use the following information.

Cindy wants to study meteorology. She has been reading about thunderstorms and found out that the time t in hours that a thunderstorm will last can often be predicted if one knows the distance across the storm in miles. Meteorologists use the formula $t^2 = \dfrac{d^3}{216}$ where d is the distance across the storm in miles. Cindy decided to time a recent thunderstorm.

5. If the thunderstorm lasted 1 hour 50 minutes, what is the distance in miles across the storm?

6. What would be the distance across if the storm lasted twice as long?

Lesson 9–2

9-3 Word Problem Practice

Triangles

1. LANDSCAPING Paula has a garden in the shape of a triangle. Before planting, she made a scaled drawing of the garden. She measured two of the angles of the garden. What must be the measure of the third angle?

112° 26°

House
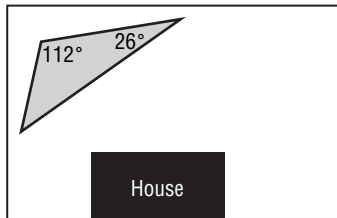
2. ORIENTEERING Angie is becoming a wilderness scout. She is learning to use a compass to orient herself in the woods. Angie has oriented the compass so the needle is pointing north. She is facing east. If she wants to head southwest, what kind of angle turn will she make: an acute, obtuse, or right angle?

3. TROPHIES At Fred's school, the most improved students receive a trophy in the shaped of a triangle. The three side lengths of the trophy are 5 inches, 8 inches and 8 inches, and two angle measures are 36° and 72°. Classify the triangle by angles and by sides.

4. QUILTING Jan wants to make a quilt using the pattern she created. The pattern is made up of triangles. What kind of triangles did Jan use in her pattern? Identify the triangles by angles and by sides.
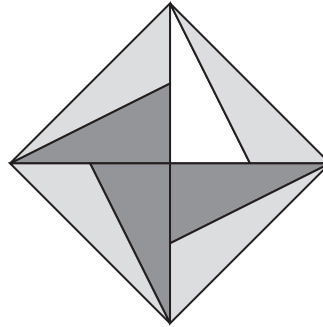
MODELS For Exercises 5 and 6, use the following information.

Barry is building a model house. One face of the roof is shaped like a triangle. To help him find the correct triangle to use, his father gives Barry a little math riddle: the largest angle is five more than 4 times the smallest angle and the middle angle is twice the smallest angle.

5. Write an equation to solve for the smallest angle and solve the equation.

6. Find the measures of the other two angles.

9-4 **Word Problem Practice**

The Pythagorean Theorem

1. **HIKING** Freddy is on a nature hike. He hikes west 4 miles, and then he turns due north and hikes for 2 miles. It is getting dark and Freddy wants to take the shortest route back to where he started. What is the direct distance back to his starting point?

2. **CONSTRUCTION** Madeleine is helping to build a house with Habitat for Humanity. After an exterior wall is erected, she measures it to see if it is square. The height of the wall is 9 feet. She measures 12 feet along the floor from the corner and makes a mark. What should be the length of the diagonal from the top of the wall to her mark if the wall is square?

9 ft

12 ft
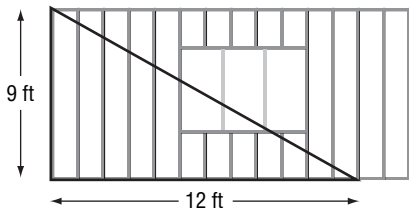
3. **FURNITURE** A corner table has a top in the shape of an isosceles right triangle. If the hypotenuse is 14 inches long, what is the length of each side?

4. **AIRPLANES** An airplane is flying at an elevation of 15,000 feet. The airport is 6 miles away from a point directly below the airplane on the ground. How far is the airplane from the airport?

15,000 ft

?

6 miles
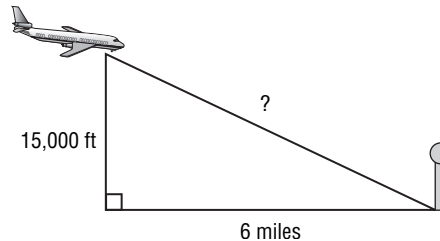
SAFETY For Exercises 5–7, use the following information.

For safety reasons, the base of a ladder should always be about 1 foot away from the vertical support for every 4 feet of height.

5. Pete needs to reach his cat in a tree. The cat is 15 feet off the ground and Pete's ladder is 16 feet long. Can Pete safely set up the ladder to rescue his cat? Explain.

6. How long should an extension ladder be adjusted to safely reach a window that is 22 feet above the ground?

7. What is the maximum height that a 24-foot ladder can safely reach?

9-5 Word Problem Practice

The Distance Formula

1. **MAPS** On a map of Joe's hometown, his house is located at $(3, 4)$. His school is located at $(-2, 2)$. How many units are there from Joe's house to his school?

2. **CARTOGRAPHY** Nicole is looking at a map of an amusement park. The scale is one unit equals 250 feet. The roller coaster is located at $(5, 3)$ and the water slide at $(-2, -1)$. How many feet apart are the two rides? Round to the nearest foot.

3. **LANDSCAPING** Susan is planting some trees in her front yard. She planted a Bradford pear tree 12 feet west and 1 foot north of her flagpole and planted a Juniper tree 15 feet east and 3 feet north of her flagpole. How far apart are the two trees? Round to the nearest tenth of a foot.

4. **HIKING** Two scout patrols start hiking in opposite directions. Each patrol hikes 5 kilometers. Then the scouts turn 90° to their right and hike another 6 kilometers. How many kilometers are there between the two scout patrols?

MAPS For Exercises 5–7, use the following information.

Billy and Sam drew a scaled map of their town to determine who lives closer to the Arcade, a favorite week end meeting place for Billy and Sam. The following grid shows where Billy and Sam live and also where the Arcade is located. Each unit on the grid represents $\frac{1}{2}$ mile.
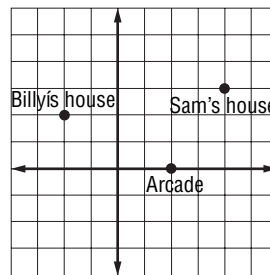
5. How far is Sam's house from the Arcade?

6. How far is Bill's house from the Arcade?

7. How far do Sam and Bill live from one another?

9-6 Word Problem Practice

Similar Polygons and Indirect Measurement

1. **CLIMBING WALLS** Joe's friends are going to climb the climbing wall and have invited Joe to go with them. Joe is afraid of heights and wants to know how high the climbing wall is before he climbs it. Joe is $5\frac{1}{2}$ feet tall and at 3:00 P.M., his shadow is $2\frac{3}{4}$ feet long.

   At the same time, the shadow of the rock-wall is 35 feet long. How high is the rock-wall?

2. **SWIMMING** Tien's camp is having a swim race across the lake. Before the race, Teresa wants to know how many meters it is across the lake. She knows that the flagpole is 22 meters due south from the dock, and that the main cabin is 5 meters due south from the flagpole. She also knows that her cabin is 8 meters due west from the main cabin. Using the diagram below, how far is it across the lake?
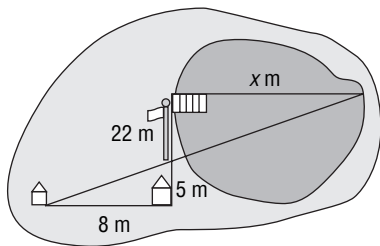
3. **PIZZA** Ralph's Pizza Shop sells two sizes of rectangular pizzas that are similar in shape. A large pizza is 12 inches by 18 inches. The shorter side of the small pizza is 6 inches. What is the perimeter of the small pizza?

4. **SHADOWS** Britney is 5 feet tall and casts a $3\frac{1}{2}$-foot shadow at 10:00 A.M. At that time, a nearby tree casts a 17-foot shadow. Two hours later, Britney's shadow is 2 feet long. What is the length of the shadow of the tree at this time?

PERIMETER AND AREA For Exercises 5–7, use the following information.

The front yard and back yard at the Jones' home are similar rectangles. The back yard is 20 feet by 30 feet. The longer dimension of the front yard is 20 feet.

5. Find the scale factor of the two yards. What is the other dimension of the front yard?

6. Find the perimeters of both yards. What is the scale factor of the perimeters?

7. Find the areas of both yards. What is the scale factor of the areas?

10-1 Word Problem Practice

Line and Angle Relationships

1. **PROPERTY LINES** The front and back property lines of Michaela's land are parallel lines. If the angle between the west side property line and back property line is 106°, what is the angle between the front property line and west side property line?

2. **SCISSORS** Archie opened up a pair of scissor so that the angle between the blades is 38°. What is the angle between the handles?

38°

?

3. **FENCING** The sections of fence in Sioban's yard have diagonal supports as shown. The top side of the diagonal support makes an angle of $x°$ with the fence slats. The bottom side makes an angle that is twice the measure of the top angle. Find the measures of both angles.

$x°$
$2x°$
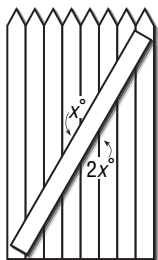
4. **MAPS** In the following map, First Avenue, Second Avenue, and Third Avenue are parallel. Cross Street intersects all three avenues. First Avenue and Cross Street meet at a 25° angle. What angle does the intersection of Third Avenue and Cross Street make?

Cross St.
25°
$x°$
First Ave.
Second Ave.
Third Ave.
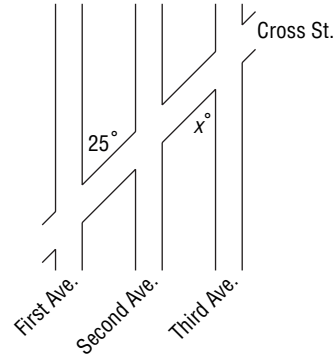
HIKING For Exercises 5 and 6, use the following information.

Dave and Susie are walking on parallel trails in the woods. Dave's trail turns to the right 43° and meets up with Susie's trail.

500 ft
400 ft
43°
x ft
Dave's Trail   Susie's Trail
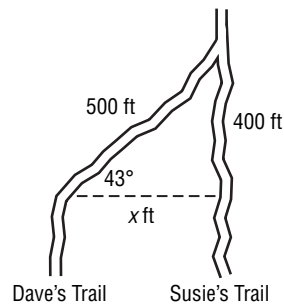
5. At what angle does Dave's trail meet Susie's trail?

6. How far apart were Dave and Susie's trails originally?

10-2 **Word Problem Practice**

Congruent Triangles

1. ROOFING The structure of a roof can be broken into congruent triangles. If side $\overline{WX}$ is 12 feet long, what is the length of side $\overline{WZ}$?
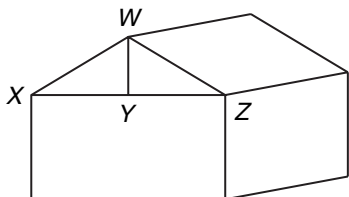
2. CONSTRUCTION Braces are often used to support walls during the construction of a house. If the two braces used in the following house are the same length and perpendicular to the ground, what is the measure of the angle x where the braces meet the ground?
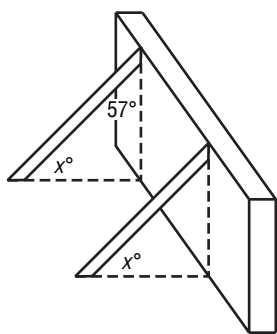
3. FLOWER BEDS Jane has two congruent flower beds in her backyard. The flower beds are triangular in shape. If the longest side of one flower bed is 12 feet, how long is the longest side of the other flower bed?

4. AWARDS The award for Most Improved Math Student in Mrs. Pike's classroom is a circle containing two congruent triangles connected at a vertex. What side in $\triangle ABC$ corresponds to $\overline{DE}$?
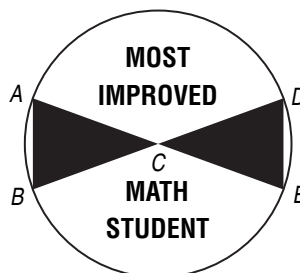
KITES For Exercises 5 and 6, use the following information.

Joey's kite is made up of 4 congruent right triangles and 1 square as shown in the diagram below.
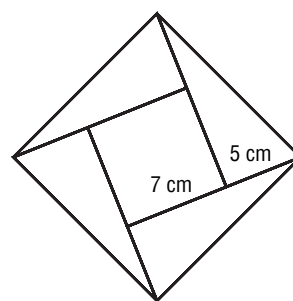
5. What are the three side lengths of each triangle?

6. What is the perimeter of Joey's kite?

Lesson 10–2

10-3 Word Problem Practice

Transformations on the Coordinate Plane

1. **MAPPING** Francesca wants to rearrange her bedroom, so she drew the floor plan of her bedroom on a coordinate grid. If her bed was originally located in the second quadrant, which quadrant will it be in if she rotates its position 90° clockwise?

2. **ARCHEOLOGY** Archeologists use a grid to record the location of artifacts in a dig site. An assistant marked grid A3 as the location of two arrow heads. The arrowheads were actually found in the grid 4 units to the right and 3 units down. Which grid should the assistant record as the location of the arrowheads?
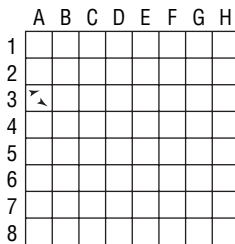
3. **SWIMMING POOLS** Mrs. Jensen is planning to have a swimming pool installed. The contractor drew the pool on the coordinate grid. Jenny wants a bigger pool and decides a dilation with scale factor 2 centered at the origin will be sufficient. What are the coordinate of the vertices of the new pool?
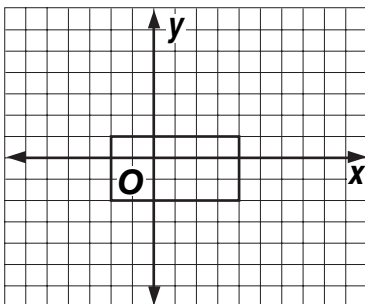
4. **GAMES** In the game of checkers, the pieces are set up in a particular order. Which transformation would place checker A on top of checker B?
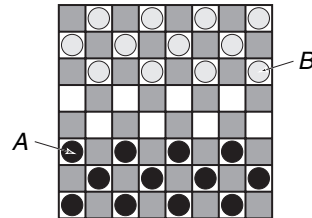
MODELS For Exercises 5 and 6, use the following information.

Long-grass Landscape Company often draws a scale model of yards they are designing. The scale factor of the model shown is 1 inch to 10 feet.
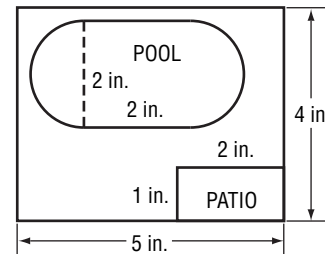
5. Does this model represent a dilation, translation, or reflection of the actual yard?

6. What will be the actual dimensions of the patio?

Lesson 10–3

10-4 Word Problem Practice

Quadrilaterals

1. KITES Yashika got a new kite for her birthday. What quadrilateral best describes the shape of this kite?
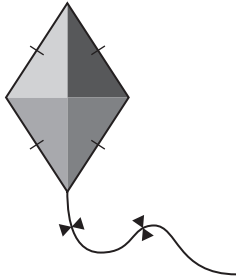
2. PLANTERS A city used large tree planters to line the road. Identify as many different quadrilaterals as possible in the planters.
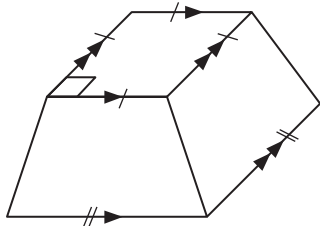
3. PROPERTY Mr. Orwell has some property in the middle of the wilderness. The shape of the property is a quadrilateral. Mr. Orwell knows the angles of intersections of three sides are 28°, 147°, and 72°. What is the measure of the fourth angle of the property?

4. WINDOWS The window above the front door in Heather's home is shown below. Find the measures of angles 1, 2, and 3.
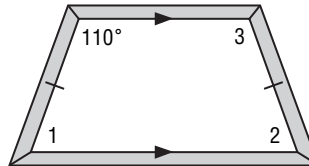
DESIGN For Exercises 5–7, use the following information.

Diego is going to design a kite. Two of the opposite angles are congruent. One of the other angles is half the congruent angles, and the other is twice the congruent angles.

5. Make a sketch of the kite.

6. Write an equation to find the measures of the four angles of the kite.

7. What are the measures of the four angles?

10-5 **Word Problem Practice**

Polygons

1. **TRAFFIC SIGNS** A familiar sight to many people is the red STOP sign found at street corners and intersections. The shape of the STOP sign is shown below. Classify the polygon and determine if it appears to be regular or not regular.

2. **NUTS AND BOLTS** The nut to a standard bolt is a regular hexagon. What is the sum of the measures of the interior angles of the nut?
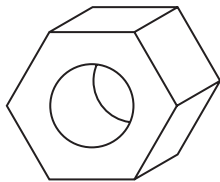
3. **WINDOWS** Some older houses have regular octagonal windows. What would be the measure of one of the interior angles in this type of window?

4. **AREA RUGS** The pattern in an area rug is shown below. Identify the three different polygons used to create the pattern.
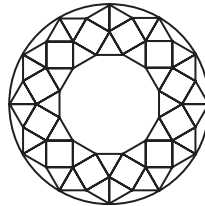
SYMBOLS For Exercises 5–7, use the following information.

Jenna made this shape with patterns blocks.
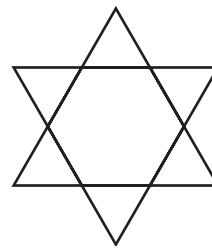
5. This design can be made up of 7 regular polygons. What are they?

6. This design is also made of one dodecagon. What is the sum of the measures of all the interior angles of the dodecagon?

7. What are the measures of the interior angles of the dodecagon?

10-6 **Word Problem Practice**

Area: Parallelograms, Triangles, and Trapezoids

1. **FLOOR PLANS** Matt's bedroom is shaped like a parallelogram. His parents have decided to buy a new carpet for his room. If two opposite walls are 12 feet long and the distance between these walls is 8 feet, how many square feet of carpet will they need to buy?

2. **SAILBOATS** A sailboat has a triangular sail with a height of 18 feet and the base of 12 feet. What is the area of the sail?

3. **TILING** Mrs. Sanchez wants to tile her bathroom floor. The floor is 5 feet wide and 8 feet long. The tiles Mrs. Sanchez wants to use are 4 inch squares. How many tiles will she need to cover the bathroom floor?

4. **GLASS COSTS** Mrs. Humphrey needs to replace a broken window at her house. The window is shaped like a trapezoid with the dimensions shown below. If glass costs $4.50 per square foot, how much will the replacement window cost?

21 in.
18 in.
42 in.
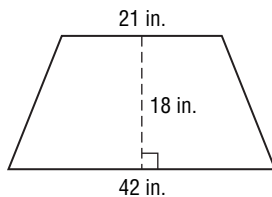
SYMBOLS **For Exercises 5–7, use the following information.**

Melanie wants to cut her cake into triangular wedges to serve at her party. She cannot decide what kind of triangle to cut. She tries two possible triangular wedges.

6 in.
4 in.
Piece 1
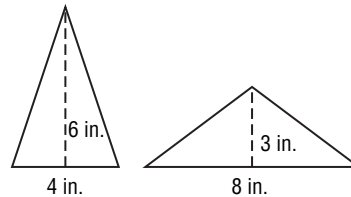
3 in.
8 in.
Piece 2

5. What is the area of the first wedge? What is the area of the second wedge?

6. Sketch and label another triangular wedge with the same area.

7. Melanie wants each guest to have the same amount of cake. If there are 54 guests at the party, what should the dimensions of the cake be so that everyone gets the same amount of cake?

10-7 Word Problem Practice

Circumference and Area: Circles

1. **TREES** A tree on Joanne's property has a circumference of 6.8 feet. What is the diameter of the tree?

2. **DOGS** Carl's dog, Buddy, is on an 8-foot leash that is attached to the center of a 20-foot fence. How much space does Buddy have to roam around?

20 ft   8 ft
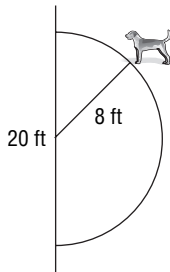
3. **KITCHEN FURNITURE** Mr. Margulies bought four new stools for her kitchen. Each stool top has a diameter of 14 inches. Mr. Margulies wants to make pads for each stool. The padding is three cents per square inch. How much will Mr. Margulies spend in padding for the four stools?

4. **TOYS** Josh has a large plastic disc that he uses to play catch with his dog. The disc has a radius of 6 inches. What is the area of the disc?

PIZZA For Exercises 5–7, use the following information.

At Paco's Pizza Shop, a large pizza has a diameter of 16 inches. A small pizza has a diameter of 12 inches.

5. What is the area of the small pizza? What is the area of the large pizza?

6. A large pizza costs $9.95 and a small pizza costs $5.95. Which pizza is a better deal? Explain.

7. On Tuesday's, Paco's Pizza has a special, two small pizzas for $11.25. Is this truly a special price? Explain your reasoning.

10-8 Word Problem Practice

Area: Composite Figures

1. **SHELVING** The back of a shelving unit is shown below. How much plywood is needed to construct this piece of the unit? Round to the nearest whole number.
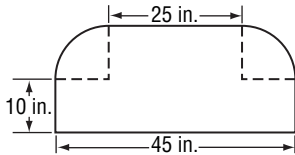
2. **LANDSCAPING** Peter's backyard is rectangular in shape, with dimensions 60 feet by 50 feet. He plans to install a circular above ground pool that has a diameter of 20 feet. What will be the area of his backyard that is left after installing the pool? Round to the nearest whole number.

3. **DOG HOUSES** Barbara is going to paint the front of her dog's house green. If one quart of paint covers 8 square feet, will she need more than one quart?
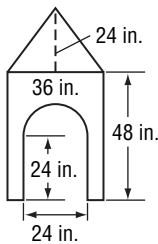
4. **LOGOS** The logo for Super Soda Company is shown below. What is the area of the shaded region?
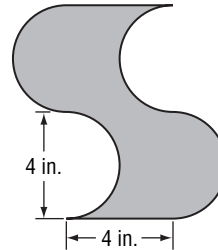
BOATS For Exercises 5 and 6, use the following information.

Frank is using a template to make a boat cover out of canvas for his boat. The template is shown below.
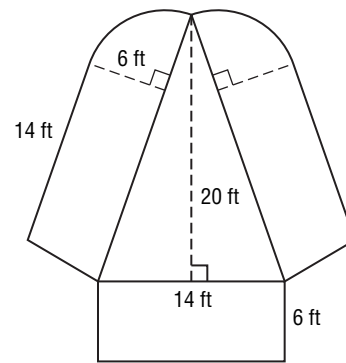
5. How many square feet of canvas will he need to make the template?

6. If canvas costs $8.00 a square yard, how much will the canvas cost?

Lesson 10–8

11-1 **Word Problem Practice**

Three-Dimensional Figures

1. **ARCHITECTURE** The Pentagon in Washington, D.C., is shaped like a pentagonal prism. Use the figure below to identify its bases and faces.
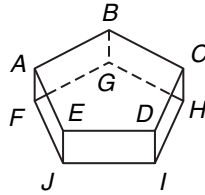
2. **BUILDINGS** The sketch below shows the plans for a tower to be built in Dallas, Texas. Draw and label the top, front, and side views and a top-count view.
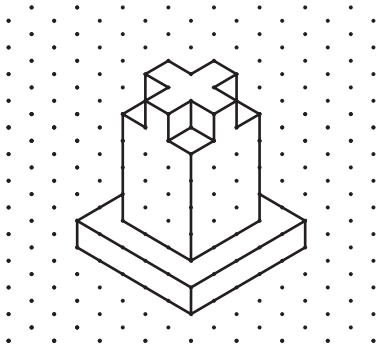
3. **CONTAINERS** Frozen juice concentrate comes in a particular solid. Identify the solid and name 4 other food products that come in a similarly shaped solid.

4. **SCULPTURE** Use the top-count view of the sculpture to sketch the three-dimensional model of the sculpture.

4	3	3	4
2	1	1	2

DICE For Exercises 5–7, use the following information.

Dice come in many different shapes. The most common die has six sides. There are also dice with four, eight, twelve and twenty sides.

5. How many faces does each die mentioned above have?

6. How many edges do the four-, six-, and eight-sided dice have?

7. How many vertices do the four-, six-, and eight-sided dice have?

Lesson 11-1

11-2 Word Problem Practice

Volume: Prisms and Cylinders

1. **CONSTRUCTION** Johnson Construction Company is going to build a house on a concrete slab. The slab is to have dimensions 30 feet by 20 feet by 2 feet. How many cubic feet of concrete should the construction company order?

2. **PACKAGING** The Fresh Chili Company is changing the size of their cans of chili. The new can needs to hold 500 cubic centimeters of chili. The height of the can is to be 11 centimeters. What must the radius of the new can be? Round your answer to the nearest tenth.

3. **WASTE COLLECTION** At Peter's job, he needs to empty wastebaskets. The cylindrically shaped wastebaskets have a height of 3 feet and a diameter of $1\frac{1}{2}$ feet. Peter empties the wastebaskets into a dumpster that is shaped like a rectangular prism. If the dumpster is 8 feet wide, 6 feet deep, and 5 feet tall, how many wastebaskets full of trash will fit in the dumpster?

4. **AGRICULTURE** Sue is going to build a planter as sketched below. How many cubic feet of dirt will be needed to fill the planter?
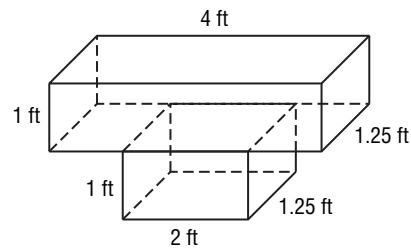
WATER STORAGE For Exercises 5–7, use the following information.

The town of Old Creek, Oklahoma, has a water reservoir that is shaped like a triangular prism. The area of the triangular surface of the reservoir is 1500 square yards, and the depth is 20 yards.

5. When the reservoir is completely full, how many gallons of water does it hold? (*Hint*: 1 yd^3 holds approximately 202 gallons.)

6. After 75 days of no rain, the reservoir is now only 4 yards deep. How many gallons of water have been used?

7. Find the average gallons-per-day rate of water that was used from the reservoir.

Lesson 11-2

11-3 Word Problem Practice

Volume: Pyramids, Cones, and Spheres

1. **ARCHITECTURE** Although the Eiffel Tower in Paris is not a solid pyramid, its shape approximates that of a pyramid with a square base measuring 120 feet on a side and a height of 980 feet. If it were a solid pyramid, what would be the Eiffel Tower's volume, in cubic feet?

2. **WEATHER** After a snow storm, you and a friend decide to build a snowman. You use three spheres of snow to build the snowman. The bottom sphere has a diameter of 4 feet, the middle has a diameter of 2 feet, and the head has a diameter of 18 inches. What is the volume of the snowman? Round your answer to the nearest cubic foot.

3. **ICE CREAM** A spherical scoop of ice cream is placed on a waffle cone. The diameter of the ice cream scoop is 6.4 centimeters. The waffle cone has a diameter of 5 centimeters and a height of 9 centimeters. If all the ice cream melts before you eat any, how much of the melted ice cream will overflow the waffle cone? Round your answer to the nearest tenth.

4. **HISTORY** The Great Pyramid of Khufu in Egypt has a square base measuring 756 feet on a side and a height of 481 feet. The stones used to build the Great Pyramid were limestone blocks with an average volume of 40 cubic feet. How many of these blocks were needed to construct the Great Pyramid? Round your answer to the nearest whole number.

FARMING For Exercises 5–7, use the following information. Round to the nearest whole number if necessary.

Mr. Mills has just finished his corn harvest. He filled 12 trucks with corn and needs to move the corn to one of the two silos on his farm. Each truck bed is shaped like a rectangular prism having dimensions 10 feet wide, 20 feet long, and 6 feet tall. Mr. Mills needs to fit all the corn in the same silo.

Silo A   Silo B
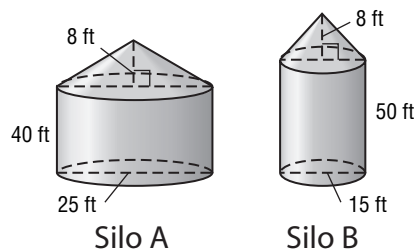
5. How much corn has Mr. Mills harvested?

6. How much corn will each silo hold?

7. Which silo should Mr. Mills put all of his corn in? How many more full truckloads of corn could he store in the larger silo?

11-4 Word Problem Practice

Surface Area: Prisms and Cylinders

1. **DECORATING** Ms. Frank is going to wallpaper a living room with dimensions 24 feet long, 18 feet wide, and 8 feet high. What surface area does Ms. Frank plan to wallpaper?

2. **MANUFACTURING** The Acme Canning Company produces cans for chicken soup. If each can has a diameter of 2 inches and a height of $3\frac{1}{4}$ inches, how much aluminum is needed to make one can? Round to the nearest hundredth.

3. **MUSEUM** A museum curator needs to order a display case for a small artifact. The case needs to be a rectangular prism and made entirely of clear plastic. The bases must each measure $1\frac{1}{2}$ feet by $1\frac{3}{4}$ feet and the sides each 3 feet high. Find the cost of the case if the clear plastic costs $10 per square foot.

4. **SIDING** The Ramirez family is going to put vinyl siding on a shed. They will cover all four walls completely, except for the door. The siding costs $3 per square foot. How much will the siding cost for their shed?

5 ft
3 ft
8 ft
7 ft
15 ft
10 ft
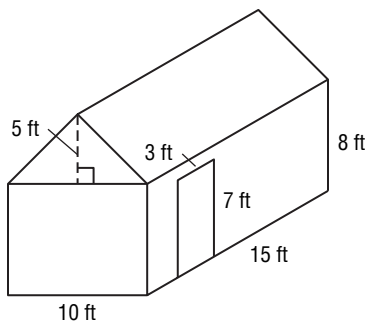
SHIPPING For Exercises 5–7, use the following information.

FPS, a shipping company, uses a container in the shape of a triangular prism to pack blueprints, posters, and other items that can be rolled up to fit inside the container. Packages-R-Us uses a container shaped like a cylinder for the same purposes. The cardboard used to make each container costs the same amount per square inch.

5.2 in.
38 in.
38 in.
2 in.
6 in.
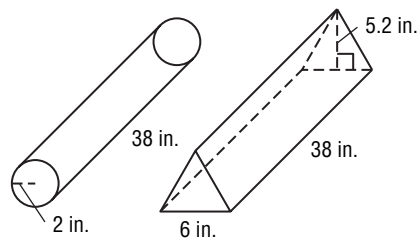
5. What is the surface area of the FPS box?

6. What is the surface area of the Packages-R-US box?

7. If each company buys 100 of these packages, which company will spend less money per package? Explain.

11-5 Word Problem Practice

Surface Area: Pyramids and Cones

1. **PARTY HATS** The Goodtime Company needs to make paper hats to use for special events. The paper hats are in the shape of a cone. The radius of the cone is 8 centimeters and the slant height is 20 centimeters. How many square centimeters of paper are needed to make each hat? Round our answer to the nearest tenth.

2. **TEEPEES** Ryan is trying to build a teepee for a school project on Native Americans. Teepees are approximately the shape of a cone. Ryan has 290 square feet of canvas to make the teepee. If the diameter is to be 12 feet, what will the slant height be if he uses all the canvas?

3. **SCOOPS** Audrey uses a metal scoop to measure the correct amount of food to give to her horse. The scoop is shaped like a cone and is shown below. How much metal was used to make the scoop? Round your answer to the nearest tenth

6 in.

$8\frac{1}{2}$ in.
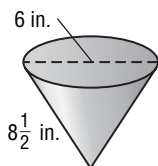
4. **STORAGE TANKS** A water storage tank has a roof that is shaped like a square pyramid. What is the surface area of the water tank?

7.8 ft
10 ft
10 ft
10 ft
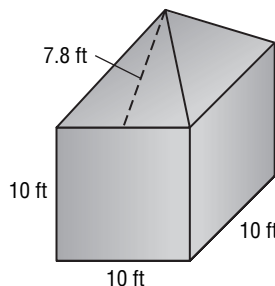
ICE CREAM For Exercises 5–7, use the following information.

The SmileTime Ice Cream Co. is going to begin selling their ice cream in cardboard cones instead of cylindrically-shaped cups. (Note: There is no top on either container.)

$3\frac{1}{2}$ in.

$1\frac{3}{4}$ in.

$2\frac{1}{2}$ in.

$2\frac{1}{2}$ in.
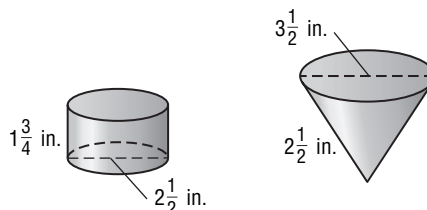
5. What is the surface area of each container? Round your answer to the nearest tenth.

6. If the paper costs 90¢ per square foot, how much does SmileTime Ice Cream Company save for every 100 cups they buy?

Lesson 11-5

11-6 Word Problem Practice

Similar Solids

1. **PACKAGING** The Homemade Soup Company sells two sizes of soup cans. One can has a diameter of 3 inches and a height of 5 inches. The larger can has a diameter of 4 inches and a height of 6 inches. Are the two cans similar? Explain.

2. **WATER TANKS** Morgan Plumbers installed a cylindrical water tank that is 5.4 feet tall, has a radius of 2.1 feet and holds about 540 gallons of water. A similarly shaped water tank has a radius of 1.5 feet. How much water will the smaller tank hold?

3. **CEREAL BOXES** Tom is given three cereal boxes, as shown below. He needs to determine which two are similar. Which boxes are similar, and what is the scale factor from the small box to the large?

12 in.   6 in.   4 in.
8 in.   4 in.   3 in.
3 in.   1.5 in.   1 in.

Box A   Box B   Box C
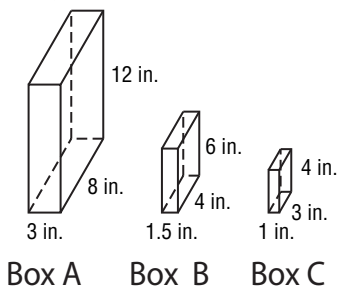
4. **ICE SCULPTURE** Larry is carving an ice swan for a wedding. His model is one-sixth the size of the actual carving. If his model weighs 3 pounds, how much will the actual carving weigh?

PACKAGING For Exercises 5–7, use the following information.

Lisa was at the movies and wanted to buy some popcorn. The popcorn was sold in two similarly shaped cylindrical containers. The small container cost $4.50 and the large container cost $6.00. The small container is 8 inches tall and has a diameter of 5 inches. The large container is 10 inches tall.

5. What is the diameter of the large container?

6. What are the volumes of the large and small containers?

7. Which size popcorn is the better deal? Explain.

12-1 **Word Problem Practice**

Stem-and-Leaf Plots

1. CUSTOMER SERVICE A restaurant owner recorded the average time in minutes customers waited to be seated each night. His data are shown in the table below. To organize the data into a stem-and-leaf plot, how many stems would you need?

Week 1	15	8	10	5	20	35	45
Week 2	9	3	7	8	25	38	43

2. PHONE Allison's mother makes a stem-and-leaf plot to track the time in minutes that Allison spends talking on the phone each night. In which interval are most of the Allison's calls?

Stem	Leaf
1	0 5
2	3 4 5 8 9
3	0 5 8
4	1 3 5

1|5 =15 minutes

3. ELECTRIC BILLS Jenny's family is selling their house. Jenny's mother wants to put together a table of monthly electricity costs. Below is a list of their electric bills for the past twelve months. Organize the data in a stem-and-leaf plot. In which interval are most of the electric bills?

$95, $99, $85, $79, $82, $88,

$98, $95, $94, $87, $89, $90

4. TEST SCORES The scores from the most recent test in Mr. James' biology class are shown in the stem-and-leaf plot below. Find the highest and lowest scores, and then write a statement that describes the data.

Stem	Leaf
5	4 5
6	3 7 8
7	0 1 5 5 8 9
8	0 2 3 7 9
9	0 3 5 8 8

5|4 =54%

SPORTS For Exercises 5–7, use the following information.

Tamara and LaDawn have recorded their times in seconds in the 100-meter dash from the past six track meets in the table below.

LaDawn	16.5	16.6	17.0	16.8	17.2	17.1
Tamara	16.7	16.4	16.1	17.0	16.5	16.8

5. Organize the times in a back-to-back stem-and-leaf plot.

6. What are the median times for LaDawn and for Tamara?

7. If you were the coach, who would you choose to represent the team at the next competition? Explain.

Lesson 12-1

12-2 **Word Problem Practice**

Measures of Variation

1. **SUSPENSION BRIDGES** The lengths in meters of the world's largest suspension bridges are given in the table below. Find the range of the data.

Suspension Bridge	Length of center span (meters)
Akashi–Kaikyo Bridge	1991
Great Belt Bridge	1624
Runyang Bridge	1490
Humber Bridge	1410
Jiangyin Suspension Bridge	1385
Tsing Ma Bridge	1377
Verrazano Narrows Bridge	1298
Golden Gate Bridge	1280
Hoga Kusten Bridge	1210
Mackinac Bridge	1158

2. **ACADEMICS** Mrs. Santiago gave each of her 21 students a reading test. The scores are organized in the stem-and-leaf plot below. Find the median score.

Stem	Leaf
1	5 7 8 9
2	0 2 5 5 5 7 8
3	0 2 5 7 9
4	2 4 5 8 9
5	0

2|5 5 25

3. **EXERCISE** Shown below is the number of minutes Yashika walked each day for two weeks. Find the upper and lower quartile of the data.

Week 1	25	22	15	30	45	18	25
Week 2	35	42	30	25	20	15	10

4. **BASKETBALL** Jan tracked the points per game of his favorite basketball player for the 2004–2005 season. During the last six games that he played in the season, he scored these points: 42, 18, 20, 33, 22, 37. Find the upper and lower quartiles, the interquartile range, and determine if there are any outliers.

SPORTS For Exercises 5–7, use the following information.

Rodney researched the longest-playing professional baseball players. He made a table of the nine who have played professional baseball for 25 seasons or more.

Player	Years Played
Eddie Collins	25
Cap Anson	27
Jim Kaat	25
Bobby Wallace	25
Tommy John	26
Charlie Hough	27
Rickey Henderson	25
Deacon McGuire	26
Nolan Ryan	27

Source: www.baseballreference.com

5. Find the range of the data set.

6. What is the median of the data set?

7. Find the upper and lower quartile and the interquartile range.

12-3 Word Problem Practice

Box-and-Whisker Plots

1. CARS Martina bought a new car and wanted to know how many miles per gallon her new car got. She kept track of her mileage and gas consumption for 10 separate trips. The miles per gallon are displayed in the box-and-whisker plot below. What is the median of the data?

20 22 24 26 28 30 32 34 36 38 40
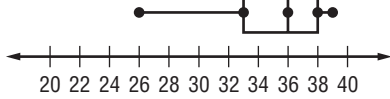
2. ZOOLOGY Archie researched pandas for a science project. He looked up the weight in kilograms of adult pandas and displayed the data in a box-and-whisker plot. How much do most adult pandas weigh?

80   88   96   104   112   120
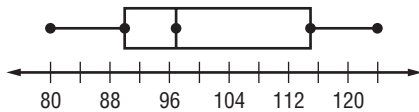
3. SPORTS The number of games won by the teams in each conference of the National Basketball League is displayed below. Write a few sentences that compare the data.

Eastern Conference
Western Conference
10   20   30   40   50   60   70
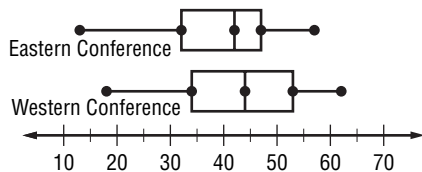
4. FOOD The table shows the recent top 10 ice cream-consuming countries. Make a box-and-whisker plot of the data.

Country	Consumption per Capita (pints)
Australia	36.8
New Zealand	27.8
USA	27.5
Sweden	23.8
Canada	22.2
Ireland	20.6
Norway	20.2
Finland	19.4
Denmark	16.9
Germany	16.7

16 18 20 22 24 26 28 30 32 34 36 38
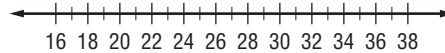
WEATHER For Exercises 5–7, use the information below.

George researched peak wind gusts in Texas. He made a box-and-whisker plot to display the data he collected.

50   60   70   80   90   100
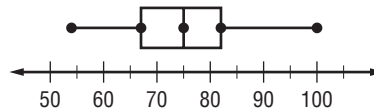
5. What is the slowest recorded wind gust?

6. What percent of the wind gusts range from 67 to 82 miles per hour?

7. What would a peak gust have to be for it to be an outlier?
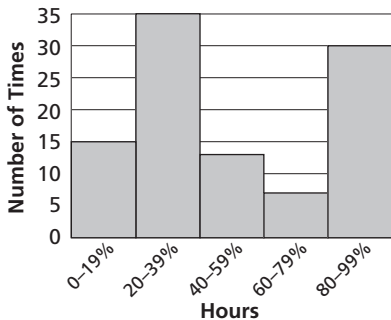
12-4 Word Problem Practice

Histograms

1. MUSIC Students in grades 6–12 were asked, "Of the songs you listen to, what percent of the songs' lyrics do you know?" The histogram shows the results. How many students responded in all?
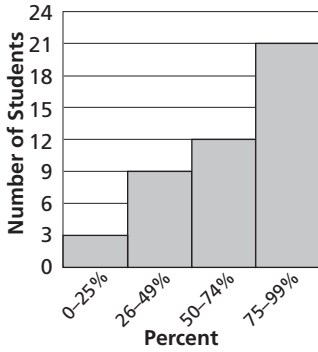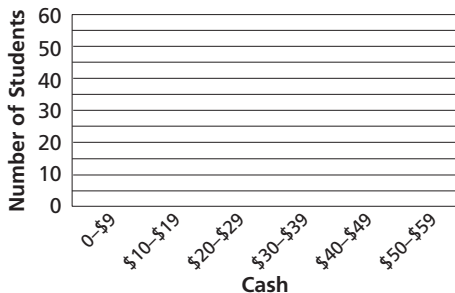

2. VOLUNTEERING The histogram shows how many hours per year a group of teens said they spend volunteering. How many hours did most of them volunteer?


3. MONEY A group of students were asked How much cash (in bills) is in your wallet right now? Construct a histogram to represent the data.

Amount	Number of Students
0-$9	54
$10-$19	20
$20-$29	16
$30-$39	5
$40-$49	4
$50-$59	1

4. WEATHER The list below shows the highest recorded temperature of the 20 largest U.S. cities. Display the data in a histogram.

122	110	111	106	109
105	104	104	105	102
104	106	102	104	108
112	113	109	111	103
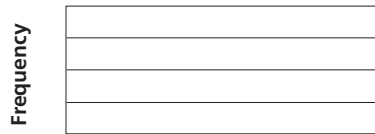
NEWSPAPERS For Exercises 5 and 6, use the histogram below.
Teens ages 13 to 18 who read a newspaper at least once a week were asked How many minutes a day, on average, do you spend reading the newspaper? The responses are displayed in the histogram.
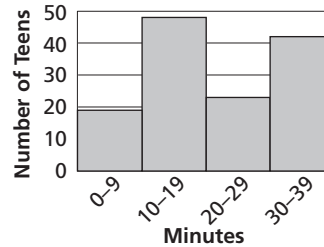
5. How many teens said they read a newspaper for less than 30 minutes?

6. How many teens were surveyed in all?

## 12-5 **Word Problem Practice**

Choosing an Appropriate Display

1. RADIO The table below shows the average amount of time that teenagers spent listening to the radio from 1999 to 2003. What would be an appropriate way to display the data?

Year	1999	2000	2001	2002	2003
Hours/week	11.4	10.5	10.0	9.25	8.5

2. TELEVISION The table below shows the number of hours students spend watching TV in one week. What would be an appropriate way to display the data?

Students	1-10	11-20	21-30	31-40	40+
Hours	6	19	14	4	1

3. ENTERTAINMENT Teens spend more time on the Internet than with any other form of media. In an average week, they spend 16.7 hours online versus 13.6 hours watching TV, and 12 hours listening to the radio. Display the data using the most appropriate display.

28.4% Radio
39.5% Online
32.1% TV
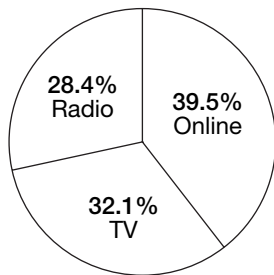
4. MONEY MATTERS The table below shows the minimum age that a person must be in order to obtain a full driver's license. Would a box-and-whisker plot be an appropriate display of the data set? Explain.

State	CT	GA	ID	NJ	TX
Minimum age (yr, mo)	16, 6	18,0	15,0	17,0	16,0

Source: http://golocalnet.com/drivingage/

VIDEO GAMES For Exercises 5-7, use the information below.
The table shows some of the recent top selling video game categories.

| Genre	Percent
Action	30.1%
Children	9.5%
Racing	9.4%
Simulation	9.0%
Sports	17.8%

Source: www.theesa.com/archives

5. What type of graph would best represents the data if each category is to be compared to the whole?

6. What type of graph would best represents the data if the categories are to be compared to each other?

7. Suppose you wanted to compare how the percent of action games had changed over the last 5 years. What type of graph would best represent the situation?

Lesson 12-5

12-6 Word Problem Practice

Misleading Graphs

1. TELEPHONE SERVICE A market research company was hired to track the market share of AllTalk, a long-distance carrier, from 2003 to 2006. Which graph shows a more dramatic increase?
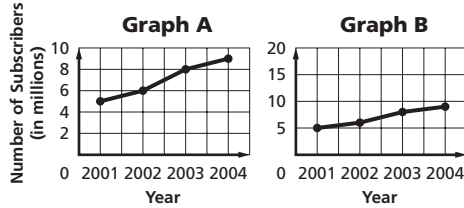
2. HOUSING The graphs below show the median sales price of new single-family homes sold in the United States in 1990 and 2000. Explain why the graphs look different.
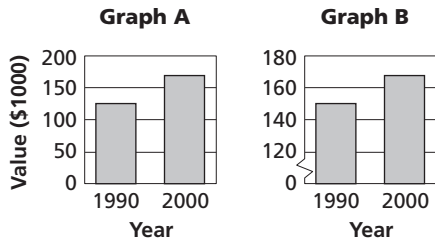

3. POSTAL RATES Emma wants to graph postal rates from 1981 to 2005.

1981	1985	1988	1991	1995	1999	2002	2005
20¢	22¢	25¢	29¢	32¢	33¢	34¢	37¢

**Source:** http://www.vaughns-1-pagers.com/economics/postal-rates.htm

In her graph, she wants to exaggerate the increases. How can she show this?

4. MARKETING The graph below displays the results of a taste test of different colas. The graph suggests that cola B was the overwhelming favorite. Is this statement accurate? Explain.
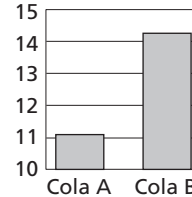
TASTE TESTS For Exercises 5 and 6, use the graphs below.
Tasty Chicken Restaurant wanted to find out which chicken strips people prefer. The restaurant offered three kinds of chicken strips to taste. The results are displayed in the graphs below.
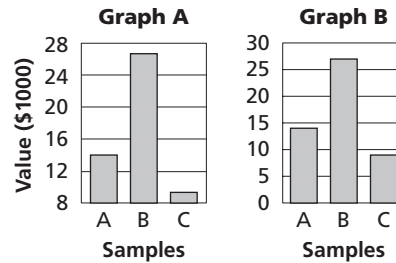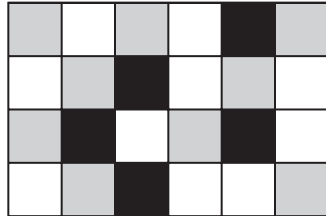

5. Do both graphs show the same information?

6. Which graph suggests that choice B was preferred three to one?

## 12-7 **Word Problem Practice**

Simple Probability

1. PINS AND NEEDLES A pin is dropped at random onto the rectangle below. The pin lands in one of the small squares. What is the probability that the pin lands inside a gray square?

2. VIDEO GAMES Tyler has 14 video games. Five are action/adventure games, 2 are arcade games, 1 is a racing game, and 6 are sports games. Tyler cannot decide which game to play, so he will choose one without looking. What is the probability that the game he chooses is an arcade game?

3. VOLUNTEERING Aisha surveyed her classmates to find out where they get their news. Of a group of 320 teens, about how many get their news online?

Where Teens Get Their News

Radio 7%
Magazines 4%
Online 9%
TV 48%
Word of mouth 14%
Newspaper 18%
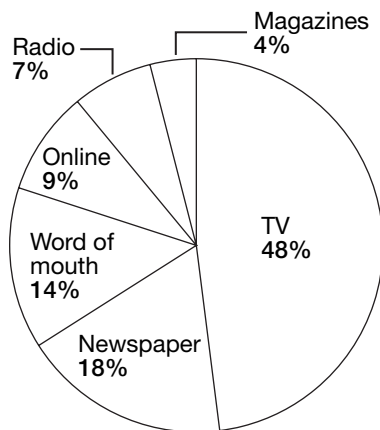
Source: usaweekend.com

4. CANDY A bag of chewy candies contains 22 cherry, 16 green apple, 15 lemonade, 15 orange, and 9 grape candies. Lashanda picks a piece from the bag without looking. What is the probability that she will pick a grape candy? Express the answer as a decimal rounded to the nearest hundredth and as a percent.

FUND-RAISING For Exercises 5–7, use the following information.
To raise money, Angie's class sold 80 boxes of cookies. She made the table below to show which cookies they sold the most.

Bestselling Baker Cookies	
Mints Cookies	25%
Caramel Cookies	19%
Peanut Butter Cookies	13%
Chocolate Cookies	11%
Butter Cookies	9%

5. About how many people bought chocolate cookies?

6. About how many people bought caramel cookies?

7. How many people would you expect to say that they bought another type of Baker Cookie that is not listed in the table?

12-8 Word Problem Practice

Counting Outcomes

1. SPORTS Khalil plays on the interleague soccer team at school. The team has practice jerseys for the players. The jerseys come in blue, black, or gray, in sizes small, medium, and large. Draw a tree diagram to list all of the practice jerseys Khalil can choose from.

2. CLOTHING Brittany is choosing an outfit to wear to the football game on Friday night. She has 5 sweaters, 7 turtlenecks, and 8 pairs of pants from which to choose. How many different outfits can she choose from?

3. GAMES Jen and Travis are playing a game that requires each player to roll a number cube and choose one ball from a bag without looking that contains one red, one blue, one green, and two yellow balls. The player that rolls an even number and chooses a yellow ball is the winner. What is the probability of a player rolling an even number and drawing a yellow ball without looking?

4. FOOD A local bookstore offers a limited sandwich menu for their lunch-time customers. The choices are listed in the table below. How many different kinds of sandwiches does the bookstore offer?

Bread	Meat	Condiments
White	Turkey	Lettuce
Wheat	Roast Beef	Tomato
Rye	Ham	Cheese
Italian		Onions

LICENSE PLATES For Exercises 5–8, use the following information.
Chet noticed that most of the license plate numbers in his state have three letters, A through Z, followed by three digits, 0 through 9.

5. How many different three-letter combinations are there for a license plate?

6. How many different three-digit combinations are there for a license plate?

7. How many different license plates can the state issue?

8. The license plate on Chet's mother's car is CPD 290, which are Chet's initials. What is the probability of his mother getting that license plate?

Lesson 12-8

12-9 Word Problem Practice

Permutations and Combinations

1. **SOFTBALL** There are 10 players on Julia's softball team. The coach is deciding on the batting order for the next game. How many different orders does the coach have to choose the first 4 batters?

2. **PIZZA** The owner of the Pizza Village wants to advertise her pizza shop on the radio. The table below shows all of the different pizzas the Pizza Village offers. How many different 1-topping pizzas can she say they offer?

Pizza Village		
Crust	**Size**	**Toppings**
Thin	Small	Extra cheese
Thick	Medium	Sausage
Deep-dish	Large	Mushrooms
		Olives
		Onions
		Vegetables
		Pepperoni
		Sausage

3. **FOOTBALL** Ryan and Gus play on a 6-man football team. The team has 9 players in all. How many different combination of players can their coach put on the field at any one time?

4. **LICENSE PLATES** In Ohio, license plates are issued with three letters followed by four numbers. The first number cannot be zero. Numbers repeat, but letters do not. How many license plates can Ohio generate with this format?

SOCIAL SECURITY NUMBERS For Exercises 5 and 6, use the following information. In the United States, each citizen is assigned a nine-digit social security number. The first three digits of the social security number are assigned based on the ZIP code in the mailing address provided on the original application form. The two middle digits of the social security number, which range from 01 through 99, are used to break all of the social security numbers within the same area number into smaller blocks. The last four digits in a social security number run consecutively from 0001 through 9999.

5. How many social security numbers that start with 467 are possible?

6. There are 38 social security area numbers assigned to Texas. How many different social security numbers are possible?

7. There are 72 areas among the 50 states and the District of Columbia. How many different social security numbers are possible?

Lesson 12-9

12-10 Word Problem Practice

Probability of Composite Events

1. BIRTHDAYS Sarah's birthday and Dakota's birthday are both in May. What is the probability that their birthdays are the same day in May?

2. GAMES Marvin and Greg are playing a card game. The deck of cards has 25 red cards, 25 yellow cards, 25 blue cards, 25 green cards, and 8 wild cards. Marvin shuffles the deck two times before he starts to deal the cards. What is the probability that the first card Marvin deals is yellow or wild card?

3. DOMINOES A set of dominoes contains 91 tiles, with the numbers on the tiles ranging from 0 to 12. There are 13 tiles that have the same number on each end. These tiles are called doubles. To begin a game, each player draws one tile, which is not returned to the pile. What is the probability that the first and second players each draw a double?

4. MONEY Mr. Santiago pulls two bills at random from the 4 $1 bills, 3 $5 bills, and 1 $20 bill in his pocket. What is the probability that he chooses one $1 bill and one $5 bill?

ANALYZE GRAPHS For Excercises 5 and 6, use the information below.

The graph shows the favorite sports team of teens between the ages of 15 and 18.

Favorite Sports Team
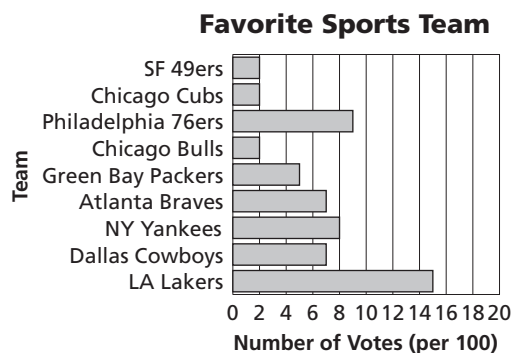
Source: www.stamats.com/stamatsstats/stamatstatvol2no11.htm

**5.** What is the probability that one teen likes the Dallas Cowboys and another likes the Atlanta Braves? Express as a percent rounded to the nearest tenth.

6. What is the probability that one teen likes the L.A. lakers adn another likes the N.Y. Yankees? Express as a percent rounded to the nearest thousandth.

Lesson 12-10

13-1 Word Problem Practice

Polynomials

1. **PLANETS** The diameter of a planet can be found by knowing the distance from the viewer to the planet, d, and the planet's angular size, A, or how big it appears to be. The approximate diameter is found using the expression $\frac{2\pi}{360}\,dA$. Is this expression a polynomial? Explain. If it is, classify it as *monomial*, *binomial*, or *trinomial*.
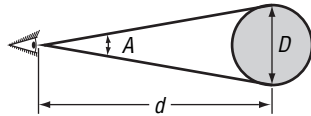
2. **AIRPLANES** The steady ascent of an airplane is represented by the equation $y = \frac{3}{7}x + 2$. What is the degree of the polynomial?
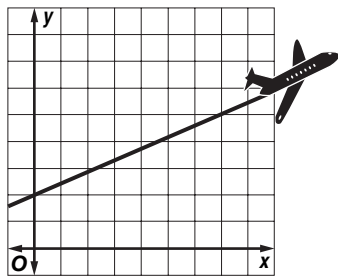
3. **BASKETBALL** A basketball player takes a shot from inside the foul line. The ball travels on an arch according to the equation $y = -0.6x^2 + 3.2x + 6$. Classify the equation as *monomial*, *binomial*, or *trinomial* and find the degree of the polynomial.

4. **DIVING** A diver practices for an upcoming meet. She dives from a platform and follows a trajectory that can be expressed by the equation $y = 2x^4 + 12x$. Classify the equation as *monomial*, *binomial*, or *trinomial* and find the degree of the polynomial.

ROCK CLIMBING For Exercises 5–7, use the following information.

A rock climber plans to climb up one side of the mountain and down the other.
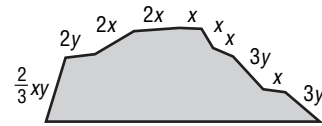
5. Write the polynomial expression that represents the distance the rock climber will travel.

6. Classify the polynomial as a *monomial*, *binomial*, or *trinomial*.

7. What is the degree of the polynomial?

13-2 Word Problem Practice

Adding Polynomials

1. **TELEPHONE PLAN** A phone plan with XYZ Cellular costs $49 per month, with additional fees of t per text message and e per minute for any extra minutes not covered by the plan. Aaron sent 13 text messages and used 7 extra minutes in January, and sent 8 text messages and used 27 extra minutes in February. Write an expression representing Aaron's two month telephone bill.
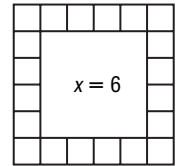
2. **GARDENING** Marty and Jack are planning a vegetable garden together. They decide that they want a design with six square pieces in the middle and a 3-foot border around the outside. Write an expression that represents the area of the garden.
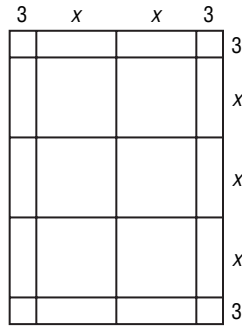
3. **SNACK SALE** Susanna and Winston held a snack sale to raise money for a class trip. They sold drinks for d dollars each and snacks for s dollars each. Starting with $30 to begin with, they sold items according to the table. Write an expression that represents how much money they had at the end of the snack sale.

Item	Number Sold
Lemonade	20
Fruit Punch	34
Apple	18
Pretzel	9
Granola Bar	28

4. **ANCIENT ART** A *mosaic* is a panel made up of objects, such as broken glass or seashells, that form a design. One method for producing mosaic, which the ancient Greeks and Romans often used, was to press tiles into grout. Held in place by the grout, some of the designs have survived for thousands of years. Suppose an artisan wanted to create a square mosaic panel measuring x inches on a side by first lining the edges with a row of tiles that measured 1 inch square. Write an expression to represent the number of square edge tiles needed for the panel. Sample answers:

$x = 6$

PRINT SHOP For Exercises 5 and 6, use the following information.

A small business provides a photocopying and printing service for its customers. Its prices are listed in the table.

Product	Price Each
Greeting Card	$0.50
Folded Brochure	$1.00
Poster	$4.25

5. Write the polynomial expression that represents the total cost of a print job that includes c cards, b brochures, and p posters.

6. If a copy job costs $232.50 in total and includes 100 greeting cards and 55 brochures, how many posters were included?

Lesson 13-2

## 13-3 Word Problem Practice

Subtracting Polynomials

1. GEOGRAPHY The highest point in the state of Oklahoma is Black Mesa and the lowest point is the Little River. The difference in elevation between these two points is 176 meters more than the sum of the elevations. What is the elevation of the lowest point in Oklahoma?

2. TAXI FARES The rate for a taxicab in Austin is $3.50 for the first mile plus $2 for each additional mile. In Houston, the taxi rate is $4 for the first mile and $1.80 for every mile thereafter. What is the difference between the taxi rates of these two cities?

3. GEOMETRY The perimeter of the isosceles triangle is $8x - 3$ inches. Find the length of the third side.

$3x - 2$
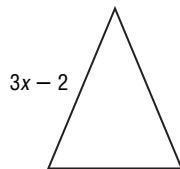
4. POSTERS Pam and her friends are making a poster for the clothing drive at school. They decide on the design below. Each rectangle will be outlined with ribbon. Write an expression to show much more ribbon Pam and her friends will need for the larger rectangle than for the smaller one.

$4x + 5$
$2x + 3$
$2x$
$x - 4$
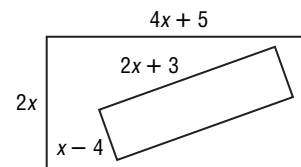
INTERIOR DECORATING For Exercises 5 and 6, use the following information.

Shayla is putting up a wallpaper border on the walls in her room. The border comes in pieces that are x feet long. Shayla figures that she will need 4 pieces plus an extra 3 feet of border to trim the long wall of her room.

5. Write the polynomial expression that represents the length of her room.

6. The total amount of border Shayla used was $14x + 10$ feet. Write the polynomial expression that represents the width of her room.

Lesson 13-3

13-4 Word Problem Practice

Multiplying a Polynomial by a Monomial

1. BOOKS The largest published book in the world is Michael Hawley's *Bhutan: A Visual Odyssey Across the Kingdom*. The length of a page is 3 feet shorter than twice its width. The perimeter of a page is 24 feet. What are the dimensions of the book?

2. GEOMETRY Find the area of the shaded region. Write in simplest form.
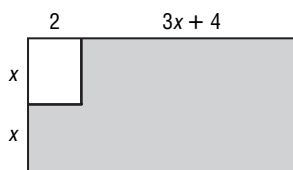
3. FOOTBALL The dimensions of Canadian football fields are different than the dimensions of American football fields. Use the information in the table to find the length and width of each football field.

Playing Field Plus End Zones		
Measure	American (ft)	Canadian (ft)
Perimeter	1040	1290
Width	w	w
Length	$2w + 40$	$(2w + 40) + 20$

4. FLAGS The largest flag flown from a flagstaff is a Brazilian national flag in Brasilia, Brazil. The width of the flag is 20 meters more than half the length. Find the area of the flag. Write in simplest form

MANUFACTURING For Exercises 5–7, use the following information.

Casey's Cardboard Company makes different sizes of cardboard boxes. The figure below shows a template for one size cardboard box before it has been cut and folded.
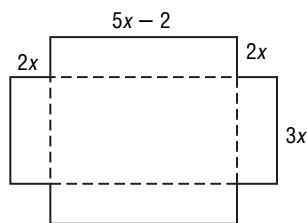
5. Write a simplified expression to represent the surface area of the cardboard box.

6. Find the surface area of the box if x is 4 inches.

7. Suppose a side is extended to so the box will be completely enclosed when it is put together. Write a simplified expression to represent the surface area of the enclosed box.

Lesson 13-4

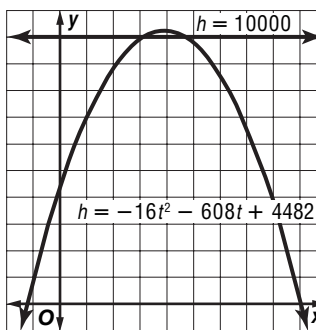## 13-5 Word Problem Practice

Linear and Nonlinear Functions

1. TEMPERATURE In the United States, temperature is most often measured in degrees Fahrenheit. Temperature is measured in degrees Celsius in the metric system. The formula used to convert between these two units of measure is $F = \frac{9}{5}C + 32$ where F represents degrees Fahrenheit and C represents degrees Celsius. Does this equation represent a *linear* or *nonlinear* function?

2. COMPUTER GAMES Suppose the function $-0.005d^2 + 0.12d = h$ is used to simulate the path of a golf ball that is hit off a tee in a computer game. Does this equation represent a *linear* or *nonlinear* function?

3. GASOLINE The table below shows gasoline prices in Springfield during a one-month period. Is the change in gas price a linear function? Explain.

Day of the Month	Price per Gallon
1	$2.57
4	$2.72
7	$2.72
10	$2.88
13	$2.88
16	$2.84
19	$2.76
21	$2.72
24	$2.64
27	$2.60
30	$2.52

4. FOOTBALL PUNTS The function $h = -16t^2 + 90t + 1.5$ represents the height h of the football, in feet, after t seconds when a punter kicks the ball with an upward velocity of 90 feet per second and his foot meets the ball 1.5 feet off the ground. Is this a linear function of time? Explain.

FLIGHT RESEARCH For Exercises 5 and 6, use the following information.

The equation $h = -16t^2 + 608t + 4482$ represents the height, h, in feet, of a pilot over time, t, in seconds, after he or she has ejected from a jet and falls to Earth with the aid of a parachute. A pilot is flying at an altitude of approximately 10,000 feet and is forced to eject from the jet. The equation $h = 10,000$ represents an altitude of 10,000 feet.

5. Which equation is a linear function?

6. Explain why the other equation is a nonlinear function.

13-6 Word Problem Practice

### Graphing Quadratic and Cubic Functions

1. RACING Between the ages of 8 and 16, Houston native Erica Enders won 37 junior dragster races. The distance her car travels down the drag strip can be expressed by the equation $d = \frac{1}{2}at^2$, where a is the rate of acceleration and t is time. Suppose her car accelerates at a rate of 49.5 feet per second. Find the number of feet her car traveled after 7 seconds.

2. PHYSICS The top of the Leaning Tower of Pisa is 185 feet above the ground. Suppose an object is dropped from the top of the Leaning Tower of Pisa. The height h in feet of the object, after t seconds, is represented by the equation $h = 185 - 16t^2$. An object is dropped off the top of the Leaning Tower of Pisa. How far from the ground is it after 3 seconds?

3. VISTAS The Texas State Capitol building is 311 feet tall. The formula $a = \frac{2}{3}d^2$ represents the number of miles d that a person can see from an altitude of a feet. Graph the function and use it to estimate how far you could see from the top of the Texas State Capitol.
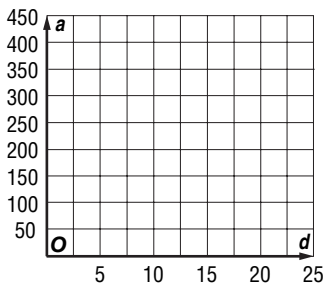
4. GEOMETRY Write the function for the volume of a cone as a function of a radius r units if the height equals the radius. Then graph the function.
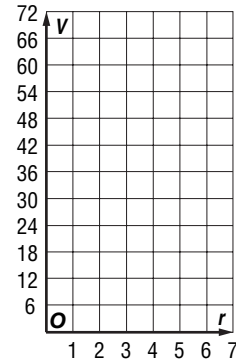

FIREWORKS For Exercises 5 and 6, use the following information.

The largest annual pyrotechnic display in North America is *Thunder over Louisville* held to kick off the Kentucky Derby Festival. The table shows the larger shell sizes and their corresponding velocities.

Shell Size (in.)	Initial Velocity (ft/sec)
8	235
10	263
12	287.5
24	393
36	481

Source: www.pyropage.net/physics.html

5. The equation $h = -16t^2 + 235t + 3$ represents the height h in feet of an 8-inch shell t seconds after it is launched from 3 feet with an initial velocity of 235 feet per second. Graph the equation.
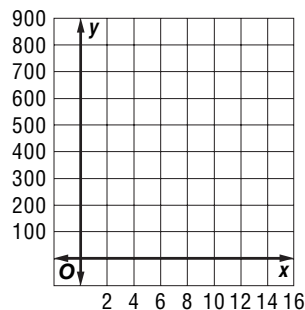
6. How high is the shell after 5 seconds?