Real-Life Career Masters

GLENCOE MATHEMATICS

Mathematics

Applications and Concepts

Courses 1, 2, and 3

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Teacher's Guide to Using Real-Life Career Masters

What are Real-Life Career Masters?
The goal of real-life career, classroom-to-career, school-to-work, or tech-prep programs is to create a workforce in the United States that is technically literate. Through these programs, students can enter the workforce as qualified technicians or be prepared for highly skilled technical occupations.

The key to implementing real-life career programs is a partnership between schools and business. These programs aim to have students leave high school with:

- marketable skills,
- the academic credentials to pursue higher education, or
- both, so that the student can earn a living during a pattern of lifelong learning.

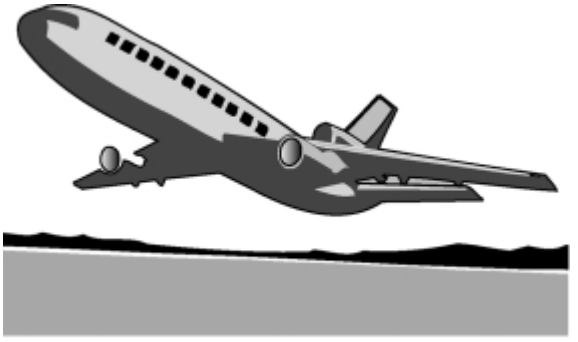
How should the Real-Life Career Masters be used?
This booklet is designed to be used with students using *Mathematics: Applications and Concepts,* Courses 1, 2, and 3. While middle school is the time when many students lose interest in school, it is also the time when many students begin making choices that will affect them for the rest of their lives. Thus, the Real-Life Career Masters are designed to enhance and broaden students' understanding, knowledge, and appreciation of mathematics. Students will learn how mathematics is related to the real world and, even more, how mathematics is used in the workplace.

When should the Real-Life Career Masters be used?
These masters can be used as short activities to motivate students who need more examples of why mathematics is important. These can also be used as quick activities when the class periods have been cut short or as extra activities on assessment days for those students who finish early.

NAME _____ DATE _____ PERIOD _____

1-7 Real-Life Career Activity

Airline Ticket Agent



Airline ticket agents make sure that passengers are on the correct flight. If a flight is canceled or delayed, they help passengers find different flights that will get them to their destination. Ticket agents also check that each passenger's baggage is the right size and weight to be loaded onto the airplane. Bags that are too large or too heavy cannot be taken on the plane. A plane that is too heavy will not be able to fly correctly. Ticket agents for one airline use the formula below to check that baggage is the correct size.

$$H + W + L = 62 \text{ inches}$$

In this formula, H is the height of the bag, W is the width of the bag, and L is the length of the bag.

Suppose a passenger has a bag 26 inches high and 16 inches wide. What length L can the bag be?

$H + W + L = 62$	*The sum is 62.*
$26 + 16 + L = 62$	*Replace H with 26 and W with 16.*
$42 + L = 62$	*Add.*
$L = 20$	*Solve for L.*

The bag can be 20 inches long.

Solve.

1. A passenger has a bag 5 inches high and 10 inches wide. What length can the bag be?

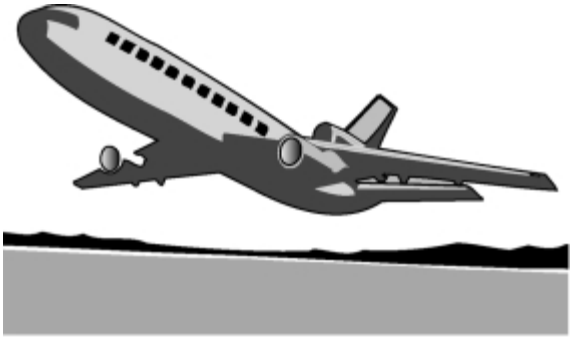
2. A passenger has a bag 35 inches long and 20 inches wide. What height can the bag be?

3. A passenger has a bag 50 inches long and 20 inches wide. Will the ticket agent send the bag to be loaded on the plane?

NAME _____ DATE _____ PERIOD _____

1-7 Real-Life Career Activity

Airline Ticket Agent



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$26 + 16 + L = 62$	*Replace H with 26 and W with 16.*
$42 + L = 62$	*Add.*
$L = 20$	*Solve for L.*

The bag can be 20 inches long.

Solve.

1. A passenger has a bag 5 inches high and 10 inches wide. What length can the bag be? **47 in.**

2. A passenger has a bag 35 inches long and 20 inches wide. What height can the bag be? **7 in.**

3. A passenger has a bag 50 inches long and 20 inches wide. Will the ticket agent send the bag to be loaded on the plane?
No; the bag is too big.

2-7

Real-Life Career Activity

Clinical Research Statistician

Clinical research statisticians collect and analyze data from clinical trials, such as tests on new medicines. They help design the research tests, analyze the results, and summarize the results using statistical terms such as mean, median, and mode. Their summaries help scientists decide whether a new medicine is effective or whether the product has too many side effects.

One clinical research study might record how much time a drug remains in a person's bloodstream. Suppose the researchers study 10 people and record the results in hours below.

16, 18, 19, 21, 21, 21, 22, 22, 24, 26

Suppose the statistician needs to find the mean, median, and mode of this set of data.

$$\text{mean} = \frac{(16 + 18 + 19 + 21 + 21 + 21 + 22 + 22 + 24 + 26)}{10}$$
$$= 21$$
$$\text{median} = \frac{(21 + 21)}{2}$$
$$= 21$$
$$\text{mode} = 21$$

The mean is 21 hours, the median is 21 hours, and the mode is 21 hours.

Solve.

1. Find the mean, median, and mode of this set of research data in hours: 21, 21, 22, 22, 25, 25, 26, 26, 26, 26

2. Find the mean, median, and mode of this set of research data in hours: 25, 25, 26, 26, 27, 27, 27, 28, 29, 30

3. Find the mean, median, and mode of the three sets of research data combined: 16, 18, 19, 21, 21, 21, 21, 21, 22, 22, 22, 22, 24, 25, 25, 25, 25, 26, 26, 26, 26, 26, 26, 26, 27, 27, 27, 28, 29, 30

NAME _____ DATE _____ PERIOD _____

2-7 Real-Life Career Activity

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16, 18, 19, 21, 21, 21, 22, 22, 24, 26

Suppose the statistician needs to find the mean, median, and mode of this set of data.

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$$= 21$$
$$\text{median} = \frac{(21 + 21)}{2}$$
$$= 21$$
$$\text{mode} = 21$$

The mean is 21 hours, the median is 21 hours, and the mode is 21 hours.

Solve.

1. Find the mean, median, and mode of this set of research data in hours: 21, 21, 22, 22, 25, 25, 26, 26, 26, 26

mean = 24 h; median = 25 h; mode = 26 h

2. Find the mean, median, and mode of this set of research data in hours: 25, 25, 26, 26, 27, 27, 27, 28, 29, 30

mean = 27 h; median = 27 h; mode = 27 h

3. Find the mean, median, and mode of the three sets of research data combined: 16, 18, 19, 21, 21, 21, 21, 21, 22, 22, 22, 22, 24, 25, 25, 25, 25, 26, 26, 26, 26, 26, 26, 26, 27, 27, 27, 28, 29, 30

mean = 24 h; median = 25 h; mode = 26 h

3-5

Real-Life Career Activity

Securities Researcher

Securities researchers find and give information to stock brokers so that the brokers can buy and sell stocks wisely. To find out more about a company, a securities researcher can read the company's annual report, attend the company's presentations, and compare the company's performance with the performance of its competitors. A securities researcher usually researches companies in only one field, such as pharmaceutical manufacturing. By focusing on one field, the researcher can draw better conclusions about the success of a company in that field.

Because securities researchers make decisions about financial data, they use math. Suppose one share of a company's stock cost $25.43 on January 1. On April 1, the price of a share of the stock was $26.39. The researcher compares the two amounts to see whether the share price has increased or decreased. The price of $26.39 is greater, so the share price has increased since January 1.

$$26.39 - 25.43 = 0.96$$

The share price has increased $0.96 since January 1.

Suppose a share price is $33.15 on April 1, and $31.21 on July 1. By how much has the share price changed?

The share price was greater on April 1, so the price has decreased.

$$33.15 - 31.21 = 1.94$$

The share price has decreased $1.94.

Solve.

1. Calculate the change in the share price if a share costs $32.56 on July 1 and $34.22 on October 1.

2. Calculate the change in the share price if a share costs $45.31 on April 1 and $42.98 on July 1.

3. Calculate the share price on April 1 if a share costs $16.88 on January 1 and the price increases $2.14 by April 1.

NAME _____ DATE _____ PERIOD _____

3-5 Real-Life Career Activity

Securities Researcher

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The share price was greater on April 1, so the price has decreased.

$$33.15 - 31.21 = 1.94$$

The share price has decreased $1.94.

Solve.

1. Calculate the change in the share price if a share costs $32.56 on July 1 and $34.22 on October 1.
increase of $1.66

2. Calculate the change in the share price if a share costs $45.31 on April 1 and $42.98 on July 1.
decrease of $2.33

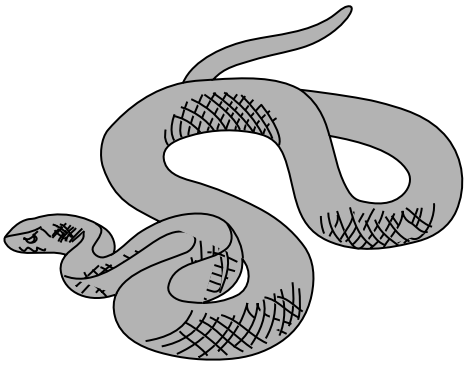
3. Calculate the share price on April 1 if a share costs $16.88 on January 1 and the price increases $2.14 by April 1. **$19.02**

NAME _____ DATE _____ PERIOD _____

4-3

Real-Life Career Activity

Store Owner



A reptile store is a pet store that specializes in selling reptile and amphibian pets. Pets might include snakes, iguanas, lizards, geckos, turtles, tortoises, and frogs. This type of pet store usually sells the live food that many of these reptiles eat, including crickets. Reptile stores usually order the crickets from a mail-order company. There are many mail-order companies supplying crickets, so a reptile store owner must compare their rates to see which is the best buy.

Suppose Company A charges $8.55 for 100 crickets, while Company B charges $8.99 for 120 crickets. Which company has the lower price?

The reptile store owner cannot compare the charges because they are for different quantities. The owner must calculate the cost per cricket.

Company A: $8.55 ÷ 100 = $0.085 per cricket
Company B: $8.99 ÷ 120 = $0.075 per cricket

Company B's cost per cricket is lower, so Company B has the better buy.

Solve. Round to the nearest cent.

1. Company A charges $11.99 for 100 jumbo crickets, while Company B charges $13.15 for 120 jumbo crickets. Which is the better buy?

Company A: $ _____ per cricket

Company B: $ _____ per cricket

2. Company A charges $4.99 for 100 tiny crickets, while Company B charges $6.99 for 120 tiny crickets. Which is the better buy?

Company A: $ _____ per cricket

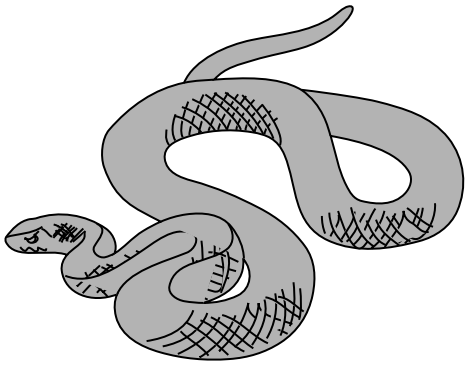
Company B: $ _____ per cricket

3. Company A charges $65.99 for 500 medium crickets. What is the cost per cricket? Round to the nearest cent.

NAME _____ DATE _____ PERIOD _____

4-3 Real-Life Career Activity

Store Owner



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Company B: $8.99 ÷ 120 = $0.075 per cricket

Company B's cost per cricket is lower, so Company B has the better buy.

Solve. Round to the nearest cent.

1. Company A charges $11.99 for 100 jumbo crickets, while Company B charges $13.15 for 120 jumbo crickets. Which is the better buy?

Company A: $ 0.12 per cricket

Company B: $ 0.11 per cricket

Company B has the better buy.

2. Company A charges $4.99 for 100 tiny crickets, while Company B charges $6.99 for 120 tiny crickets. Which is the better buy?

Company A: $ 0.05 per cricket

Company B: $ 0.06 per cricket

Company A has the better buy.

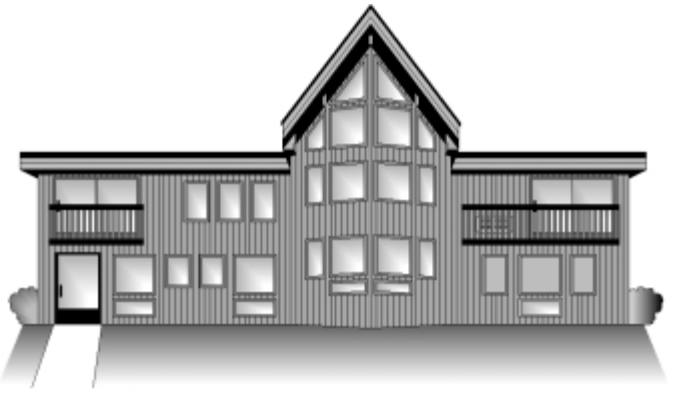
3. Company A charges $65.99 for 500 medium crickets. What is the cost per cricket? Round to the nearest cent. **$0.13**

NAME _____ DATE _____ PERIOD _____

5-3

Real-Life Career Activity

Property Manager



Property managers are responsible for properties such as apartment complexes. They have many duties, including renting apartments to new tenants, arranging to have repairs made, and collecting rent. They also oversee the landscaping and maintenance of the grounds. During icy weather, the property manager makes sure that ice does not form on the walkways around the apartment complex. If the walkways are icy, tenants may slip and hurt themselves.

Suppose a property manager has a container of pellets for melting ice. The label on the container says that 4 ounces of pellets will melt 1 square yard of ice. One square yard is the same as 9 square feet. The manager wants to know how much ice 1 ounce of pellets will melt.

4 ounces will melt 9 square feet.

1 ounce will melt $\frac{9}{4}$ square feet.

One ounce of pellets will melt $\frac{9}{4}$ square feet of ice.

You can write this amount as a mixed number.

$$\frac{9}{4} = 2\frac{1}{4}$$

One ounce of pellets will melt $2\frac{1}{4}$ square feet of ice.

Solve.

1. Two ounces of pellets will melt $\frac{18}{4}$ square feet of ice. Write $\frac{18}{4}$ as a mixed number.

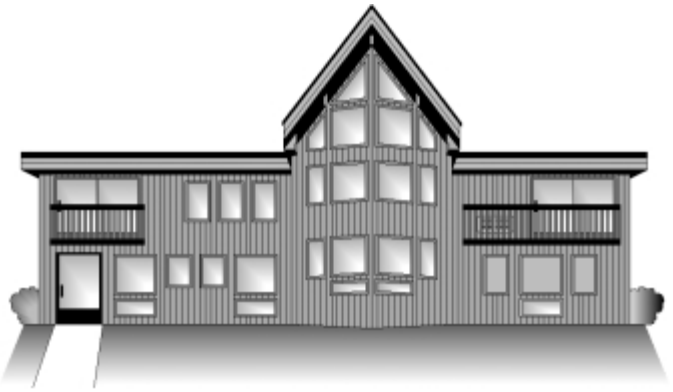
2. Three ounces of pellets will melt $\frac{27}{4}$ square feet of ice. Write $\frac{27}{4}$ as a mixed number.

3. Five ounces of pellets will melt $11\frac{1}{4}$ square feet of ice. Write $11\frac{1}{4}$ as an improper fraction.

NAME _____ DATE _____ PERIOD _____

5-3 Real-Life Career Activity

Property Manager



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1 ounce will melt $\frac{9}{4}$ square feet.

One ounce of pellets will melt $\frac{9}{4}$ square feet of ice.

You can write this amount as a mixed number.

$$\frac{9}{4} = 2\frac{1}{4}$$

One ounce of pellets will melt $2\frac{1}{4}$ square feet of ice.

Solve.

1. Two ounces of pellets will melt $\frac{18}{4}$ square feet of ice. Write $\frac{18}{4}$ as a mixed number. $4\frac{2}{4}$ or $4\frac{1}{2}$

2. Three ounces of pellets will melt $\frac{27}{4}$ square feet of ice. Write $\frac{27}{4}$ as a mixed number. $6\frac{3}{4}$

3. Five ounces of pellets will melt $11\frac{1}{4}$ square feet of ice. Write $11\frac{1}{4}$ as an improper fraction. $\frac{45}{4}$

NAME _____ DATE _____ PERIOD _____

6-1

Real-Life Career Activity

Fleet Supervisor

Fleet supervisors are managers who are responsible for ensuring that company vehicles operate correctly. The supervisor ensures that each vehicle receives its required maintenance and keeps a record of the repairs each vehicle has had.

Some fleet supervisors keep records of a vehicle's gasoline consumption—the amount of gasoline a vehicle uses to travel a fixed number of miles—because a sudden increase in gasoline consumption may signal that the vehicle needs repair. A fleet supervisor can use the formula below to calculate the gasoline consumption of a vehicle.

$$C = \frac{m}{g}$$

In this formula, C is the consumption of gas in miles per gallon, m is the number of miles traveled, and g is the amount of gasoline used.

Suppose a vehicle travels $149\frac{8}{10}$ miles on $10\frac{1}{10}$ gallons of gasoline. What is the gas consumption of the vehicle? Round each mixed number to the nearest whole number before you calculate.

$m = 149\frac{8}{10}$ miles, which rounds to 150 miles

$g = 10\frac{1}{10}$ gallons, which rounds to 10 gallons

$$C = \frac{150}{10}$$
$$= 15$$

The vehicle travels about 15 miles per gallon.

Solve. Round each mixed number to the nearest whole number before you calculate.

1. Calculate the gas consumption of a vehicle that travels $72\frac{1}{3}$ miles on $5\frac{7}{8}$ gallons of gasoline.

2. Calculate the gas consumption of a vehicle that travels $79\frac{9}{10}$ miles on $8\frac{12}{100}$ gallons of gasoline.

3. Last month, a vehicle traveled 14 miles per gallon. This month, the vehicle travels 10 miles per gallon. What could this change tell a fleet supervisor?

NAME _____ DATE _____ PERIOD _____

6-1 Real-Life Career Activity

Fleet Supervisor

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$m = 149\frac{8}{10}$ miles, which rounds to 150 miles

$g = 10\frac{1}{10}$ gallons, which rounds to 10 gallons

$$C = \frac{150}{10}$$
$$= 15$$

The vehicle travels about 15 miles per gallon.

Solve. Round each mixed number to the nearest whole number before you calculate.

1. Calculate the gas consumption of a vehicle that travels $72\frac{1}{3}$ miles on $5\frac{7}{8}$ gallons of gasoline. **12 mi/gal**

2. Calculate the gas consumption of a vehicle that travels $79\frac{9}{10}$ miles on $8\frac{12}{100}$ gallons of gasoline. **10 mi/gal**

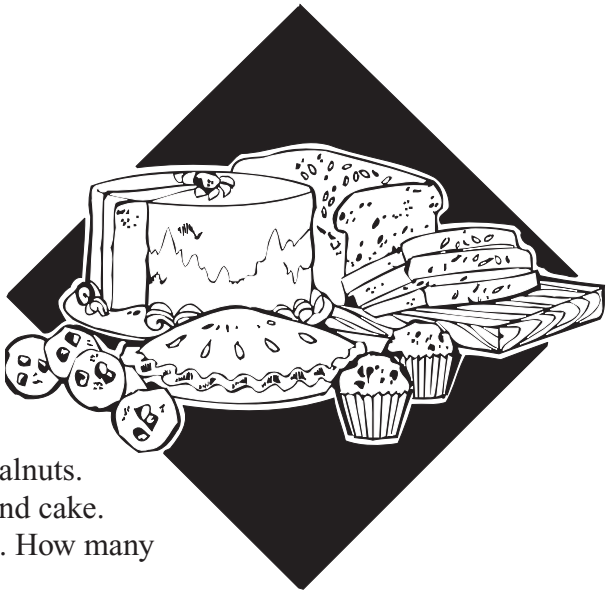
3. Last month, a vehicle traveled 14 miles per gallon. This month, the vehicle travels 10 miles per gallon. What could this change tell a fleet supervisor? **The vehicle may need repair.**

NAME _____ DATE _____ PERIOD _____

7-2

Real-Life Career Activity

Cake Baker



Some bakers run their own businesses. As well as knowing how to bake, they must know about nutrition, business administration, marketing, and health and safety regulations.

Often bakers must adapt recipes to bake smaller or larger cakes. When the recipe contains fractions, bakers must multiply and divide fractions.

A recipe for a one-pound cake includes $\frac{1}{2}$ cup of walnuts. A baker wants to use the recipe to make a five-pound cake. The baker must multiply all of the ingredients by 5. How many cups of walnuts should she use?

$$\frac{1}{2} \times 5 = 2\frac{1}{2}$$

For the five-pound cake, the baker needs $2\frac{1}{2}$ cups of walnuts.

Solve.

1. A recipe for a two-pound cake includes $\frac{1}{4}$ cup of chocolate chips. A baker wants to make a ten-pound cake. How many cups of chocolate chips does she need?

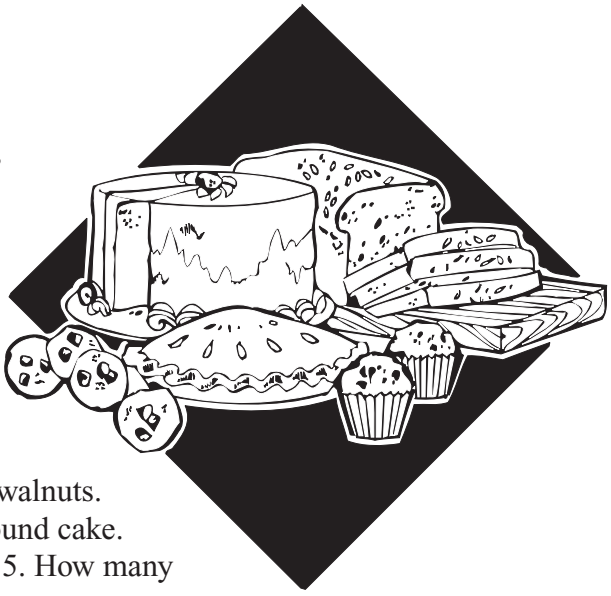
2. A recipe for a one-pound cake includes $\frac{1}{3}$ cup of sugar. A baker wants to make an eight-pound cake. How many cups of sugar does he need?

3. A recipe for a two-pound cake includes $\frac{1}{2}$ teaspoon of mint flavoring. The baker wants to make a ten-pound cake, but only has two teaspoons of mint flavoring left. Does the baker have enough mint flavoring?

NAME _____ DATE _____ PERIOD _____

7-2 Real-Life Career Activity

Cake Baker



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Solve.

1. A recipe for a two-pound cake includes $\frac{1}{4}$ cup of chocolate chips. A baker wants to make a ten-pound cake. How many cups of chocolate chips does she need?

$1\frac{1}{4}$ cups

2. A recipe for a one-pound cake includes $\frac{1}{3}$ cup of sugar. A baker wants to make an eight-pound cake. How many cups of sugar does he need?

$2\frac{2}{3}$ cups

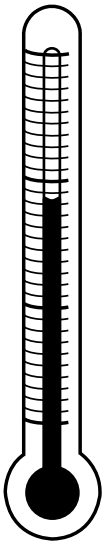
3. A recipe for a two-pound cake includes $\frac{1}{2}$ teaspoon of mint flavoring. The baker wants to make a ten-pound cake, but only has two teaspoons of mint flavoring left. Does the baker have enough mint flavoring?

No; the baker needs $2\frac{1}{2}$ teaspoons of mint flavoring.

8-1

Real-Life Career Activity

Weather Researcher



Weather researchers use weather data to produce tables, graphs, and reports. News agencies, government agencies, and private companies all use these reports. For example, some researchers determine how high ocean waves are expected to be. Lifeguards may use this information to predict how many surfers may be at the beaches the following day. Researchers might also prepare heat index reports, which alert firefighters of conditions favorable for brush fires. Researchers often compare and order integers while assembling these reports.

Suppose a researcher has a table that shows the lowest temperatures for each month of a year. The researcher wants to know which month had the lowest temperature.

Lowest Temperature Recorded in Each Month (°F)											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
−20	−12	−2	10	26	35	43	36	30	20	−7	−10

The researcher compares the temperatures looking for the lowest. The researcher finds that −20°F is the lowest temperature. This was the low temperature for January, so January had the lowest temperature of the year.

Solve.

1. Use the table to order the low temperatures from least to greatest.

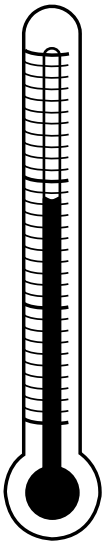
2. For which months was the lowest temperature below 0°F?

3. For which months was the lowest temperature between 32°F and 40°F?

NAME _____ DATE _____ PERIOD _____

8-1 Real-Life Career Activity

Weather Researcher



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The researcher compares the temperatures looking for the lowest. The researcher finds that −20°F is the lowest temperature. This was the low temperature for January, so January had the lowest temperature of the year.

Solve.

1. Use the table to order the low temperatures from least to greatest. **–20, –12, –10, –7, –2, 10, 20, 26, 30, 35, 36, 43**

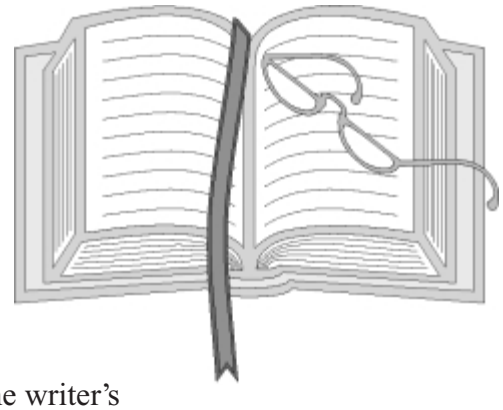
2. For which months was the lowest temperature below 0°F? **January, February, March, November, and December**

3. For which months was the lowest temperature between 32°F and 40°F? **June and August**

9-4

Real-Life Career Activity

Literary Agent



Literary agents represent book authors. The agents help the authors or writers find a publisher for the book they have written. In turn, literary agents help publishers find quality writers. Agents also explain the publisher's contracts to the writers. In return for the agent's services, writers pay their agents a *commission*—a fraction of the income the writer receives from sales of the book. The fraction usually varies between $\frac{1}{10}$ and $\frac{1}{5}$. Suppose an agent receives $\frac{1}{5}$ of the writer's income from sales of the book. The agent can use the formula below to calculate his commission.

$$a = \frac{1}{5}w$$

In this formula, a is the commission of the agent, and w is the income of the writer.

Suppose a writer signs a contract with a publisher for $30,000. What commission will the agent receive?

$$a = \frac{1}{5}(30{,}000)$$
$$a = 6{,}000$$

The agent will receive a commission of $6,000.

Solve.

1. Calculate the commission an agent who receives $\frac{1}{5}$ of the writer's income will receive from a contract for $50,000.

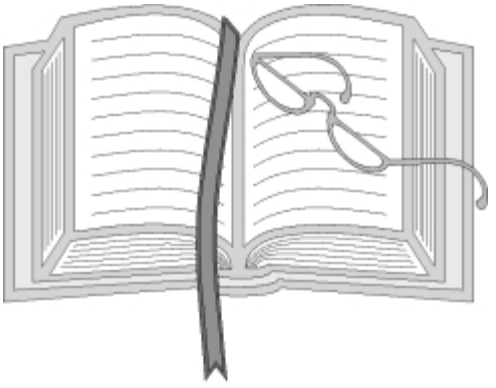
2. Calculate the commission an agent who receives $\frac{1}{5}$ of the writer's income will receive from a contract for $20,000.

3. An agent who receives $\frac{1}{5}$ of the writer's income receives $500 in commission. For how much money was the writer's contract?

NAME _____ DATE _____ PERIOD _____

9-4 Real-Life Career Activity

Literary Agent



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The agent will receive a commission of $6,000.

Solve.

1. Calculate the commission an agent who receives $\frac{1}{5}$ of the writer's income will receive from a contract for $50,000. **$10,000**

2. Calculate the commission an agent who receives $\frac{1}{5}$ of the writer's income will receive from a contract for $20,000. **$4,000**

3. An agent who receives $\frac{1}{5}$ of the writer's income receives $500 in commission. For how much money was the writer's contract?
$2,500

NAME _____ DATE _____ PERIOD _____

10-2

Real-Life Career Activity

Photo Developer

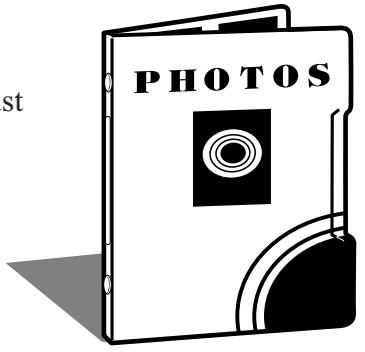


Photo developers are responsible for processing photographic film. They print the photographs we take. Although there are computerized machines that develop film, the photo developer must monitor the machines to ensure that they are working correctly.

Developers can also make extra copies of photographs. The copies can be the same size as the original photo or they can be enlarged. To keep the length and width of an enlargement proportional to the original photo, the measurements for the enlargement must be computed mathematically.

Suppose a photo developer wants to enlarge a photo that is 4 inches long and 6 inches wide. The enlarged photo must have the same proportions as the original, but be 12 inches long. What size will the enlargement be?

$\frac{4}{6} = \frac{12}{w}$	*Write a proportion.*
$4 \times w = 6 \times 12$	*Cross products*
$4w = 72$	*Multiply.*
$\frac{4w}{4} = \frac{72}{4}$	*Divide.*
$w = 18$	

The enlargement will be 12 inches long and 18 inches wide.

Solve.

1. A photo developer wants to enlarge a photo that is 4 inches long and 6 inches wide. The enlarged photo must have the same proportions as the original, but be 20 inches long. What size will the enlargement be?

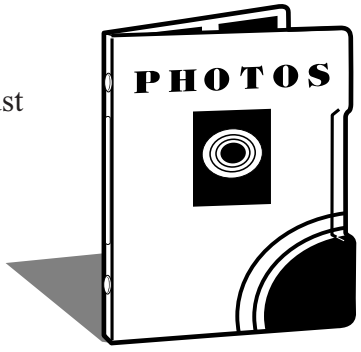
2. A photo developer wants to enlarge a photo that is 3 inches long and 5 inches wide. The enlarged photo must have the same proportions as the original, but will be 12 inches long. What size will the enlargement be?

3. A photo developer has an enlargement that is 16 inches long and 20 inches wide. The original has the same proportions as the enlargement, but is only 4 inches long. How wide is the original?

NAME _____ DATE _____ PERIOD _____

10-2 Real-Life Career Activity

Photo Developer



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$\frac{4}{6} = \frac{12}{w}$	*Write a proportion.*
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$4w = 72$	*Multiply.*
$\frac{4w}{4} = \frac{72}{4}$	*Divide.*
$w = 18$	

The enlargement will be 12 inches long and 18 inches wide.

Solve.

1. A photo developer wants to enlarge a photo that is 4 inches long and 6 inches wide. The enlarged photo must have the same proportions as the original, but be 20 inches long. What size will the enlargement be?
20 in. long and 30 in. wide

2. A photo developer wants to enlarge a photo that is 3 inches long and 5 inches wide. The enlarged photo must have the same proportions as the original, but will be 12 inches long. What size will the enlargement be?
12 in. long and 20 in. wide

3. A photo developer has an enlargement that is 16 inches long and 20 inches wide. The original has the same proportions as the enlargement, but is only 4 inches long. How wide is the original? **5 in. wide**

NAME _____ DATE _____ PERIOD _____

11-3

Real-Life Career Activity

Actuary

Actuaries are people who analyze statistics to determine how much insurance companies should charge for different insurance policies. Actuaries use statistics to calculate probabilities, such as the likelihood of personal injury or illness, automobile accidents, or property damage due to a catastrophe.

In 1995, there were about 56,000 United States residents who were at least 100 years old. They were classified according to racial descent. Of those people, 45,000 were classified as being of European descent, 7,000 were of African descent, 2,000 were of Hispanic origin, 1,000 were classified as Native American, Eskimo, or Aleut, and the remaining 1,000 were classified as Asian and Pacific Islanders.

Suppose an actuary wants to calculate the probability that a person at least 100 years old is African American. The actuary uses the probability formula.

$$P(\text{African American}) = \frac{7{,}000}{56{,}000} = \frac{1}{8}$$

The probability is $\frac{1}{8}$ that a person at least 100 years old is African American.

Solve. Express each probability as a fraction in simplest form.

1. Find the probability that a person at least 100 years old is of Hispanic origin.

2. Find the probability that a person at least 100 years old is of European descent.

3. Find the probability that a person at least 100 years old is Asian or a Pacific Islander.

NAME _____ DATE _____ PERIOD _____

11-3 Real-Life Career Activity

Actuary

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The probability is $\frac{1}{8}$ that a person at least 100 years old is African American.

Solve. Express each probability as a fraction in simplest form.

1. Find the probability that a person at least 100 years old is of Hispanic origin. $\frac{1}{28}$

2. Find the probability that a person at least 100 years old is of European descent. $\frac{45}{56}$

3. Find the probability that a person at least 100 years old is Asian or a Pacific Islander. $\frac{1}{56}$

NAME _____ DATE _____ PERIOD _____

12-6

Real-Life Career Activity

Astronaut

Duration of Notable Manned Space Flights		
Mission Name	**Duration**	**Comments**
Vostok 1	1 h 40 min	First manned space flight
Mercury 3	15 min 22 s	First American in space
Mercury 6	4 h 55 min 23 s	First American in orbit
Vostok 6	70 h 50 min	First woman in space
Apollo 9	240 h 00 min 54 s	First manned lunar module
Apollo 11	195 h 18 min 35 s	First men on the moon
Skylab 1	672 h 49 min 49 s	Included 13 hour spacewalk
Soyuz 19	143 h 31 min 00 s	Joint U.S.-U.S.S.R. flight

Solve.

1. How much longer was the first woman in space than the first man in space?

2. How much longer was the Vostok 6 flight than the Mercury 6 flight?

3. What is the total flight time for the two Apollo missions?

4. How much longer was Apollo 11 in flight than the joint U.S.-U.S.S.R. flight?

5. How many days longer was Skylab 1 than the joint U.S.-U.S.S.R. flight? (Round your answer to the nearest day.)

NAME _____ DATE _____ PERIOD _____

12-6 Real-Life Career Activity

Astronaut

Duration of Notable Manned Space Flights		
Mission Name	**Duration**	**Comments**
Vostok 1	1 h 40 min	First manned space flight
Mercury 3	15 min 22 s	First American in space
Mercury 6	4 h 55 min 23 s	First American in orbit
Vostok 6	70 h 50 min	First woman in space
Apollo 9	240 h 00 min 54 s	First manned lunar module
Apollo 11	195 h 18 min 35 s	First men on the moon
Skylab 1	676 h 49 min 49 s	Included 13 hour spacewalk
Soyuz 19	143 h 31 min 00 s	Joint U.S.-U.S.S.R. flight

Solve.

1. How much longer was the first woman in space than the first man in space?

   69 h 10 min

2. How much longer was the Vostok 6 flight than the Mercury 6 flight?

   65 h 54 min 37 s

3. What is the total flight time for the two Apollo missions?

   435 h 19 min 29 s

4. How much longer was Apollo 11 in flight than the joint U.S.-U.S.S.R. flight?

   51 h 47 min 35 s

5. How many days longer was Skylab 1 than the joint U.S.-U.S.S.R. flight? (Round your answer to the nearest day.)

   22 days

NAME _____ DATE _____ PERIOD _____

13-2

Real-Life Career Activity

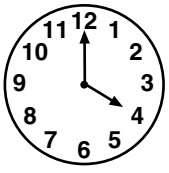
Jewelry Designer

Jewelry designers are often commercial artists who create jewelry. Before they become jewelry designers, these artists study drawing and sculpture and learn about different materials and techniques.

Some jewelry designers specialize in designing watches. The hours on the face of a watch must be exact distances apart. Designers can use angle measures to make sure that the design of a watch face is accurate. There are 12 hours on a circular watch face, and a circle contains 360°, so each hour contains $\frac{360°}{12} = 30°$. When a watch designer draws a sample watch face, the designer makes sure that there are 30° between each hour.

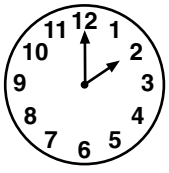
Suppose the designer wants to show how the watch will look when displaying 4 o'clock. How can the designer use angle measures to draw this?

At 4 o'clock, the minute hand is on 12 and the hour hand is on 4. There are four hours between 12 and 4, so there are 120° between the two hands. The designer can use a protractor and straightedge to draw an angle that measures 120°.

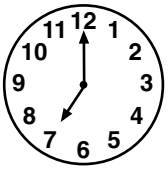


Calculate the angle measure between the two hands of each watch shown below. (There are two possible answers for Exercises 1 and 2.)

1.



2.



Solve.

3. The measure of the angle between the hour and minute hands is 180°. What hour does the watch show?

NAME _____ DATE _____ PERIOD _____

13-2 Real-Life Career Activity

Jewelry Designer

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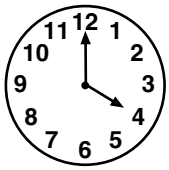

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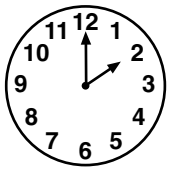
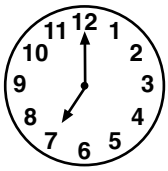


60° or 300°

2.



150° or 210°

Solve.

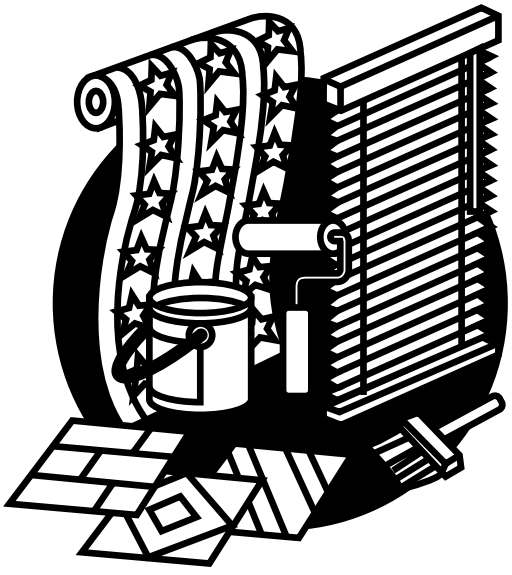
3. The measure of the angle between the hour and minute hands is 180°. What hour does the watch show? **6 o'clock**

NAME _____ DATE _____ PERIOD _____

14-6

Real-Life Career Activity

Interior Designer



Interior designers create living and working spaces that are attractive and useful. An interior designer must know all about decorating materials, the psychological effects of colors and textures, and how to calculate the amount and price of the necessary materials. A designer can use a formula to calculate the surface area of the walls and ceiling of a room.

$$A = 2(\ell \times h) + 2(w \times h) + (\ell \times w)$$

In this formula, A is the area of the room in square feet, ℓ is the length of the room in feet, w is the width in feet, and h is the height in feet.

Suppose a designer plans to cover the walls and ceiling of a sound studio with sound-absorbent tiles. Each tile is 1 square foot. The studio is 20 feet long, 15 feet wide, and 10 feet high. How many tiles should the designer order?

$$\begin{aligned} A &= 2(\ell \times h) + 2(w \times h) + (\ell \times w) \\ &= 2(20 \times 10) + 2(15 \times 10) + (20 \times 15) \\ &= 1{,}000 \end{aligned}$$

The designer should order 1,000 tiles.

Solve.

1. Calculate the number of tiles the designer will need to cover the walls and ceiling of a studio that is 15 feet long, 12 feet wide, and 10 feet high.

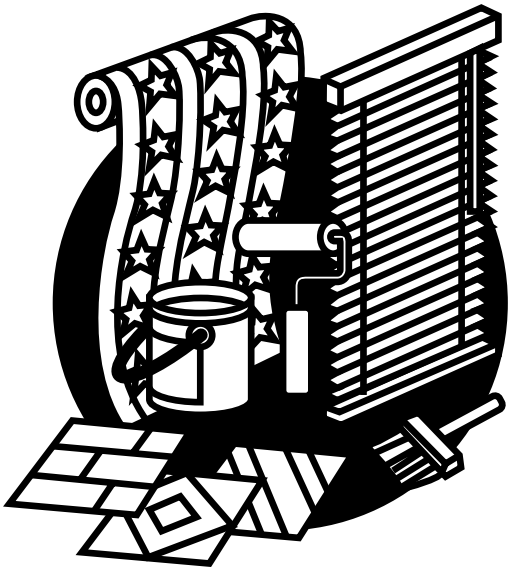
2. A studio is 15 feet long, 15 feet wide, and 12 feet high. A designer orders 1,000 tiles. Does the designer have enough tiles?

3. A designer has 650 tiles to cover the walls and ceiling of a studio that is 20 feet long, 16 feet wide, and 9 feet high. How many more tiles will the designer need?

NAME _____ DATE _____ PERIOD _____

14-6 Real-Life Career Activity

Interior Designer



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The designer should order 1,000 tiles.

Solve.

1. Calculate the number of tiles the designer will need to cover the walls and ceiling of a studio that is 15 feet long, 12 feet wide, and 10 feet high. **720 tiles**

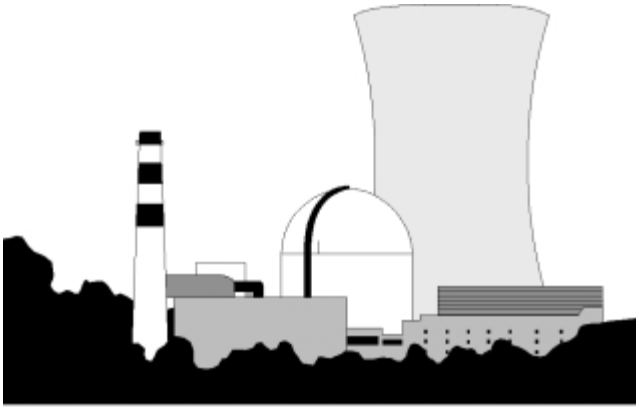
2. A studio is 15 feet long, 15 feet wide, and 12 feet high. A designer orders 1,000 tiles. Does the designer have enough tiles?
Yes, the designer needs 945 tiles.

3. A designer has 650 tiles to cover the walls and ceiling of a studio that is 20 feet long, 16 feet wide, and 9 feet high. How many more tiles will the designer need? **318 tiles**

1-9

Real-Life Career Activity

Nuclear Engineer



Nuclear engineers design, build, and operate facilities that use nuclear energy, such as nuclear power plants and scientific research facilities. Radioactive materials are used in medicine as well as in nuclear weapons. Doctors treat some types of cancers using nuclear technology. Researchers in nuclear medicine are discovering many new ways to use nuclear energy to diagnose and fight diseases.

Plutonium is a radioactive substance that nuclear power plants use. Nuclear engineers in these plants often have to carefully calculate the number of atoms contained in an amount of plutonium. An engineer can use the formula below to calculate the approximate number of plutonium atoms.

$$n = 2.5 \times 10^{21} \times m$$

In this formula, n is the approximate number of plutonium atoms, and m is the mass of the plutonium in grams.

Suppose a nuclear engineer wants to calculate how many plutonium atoms are in 2 grams of plutonium.

$$n = 2.5 \times 10^{21} \times 2$$

$$n = 5 \times 10^{21}$$

There are 5×10^{21} plutonium atoms in 2 grams.

Solve.

1. Calculate how many plutonium atoms are in 0.5 gram of plutonium.

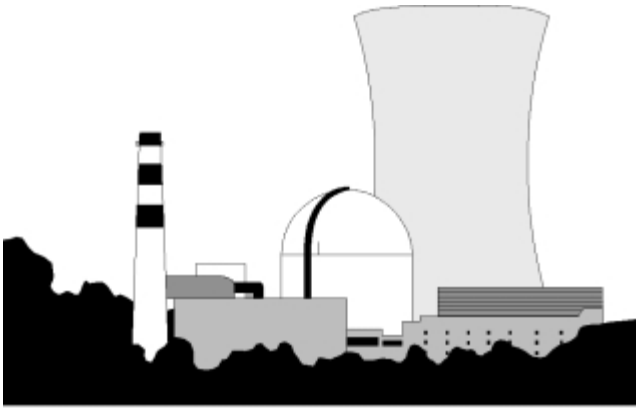
2. Calculate how many plutonium atoms are in 3 grams of plutonium.

3. If you write 2.5×10^{21} atoms without using scientific notation, how many zeros do you write?

NAME _____ DATE _____ PERIOD _____

1-9 Real-Life Career Activity

Nuclear Engineer



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$$n = 2.5 \times 10^{21} \times 2$$

$$n = 5 \times 10^{21}$$

There are 5×10^{21} plutonium atoms in 2 grams.

Solve.

1. Calculate how many plutonium atoms are in 0.5 gram of plutonium.
1.25×10^{21} atoms

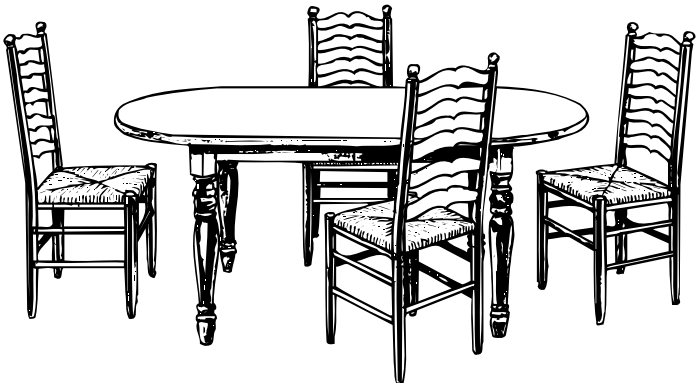
2. Calculate how many plutonium atoms are in 3 grams of plutonium.
7.5×10^{21} atoms

3. If you write 2.5×10^{21} atoms without using scientific notation, how many zeros do you write? **20**

2-1

Real-Life Career Activity

Restaurant Manager



One responsibility of a restaurant manager is handling reservations. Before a restaurant opens for the day, the manager inspects the reservation list. Then the wait staff groups the tables according to the size of the parties the restaurant is expecting. The staff combines tables to seat a range of group sizes from the smallest to the largest.

Suppose the numbers in the parties expected that evening are of the following sizes.

2, 8, 3, 10, 9, 4, 4, 5, 2, 2, 3, 8

What are the sizes of the largest and smallest parties? What is the range of party sizes for the evening?

The largest party has ten members, and the smallest party has two members. The range of party sizes is eight—the difference between the largest and the smallest. The restaurant manager uses these numbers to make sure there are tables for the party of ten and the parties of two.

Solve.

1. The hourly pay rates of the ten wait staff are: \$9, \$7.50, \$6, \$5.50, \$5.50, \$8, \$7, \$8, \$7, \$8.50. Make a frequency table of the data. What are the highest and lowest pay rates? What is the range of pay rates?

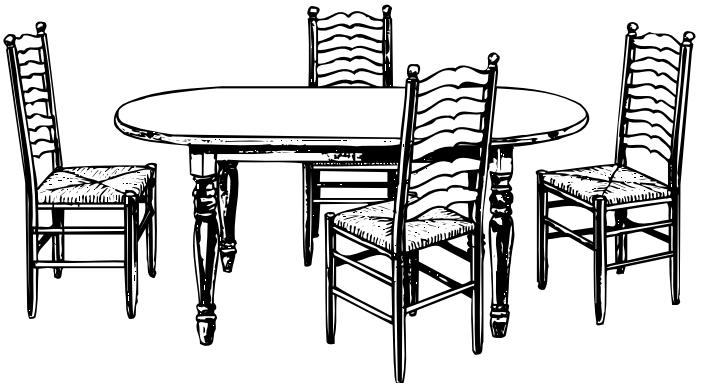
2. The numbers of months of experience of the ten wait staff are: 15, 2, 8, 14, 1, 24, 20, 8, 10, 12. What are the highest and lowest numbers of months of experience? What is the range of months of experience?

3. The sizes of the parties expected one evening are: 6, 2, 6, 2, 8, 10, 4, 2, 15, 8. Make a frequency table of the data. What are the sizes of the largest and smallest parties expected? What is the range of party sizes for the evening?

NAME _____ DATE _____ PERIOD _____

2-1 Real-Life Career Activity

Restaurant Manager



One responsibility of a restaurant manager is handling reservations. Before a restaurant opens for the day, the manager inspects the reservation list. Then the wait staff groups the tables according to the size of the parties the restaurant is expecting. The staff combines tables to seat a range of group sizes from the smallest to the largest.

Suppose the numbers in the parties expected that evening are of the following sizes.

2, 8, 3, 10, 9, 4, 4, 5, 2, 2, 3, 8

What are the sizes of the largest and smallest parties? What is the range of party sizes for the evening?

The largest party has ten members, and the smallest party has two members. The range of party sizes is eight—the difference between the largest and the smallest. The restaurant manager uses these numbers to make sure there are tables for the party of ten and the parties of two.

Solve.

1. The hourly pay rates of the ten wait staff are: \$9, \$7.50, \$6, \$5.50, \$5.50, \$8, \$7, \$8, \$7, \$8.50. Make a frequency table of the data. What are the highest and lowest pay rates? What is the range of pay rates?
\$9; \$5.50; \$3.50

2. The numbers of months of experience of the ten wait staff are: 15, 2, 8, 14, 1, 24, 20, 8, 10, 12. What are the highest and lowest numbers of months of experience? What is the range of months of experience?
24; 1; 23

3. The sizes of the parties expected one evening are: 6, 2, 6, 2, 8, 10, 4, 2, 15, 8. Make a frequency table of the data. What are the sizes of the largest and smallest parties expected? What is the range of party sizes for the evening? **15; 2; 13**

3-2

Real-Life Career Activity

Adventure Guide

Adventure guides lead groups of people on outdoor adventure trips. The trips may involve activities such as hiking, camping, mountain climbing, white-water rafting, and cross-country skiing. Adventure guides have to be athletic, relate well with others, and be good leaders. The best guides know the climate of the region and a little of its history and geography. They should also be familiar with the region's plants and animals, and they should know first aid and CPR.

For overnight hiking or camping trips, an adventure guide will recommend sleeping bags. Sleeping bags have temperature ratings that list the lowest temperature for which the bags are suitable.

Suppose an adventure guide is leading a fall color hiking trip. The overnight temperature may be as low as −10°C. There are sleeping bags with temperature ratings of 0°C, −5°C, and −15°C. Which bag should the guide recommend?

The sleeping bags rated 0°C and −5°C will not keep the hikers warm if the temperature drops to −10°C. The guide should recommend the bag rated −15°C.

Solve.

1. Three sleeping bags have temperature ratings of +10°C, +5°C, and −15°C. Which sleeping bag should hikers take if they expect the temperature to drop below freezing? Explain.

2. Three sleeping bags have temperature ratings of 0°C, +5°C, and −10°C. Which sleeping bag should hikers take if they expect the temperature to be no less than 15°C? Explain.

3. Order the temperature ratings 20°C, −5°C, 0°C, −10°C, and 15°C from greatest to least.

NAME _____ DATE _____ PERIOD _____

3-2 Real-Life Career Activity

Adventure Guide

Adventure guides lead groups of people on outdoor adventure trips. The trips may involve activities such as hiking, camping, mountain climbing, white-water rafting, and cross-country skiing. Adventure guides have to be athletic, relate well with others, and be good leaders. The best guides know the climate of the region and a little of its history and geography. They should also be familiar with the region's plants and animals, and they should know first aid and CPR.

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Suppose an adventure guide is leading a fall color hiking trip. The overnight temperature may be as low as −10°C. There are sleeping bags with temperature ratings of 0°C, −5°C, and −15°C. Which bag should the guide recommend?

The sleeping bags rated 0°C and −5°C will not keep the hikers warm if the temperature drops to −10°C. The guide should recommend the bag rated −15°C.

Solve.

1. Three sleeping bags have temperature ratings of +10°C, +5°C, and −15°C. Which sleeping bag should hikers take if they expect the temperature to drop below freezing? Explain. **the bag rated −15°C because it is the only choice below freezing, or 0°C**

2. Three sleeping bags have temperature ratings of 0°C, +5°C, and −10°C. Which sleeping bag should hikers take if they expect the temperature to be no less than 15°C? Explain. **the bag rated +5°C because the other bags would keep them too warm**

3. Order the temperature ratings 20°C, −5°C, 0°C, −10°C, and 15°C from greatest to least.
20°C, 15°C, 0°C, −5°C, −10°C

NAME _____ DATE _____ PERIOD _____

4-4

Real-Life Career Activity

Office Administrator

Office administrators are multi-talented workers responsible for many office tasks. Some of these responsibilities include supervising clerical staff, maintaining databases, receiving and sending bills, scheduling appointments, organizing meetings, and working with the company's budget.

Suppose the company's marketing manager needs to hire a printer to make some advertising packets. The printer quotes $2 for each packet and a one-time fee of $2,000 to design the materials. The budget for these materials is $8,000. How many packets can the office administrator order for $8,000? The administrator can write an equation to solve this problem using p for the number of packets.

$$8{,}000 = 2{,}000 + 2p$$

The administrator solves this two-step equation.

$$\begin{aligned} 8{,}000 &= 2{,}000 + 2p \\ 8{,}000 - 2{,}000 &= 2{,}000 - 2{,}000 + 2p \\ 6{,}000 &= 2p \\ \frac{6{,}000}{2} &= \frac{2p}{2} \\ 3{,}000 &= p \end{aligned}$$

The administrator calculates that the company can order 3,000 packets for $8,000.

Solve.

1. Calculate how many packets the administrator can order for $8,000 if each packet costs $3 and the design fee is $2,000.

2. Calculate how many packets the administrator can order for $5,000 if each packet costs $5 and the design fee is $1,000.

3. Suppose each packet costs $7 and the design fee is $3,000. The marketing manager wants 1,000 packets but the administrator has only $8,000 to spend. Does the administrator have enough money in the budget?

NAME _____ DATE _____ PERIOD _____

4-4 Real-Life Career Activity

Office Administrator

Office administrators are multi-talented workers responsible for many office tasks. Some of these responsibilities include supervising clerical staff, maintaining databases, receiving and sending bills, scheduling appointments, organizing meetings, and working with the company's budget.

Suppose the company's marketing manager needs to hire a printer to make some advertising packets. The printer quotes $2 for each packet and a one-time fee of $2,000 to design the materials. The budget for these materials is $8,000. How many packets can the office administrator order for $8,000? The administrator can write an equation to solve this problem using p for the number of packets.

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The administrator calculates that the company can order 3,000 packets for $8,000.

Solve.

1. Calculate how many packets the administrator can order for $8,000 if each packet costs $3 and the design fee is $2,000. **2,000 packets**

2. Calculate how many packets the administrator can order for $5,000 if each packet costs $5 and the design fee is $1,000. **800 packets**

3. Suppose each packet costs $7 and the design fee is $3,000. The marketing manager wants 1,000 packets but the administrator has only $8,000 to spend. Does the administrator have enough money in the budget?

No; the administrator needs $10,000 to pay for 1,000 packets.

5-4

Real-Life Career Activity

Inventory Manager

An inventory manager keeps track of the items a store has on its shelves and in its storage areas. The manager knows how many items a store needs and orders more as supplies run low. The manager gives new items a tracking number and stores them where the staff can find them quickly and easily.

Mail-order companies often charge customers a shipping fee that is based on the weight of the merchandise ordered. The inventory manager makes sure that orders are weighed and labeled.

Suppose a mail-order company charges customers for each quarter of a pound the company ships. The inventory manager records the weight of each item to the nearest quarter pound.

If an item is labeled *weight = 12.25 lb,* how would the inventory manager record this weight as a mixed number?

$$0.25 = \frac{1}{4}, \text{ so } 12.25 = 12\frac{1}{4}.$$

The inventory manager would record the weight as $12\frac{1}{4}$ pounds.

Rewrite each weight as a fraction or mixed number.

1. 4.5 lb

2. 2.0 lb

3. 4.4 lb

4. 6.25 lb

5. 7.75 lb

6. 6.2 lb

7. 3.85 lb

8. 10.7 lb

9. 7.65 lb

NAME _____ DATE _____ PERIOD _____

5-4 Real-Life Career Activity

Inventory Manager

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The inventory manager would record the weight as $12\frac{1}{4}$ pounds.

Rewrite each weight as a fraction or mixed number.

1. 4.5 lb $4\frac{1}{2}$ lb

2. 2.0 lb 2 lb

3. 4.4 lb $4\frac{2}{5}$ lb

4. 6.25 lb $6\frac{1}{4}$ lb

5. 7.75 lb $7\frac{3}{4}$ lb

6. 6.2 lb $6\frac{1}{5}$ lb

7. 3.85 lb $3\frac{17}{20}$ lb

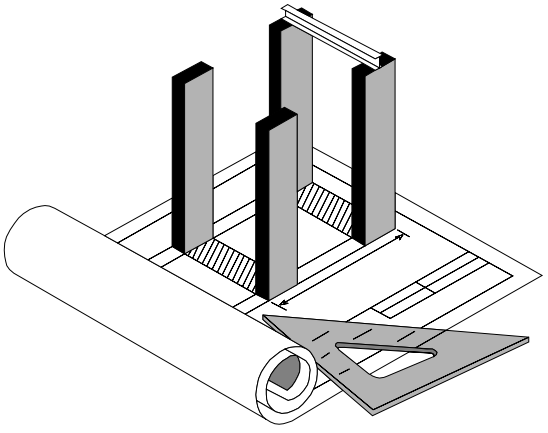
8. 10.7 lb $10\frac{7}{10}$ lb

9. 7.65 lb $7\frac{13}{20}$ lb

6-8

Real-Life Career Activity

Property Developer



Property developers buy areas of land and turn the areas into neighborhoods. The entire piece of land is called a *plat.* The developers divide the plat into individual housing plots. They must determine where to place roads and utilities. The developers coordinate with the city government to put in roads and with the utility companies to put in gas, electricity, water, telephones, and cable TV lines. It is important for developers to know all about the plats they buy, including the perimeter, so they can estimate the cost of the housing lots.

Suppose a rectangular plat is $\frac{3}{4}$ mile long and $\frac{1}{2}$ mile wide. What is the perimeter of the plat?

$$\begin{aligned} P &= \ell + w + \ell + w \\ &= \tfrac{3}{4} + \tfrac{1}{2} + \tfrac{3}{4} + \tfrac{1}{2} \\ &= 2\tfrac{1}{2} \end{aligned}$$

The perimeter is $2\frac{1}{2}$ miles.

Solve.

1. A rectangular plat is 1 mile long and $\frac{1}{2}$ mile wide. Find the perimeter of the plat.

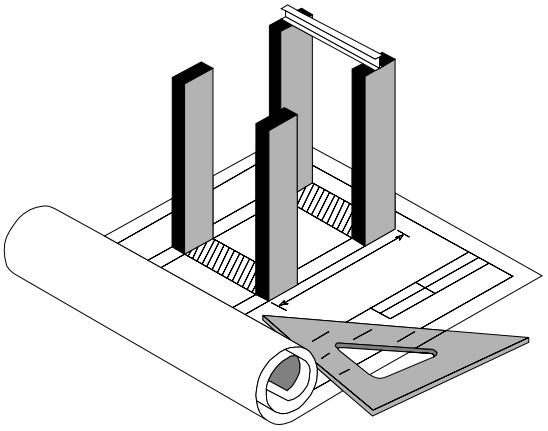
2. A rectangular plat is $1\frac{1}{2}$ miles long and $\frac{3}{4}$ mile wide. Find the perimeter of the plat.

3. A rectangular plat is 1 mile long. The perimeter is 3 miles. Find the width of the plat.

NAME _____ DATE _____ PERIOD _____

6-8 Real-Life Career Activity

Property Developer



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Suppose a rectangular plat is $\frac{3}{4}$ mile long and $\frac{1}{2}$ mile wide. What is the perimeter of the plat?

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The perimeter is $2\frac{1}{2}$ miles.

Solve.

1. A rectangular plat is 1 mile long and $\frac{1}{2}$ mile wide. Find the perimeter of the plat. **3 mi**

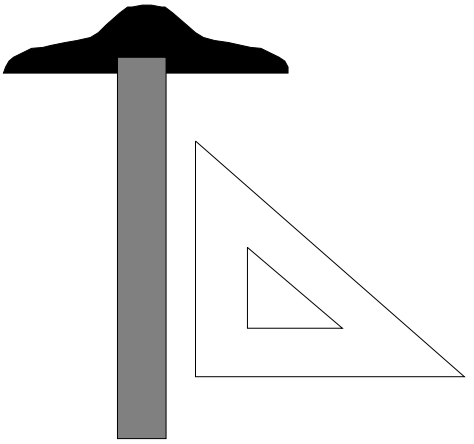
2. A rectangular plat is $1\frac{1}{2}$ miles long and $\frac{3}{4}$ mile wide. Find the perimeter of the plat. **$4\frac{1}{2}$ mi**

3. A rectangular plat is 1 mile long. The perimeter is 3 miles. Find the width of the plat. **$\frac{1}{2}$ mi**

7-4

Real-Life Career Activity

Builder



Builders construct office buildings and houses by following a *blueprint.* The blueprint is a detailed scale drawing usually made by an architect or draftsperson. The architect scales the drawing of the house to reduce the size to fit on blueprint paper, and labels the scale. The builder uses the scale to calculate the actual size of the house.

Suppose a builder has a blueprint with a scale of 1 inch:4 feet. On the blueprint, the house is 20 inches long. How long will the house be when it is built?

The builder first converts the scale to the same unit. 4 feet is the same as 48 inches. So the scale is 1 inch:48 inches. To find the length of the house, the builder multiplies the distance on the blueprint by 48.

$$20 \text{ inches} \times 48 = 960 \text{ inches}$$

Then the builder changes the result to feet by dividing by 12.

$$960 \text{ inches} \div 12 = 80 \text{ feet}$$

The house is 80 feet long.

Solve.

1. A builder has a blueprint with a scale of 1 inch:4 feet. On the blueprint, the house is 30 inches long. Find the actual length of the house.

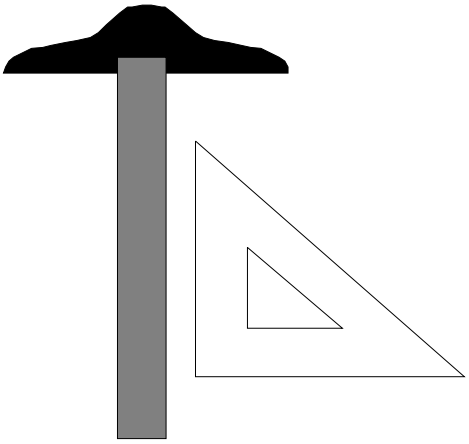
2. A builder has a blueprint with a scale of 1 inch:3 feet. On the blueprint, the house is 30 inches wide. Find the actual width of the house.

3. A builder has a blueprint with a scale of 1 inch:4 feet. The ceiling of the living room is 8 feet above the floor. What is the measurement of the ceiling on the blueprint?

NAME _____ DATE _____ PERIOD _____

7-4 Real-Life Career Activity

Builder



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Then the builder changes the result to feet by dividing by 12.

$$960 \text{ inches} \div 12 = 80 \text{ feet}$$

The house is 80 feet long.

Solve.

1. A builder has a blueprint with a scale of 1 inch:4 feet. On the blueprint, the house is 30 inches long. Find the actual length of the house. **120 ft**

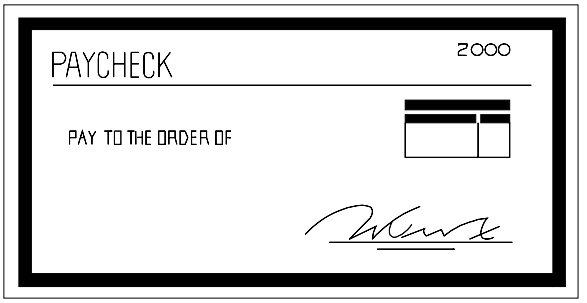
2. A builder has a blueprint with a scale of 1 inch:3 feet. On the blueprint, the house is 30 inches wide. Find the actual width of the house. **90 ft**

3. A builder has a blueprint with a scale of 1 inch:4 feet. The ceiling of the living room is 8 feet above the floor. What is the measurement of the ceiling on the blueprint? **2 in.**

8-2

Real-Life Career Activity

Payroll Clerk



Payroll clerks are office workers who make sure a company's employees are paid the correct wages. They perform many duties, including the calculation of taxes and health benefits based on payroll checks.

Payroll clerks often must include commissions in the paychecks of their sales staff. (A commission is a sum of money representing a percent of the price of items sold.) A commission is paid in addition to a base salary and usually changes from month to month. A payroll clerk can use the formula below to calculate the wages of a salesperson before taxes for each month.

$$m = b + \left(\frac{c}{100} \cdot s\right)$$

In this formula, m is the month's wages before taxes, b is the base pay, c is the percent of commission earned, and s is the sales income from inventory sold.

Suppose a salesperson earns a base pay of \$1,500 and makes sales of \$15,200, on which she earns 2% commission. What are her wages before taxes for that month?

$$\begin{aligned} m &= 1{,}500 + \left(\frac{2}{100} \cdot 15{,}200\right) \\ &= 1{,}500 + 304 \\ &= 1{,}804 \end{aligned}$$

The salesperson earns wages of \$1,804 for that month.

Solve.

1. A salesperson earns a base pay of \$1,200 and makes sales of \$9,000, on which he earns 2% commission. Calculate his wages for that month before taxes.

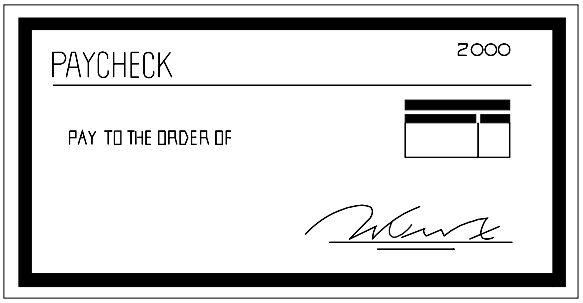
2. A salesperson earns a base pay of \$1,300 and makes sales of \$12,000, on which he earns 2% commission. Calculate his wages for that month before taxes.

3. A salesperson earns a base pay of \$1,400 and makes sales on which she earns 2% commission. Her wages for that month before taxes are \$1,620. What was the amount of her sales that month?

NAME _____ DATE _____ PERIOD _____

8-2 Real-Life Career Activity

Payroll Clerk



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Suppose a salesperson earns a base pay of $1,500 and makes sales of $15,200, on which she earns 2% commission. What are her wages before taxes for that month?

$$\begin{aligned} m &= 1{,}500 + \left(\frac{2}{100} \cdot 15{,}200\right) \\ &= 1{,}500 + 304 \\ &= 1{,}804 \end{aligned}$$

The salesperson earns wages of $1,804 for that month.

Solve.

1. A salesperson earns a base pay of $1,200 and makes sales of $9,000, on which he earns 2% commission. Calculate his wages for that month before taxes. **$1,380**

2. A salesperson earns a base pay of $1,300 and makes sales of $12,000, on which he earns 2% commission. Calculate his wages for that month before taxes. **$1,540**

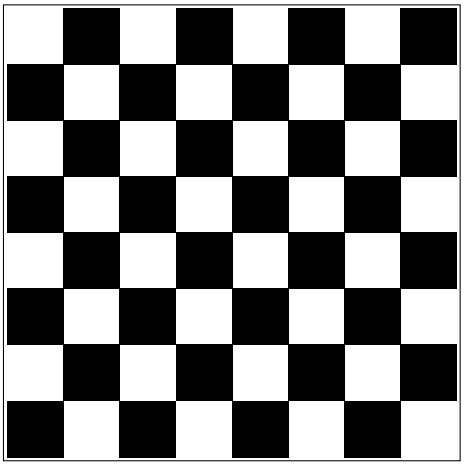
3. A salesperson earns a base pay of $1,400 and makes sales on which she earns 2% commission. Her wages for that month before taxes are $1,620. What was the amount of her sales that month? **$11,000**

NAME _____ DATE _____ PERIOD _____

9-2

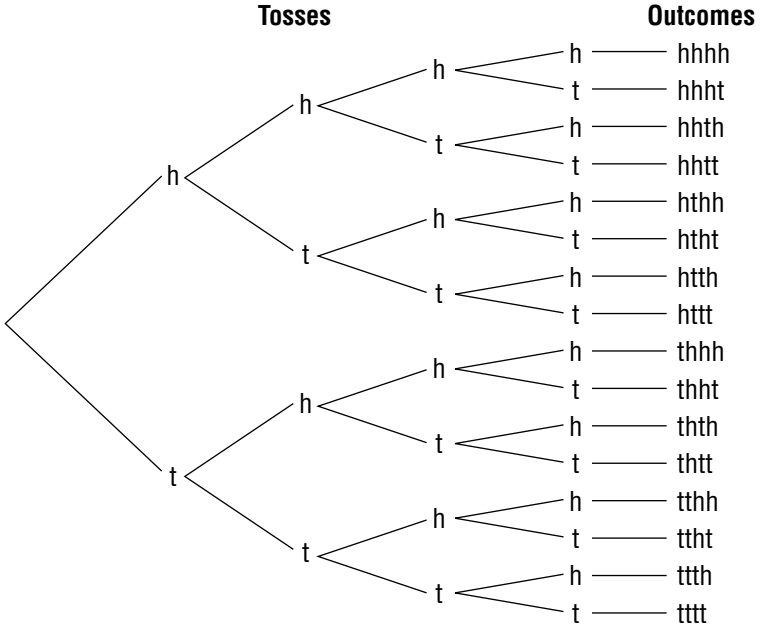
Real-Life Career Activity

Board Game Designer



Board game designers often use tree diagrams to help them decide how to write rules for a game. In this activity, a game designer is making rules for a coin toss game with four coins.

In this tree diagram, *h* is heads and *t* is tails.



Suppose the designer plans to write a rule that says a player wins 5 points if he or she tosses four heads or four tails. Find the probability that a player wins the 5 points. There are 2 ways to toss four heads or four tails. There are 16 possible ways to toss four coins. The probability that a player gets 5 points is $\frac{2}{16}$ or $\frac{1}{8}$.

Solve.

1. The designer writes that a player wins 2 points if he or she tosses two heads and two tails. Find the probability that a player gets 2 points.

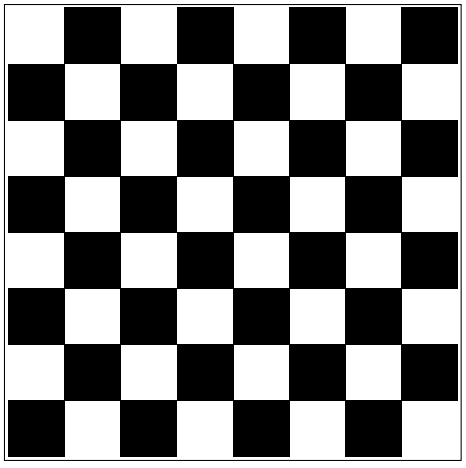
2. The designer writes that a player wins 1 point if he or she tosses three of one side and one of another. Find the probability that a player gets 1 point.

3. For what outcome, if any, would a player win no points?

NAME _____ DATE _____ PERIOD _____

9-2 Real-Life Career Activity

Board Game Designer



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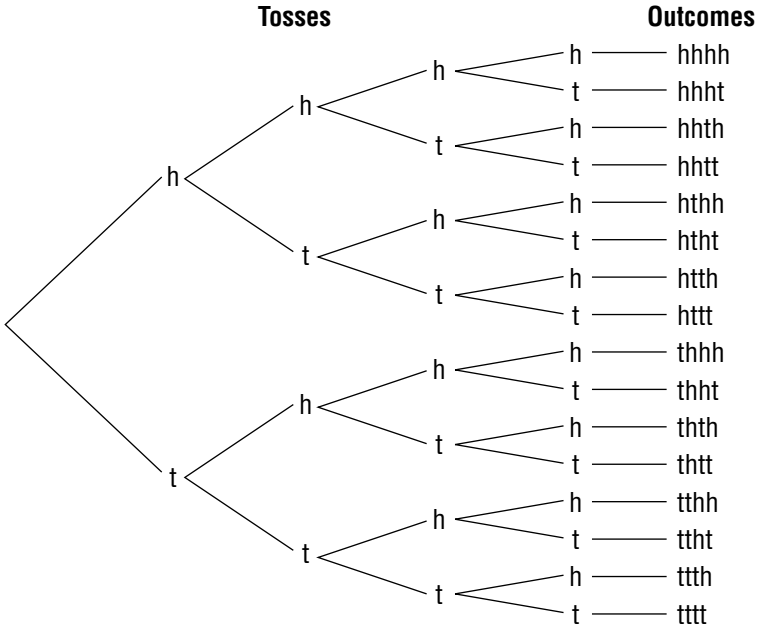

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Solve.

1. The designer writes that a player wins 2 points if he or she tosses two heads and two tails. Find the probability that a player gets 2 points.
$\frac{6}{16}$ or $\frac{3}{8}$

2. The designer writes that a player wins 1 point if he or she tosses three of one side and one of another. Find the probability that a player gets 1 point. $\frac{8}{16}$ or $\frac{1}{2}$

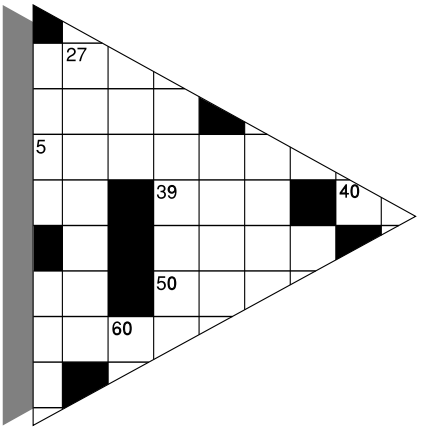
3. For what outcome, if any, would a player win no points? None; a player will win points for every possible outcome.

NAME _____ DATE _____ PERIOD _____

10-9

Real-Life Career Activity

Crossword Puzzle Designer



Crossword puzzles appear in almost every newspaper in the United States. In addition, collections of crossword puzzles are available at bookstores. The people who design these puzzles must have a good vocabulary and be clever at thinking up clues. The designs of crossword puzzles are traditionally symmetrical in some way. Some puzzles have only one line of symmetry, while others have several lines of symmetry. Today, puzzle designers use computer software to help them design their puzzles and ensure that they are symmetrical.

Here is an example of a simple 4-by-4 puzzle with one line of symmetry.

	O	F	
O	P	E	N
	A	T	
F	L	A	P

Solve.

1. The following crossword puzzle has already been designed.

S	N	A	K	E

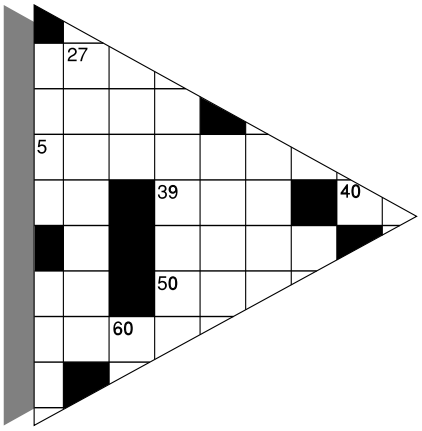
The first word, SNAKE, has been filled in. Place the remaining words into the puzzle: SIT-UP, EVENS, ARENA, PEARS, and THERE. Mark any lines of symmetry.

2. Design a different 5-by-5 crossword puzzle. Remember that the design must be symmetrical. Try to find words that will fit your design. Mark any lines of symmetry in the puzzle boxes.

NAME _____ DATE _____ PERIOD _____

10-9 Real-Life Career Activity

Crossword Puzzle Designer



Crossword puzzles appear in almost every newspaper in the United States. In addition, collections of crossword puzzles are available at bookstores. The people who design these puzzles must have a good vocabulary and be clever at thinking up clues. The designs of crossword puzzles are traditionally symmetrical in some way. Some puzzles have only one line of symmetry, while others have several lines of symmetry. Today, puzzle designers use computer software to help them design their puzzles and ensure that they are symmetrical.

Here is an example of a simple 4-by-4 puzzle with one line of symmetry.

	O	F	
O	P	E	N
	A	T	
F	L	A	P

SOLVE

1. The following crossword puzzle has already been designed.

S	N	A	K	E
I		R		V
T	H	E	R	E
U		N		N
P	E	A	R	S

The first word, SNAKE, has been filled in. Place the remaining words into the puzzle: SIT-UP, EVENS, ARENA, PEARS, and THERE. Mark any lines of symmetry.

2. Design a different 5-by-5 crossword puzzle. Remember that the design must be symmetrical. Try to find words that will fit your design. Mark any lines of symmetry in the puzzle boxes. **Answers will vary.**

NAME _____ DATE _____ PERIOD _____

11-6

Real-Life Career Activity

Landscape Designer

Landscape designers use their knowledge of plants to design gardens. They need to know which plants will thrive in the garden, how to take care of them, and how to arrange them. The garden must complement the architecture and suit the people who will enjoy it.

Once landscape designers have designed beds for the plants, they can calculate the number of plants needed to fill the bed. They can use the formula below to calculate how many plants are needed to fill a circular bed.

$$t = \pi n r^2$$

In this formula, t is the total number of plants needed, n is the number of plants in each square foot, and r is the radius of the bed in feet. Use 3.14 for π.

Suppose a landscape designer wants to fill a circular bed of radius 5 feet with marigolds. The designer can plant four marigolds in each square foot. Calculate how many marigolds the designer will need to fill the bed.

$$\begin{aligned} t &= \pi n r^2 \\ &= 3.14 \times 4 \times 5^2 \\ &= 314 \end{aligned}$$

The landscape designer will need 314 marigolds.

Solve.

1. Calculate how many pansies a landscape designer will need to fill a circular bed of radius 10 feet, if two pansies will fit in each square foot.

2. A landscape designer bought 150 marigolds. If four marigolds fit in each square foot, does the designer have enough marigolds for a circular bed of radius 4 feet?

NAME _____ DATE _____ PERIOD _____

11-6 Real-Life Career Activity

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$$\begin{aligned} t &= \pi n r^2 \\ &= 3.14 \times 4 \times 5^2 \\ &= 314 \end{aligned}$$

The landscape designer will need 314 marigolds.

Solve.

1. Calculate how many pansies a landscape designer will need to fill a circular bed of radius 10 feet, if two pansies will fit in each square foot.

628 pansies

2. A landscape designer bought 150 marigolds. If four marigolds fit in each square foot, does the designer have enough marigolds for a circular bed of radius 4 feet?

No, the designer needs 201 marigolds.

NAME _____ DATE _____ PERIOD _____

12-2

Real-Life Career Activity

Commercial Driver

Tractor-trailer drivers are commercial drivers who carry cargo long distances across the country. As well as knowing how to drive a large truck and trailer, they must also know how to calculate the weight of the cargo they are carrying. Many roads and bridges have weight restrictions so the driver must know the total weight of the vehicle. A truck driver can use the formula below to calculate the weight of the truck's cargo, assuming that the truck is completely full.

$$W = \ell whp$$

In this formula, W is the total weight of the cargo, ℓ is the length of the cargo bay, w is the width of the bay, h is the height of the bay, and p is the weight in pounds per cubic foot of cargo. The driver uses a weight table to look up the weight in pounds per cubic foot of cargo to be carried. Here is a sample weight table for some items.

Material	lb per ft^3	Material	lb per ft^3
apples	40	cocoa beans	37
red brick	120	butter	54
cement	94	gravel	95

Suppose a truck has a cargo bay 10 feet wide, 25 feet long, and 8 feet high. What weight of apples will fill the cargo bay?

$$\begin{aligned} W &= 25 \times 10 \times 8 \times 40 \\ &= 80{,}000 \end{aligned}$$

The cargo bay will hold 80,000 pounds of apples.

Solve.

1. Suppose a truck has a cargo bay 10 feet wide, 20 feet long, and 8 feet high. What weight of butter will fill the cargo bay?

2. Suppose a truck has a cargo bay 8 feet wide, 25 feet long, and 7 feet high. What weight of gravel will fill the cargo bay?

3. Suppose a truck has a cargo bay 9 feet wide and 20 feet long. The truck is carrying 126,900 pounds of cement. What is the height of the cargo bay?

NAME _____ DATE _____ PERIOD _____

12-2 Real-Life Career Activity

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$$\begin{aligned} W &= 25 \times 10 \times 8 \times 40 \\ &= 80{,}000 \end{aligned}$$

The cargo bay will hold 80,000 pounds of apples.

Solve.

1. Suppose a truck has a cargo bay 10 feet wide, 20 feet long, and 8 feet high. What weight of butter will fill the cargo bay? **86,400 lb**

2. Suppose a truck has a cargo bay 8 feet wide, 25 feet long, and 7 feet high. What weight of gravel will fill the cargo bay? **133,000 lb**

3. Suppose a truck has a cargo bay 9 feet wide and 20 feet long. The truck is carrying 126,900 pounds of cement. What is the height of the cargo bay? **7.5 ft**

1-6

Real-Life Career Activity

Highway Department Purchaser

Highway departments across the United States sow wildflowers alongside the highways for beautification. A highway department purchaser orders wildflower seeds from the supplier based on the number of acres of roadside the department plans to seed. A highway department purchaser can use the formula below to calculate the cost of buying wildflower seed using this table provided by a seed supplier.

Wildflower Seed	Pounds per Acre	Cost per Pound
yellow coneflower	3	$20.00
cornflower	4	$6.50
Indian blanket	10	$20.00
yarrow	1	$25.00
California poppy	8	$17.00

$$T = apc$$

In this formula, T is the total cost of the seed, a is the number of acres to seed, p is the number of pounds of seed needed per acre, and c is the cost per pound of the seed.

Suppose a highway department purchaser orders enough yellow coneflower seed to cover 10 acres. How much will the seed cost?

$$T = 10 \times 3 \times 20$$

$$= 600$$

The highway department will spend $600 seeding 10 acres with yellow coneflowers.

Solve.

1. Calculate how much the highway department will spend buying California poppy seed for 3 acres.

2. The highway department wants to seed 4 acres. Would it be less expensive to use cornflower seed or yarrow seed?

3. How many acres will be covered with Indian blanket seed if the total cost of the seed is $1,600?

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1-6 Real-Life Career Activity

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$$T = 10 \times 3 \times 20$$

$$= 600$$

The highway department will spend $600 seeding 10 acres with yellow coneflowers.

Solve.

1. Calculate how much the highway department will spend buying California poppy seed for 3 acres. **$408**

2. The highway department wants to seed 4 acres. Would it be less expensive to use cornflower seed or yarrow seed? **Yarrow would be less expensive.**

3. How many acres will be covered with Indian blanket seed if the total cost of the seed is $1,600? **8 acres**

2-3

Real-Life Career Activity

Temporary Employment Agency Manager

A temporary employment agency helps companies find workers for short-term jobs. It also helps workers find temporary employment. Companies use temporary workers to replace permanent staff who are out of the office because of illness or vacation. They also use temporary staff during periods of extra work. For example, mail-order companies use extra staff during the holiday season when they have more orders to fill.

The temporary agency manager is responsible for understanding the qualifications a company looks for in a temporary worker. The agency manager then chooses a person who fits the needs of the company.

Temporary workers usually work only fractions of days or weeks. The temporary agency manager can use the formula below to calculate the daily or weekly wages of a temporary worker.

$$w = h \cdot r$$

In this formula, w is the weekly or daily wages, h is the number of hours worked, and r is the hourly rate of pay.

Suppose a temporary works $14\frac{1}{2}$ hours and earns \$8.50 per hour. What is the wage of the temporary worker before taxes are deducted?

$$\begin{aligned} w &= 14\tfrac{1}{2} \cdot 8.5 \\ &= 14.5 \cdot 8.5 \\ &= 123.25 \end{aligned} \qquad \text{or} \qquad \begin{aligned} w &= 14\tfrac{1}{2} \cdot 8.5 \\ &= 14\tfrac{1}{2} \cdot 8\tfrac{1}{2} \\ &= \tfrac{29}{2} \cdot \tfrac{17}{2} \\ &= \tfrac{493}{4} = 123.25 \end{aligned}$$

The agency should pay the temporary worker \$123.25 before taxes.

Solve.

1. Calculate how much an agency should pay a temporary employee who works $27\frac{1}{2}$ hours and earns \$9.50 per hour.

2. Calculate how much an agency should pay a temporary employee who works $37\frac{1}{2}$ hours and earns \$11.50 per hour.

3. A temporary employee who works $15\frac{1}{2}$ hours earns \$162.75. Calculate the temporary's hourly rate.

NAME _____ DATE _____ PERIOD _____

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The agency should pay the temporary worker \$123.25 before taxes.

Solve.

1. Calculate how much an agency should pay a temporary employee who works $27\frac{1}{2}$ hours and earns \$9.50 per hour. **\$261.25**

2. Calculate how much an agency should pay a temporary employee who works $37\frac{1}{2}$ hours and earns \$11.50 per hour. **\$431.25**

3. A temporary employee who works $15\frac{1}{2}$ hours earns \$162.75. Calculate the temporary's hourly rate. **\$10.50**

3-6

Real-Life Career Activity

Virtual Reality Designer

Virtual reality is a place or an environment entirely generated by a computer. To enter a virtual reality environment, you wear a helmet connected to the computer or enter a virtual reality booth. Virtual reality designers use two- and three-dimensional sets of coordinates to draw their designs.

Imagine you are playing a virtual reality game. You appear to be standing on a coordinate plane at the origin (0, 0). The game designer wants you to see a female player standing at point (16, 12). The designer must have the computer calculate how far away the player appears to be from you and then draw her to the correct size. The farther away she is, the smaller the computer must draw her. The designer programs the computer to use the Pythagorean Theorem to calculate how many units away the player is standing from you.

$$\begin{aligned} \text{distance} &= \sqrt{16^2 + 12^2} \\ &= \sqrt{400} \\ &= 20 \end{aligned}$$

The computer draws the player so that she appears to be 20 units away from you.

Solve.

1. A third player joins the game. He appears to be standing at $(-6, -8)$. How many units away from you should he appear to be?

2. A fourth player joins the game. She appears to be standing at $(-9, 12)$. How many units away from you should she appear to be?

3. If you begin to move in the direction of the positive x-axis, which player will you be moving toward?

NAME _____ DATE _____ PERIOD _____

3-6 Real-Life Career Activity

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The computer draws the player so that she appears to be 20 units away from you.

Solve.

1. A third player joins the game. He appears to be standing at (−6, −8). How many units away from you should he appear to be? **10 units**

2. A fourth player joins the game. She appears to be standing at (−9, 12). How many units away from you should she appear to be? **15 units**

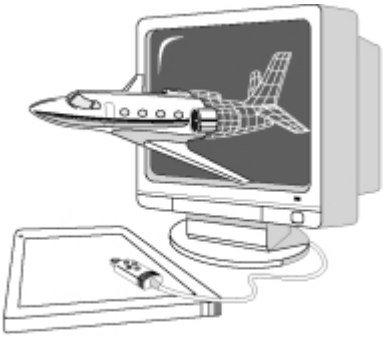
3. If you begin to move in the direction of the positive x-axis, which player will you be moving toward? **the female player at (16, 12)**

NAME _____ DATE _____ PERIOD _____

4-8

Real-Life Career Activity

Computer Game Artist



Computer game artists must not only be good artists, but also know how to use computer graphics applications. As computer technology continues to develop, artists must constantly learn to use new applications and other technology to help them draw more complex graphics with less effort. Computer game artists must be able to accurately follow the plans of game designers while working under tight deadlines in what is often a hectic environment.

Suppose an artist draws a window with corners at (1, 1), (5, 1), (1, 5), and (5, 5). The artist wants to show how the window will appear when a character in the game moves toward the window. The window is dilated with a scale factor of 2. To find the locations of the new corners of the window, the artist multiplies each corner coordinate by 2.

$$(1, 1) \rightarrow (2 \cdot 1, 2 \cdot 1) \rightarrow (2, 2)$$

$$(5, 1) \rightarrow (2 \cdot 5, 2 \cdot 1) \rightarrow (10, 2)$$

$$(1, 5) \rightarrow (2 \cdot 1, 2 \cdot 5) \rightarrow (2, 10)$$

$$(5, 5) \rightarrow (2 \cdot 5, 2 \cdot 5) \rightarrow (10, 10)$$

The new corners of the window are at (2, 2), (10, 2), (2, 10), and (10, 10).

An artist draws a door with corners at (1, 2), (9, 2), (1, 8), and (9, 8). The artist wants to show how the door will appear when a character in the game moves toward or away from the door.

1. Calculate the locations of the new corners of the door for a scale factor of $\frac{1}{2}$.

2. Calculate the locations of the new corners of the door for a scale factor of 2.

3. The new corners of the door are at $\left(\frac{1}{4}, \frac{1}{2}\right)$; $\left(2\frac{1}{4}, \frac{1}{2}\right)$; $\left(\frac{1}{4}, 2\right)$; and $\left(2\frac{1}{4}, 2\right)$. What is the scale factor?

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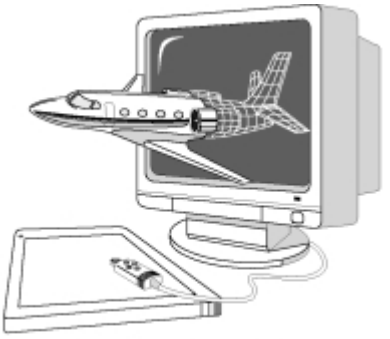
4-8 Real-Life Career Activity

Computer Game Artist



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$(1, 1) \rightarrow (2 \cdot 1, 2 \cdot 1) \rightarrow (2, 2)$

$(5, 1) \rightarrow (2 \cdot 5, 2 \cdot 1) \rightarrow (10, 2)$

$(1, 5) \rightarrow (2 \cdot 1, 2 \cdot 5) \rightarrow (2, 10)$

$(5, 5) \rightarrow (2 \cdot 5, 2 \cdot 5) \rightarrow (10, 10)$

The new corners of the window are at (2, 2), (10, 2), (2, 10), and (10, 10).

An artist draws a door with corners at (1, 2), (9, 2), (1, 8), and (9, 8). The artist wants to show how the door will appear when a character in the game moves toward or away from the door.

1. Calculate the locations of the new corners of the door for a scale factor of $\frac{1}{2}$.

$\left(\frac{1}{2}, 1\right)$, $\left(4\frac{1}{2}, 1\right)$, $\left(\frac{1}{2}, 4\right)$, and $\left(4\frac{1}{2}, 4\right)$

2. Calculate the locations of the new corners of the door for a scale factor of 2.

(2, 4), (18, 4), (2, 16), and (18, 16)

3. The new corners of the door are at $\left(\frac{1}{4}, \frac{1}{2}\right)$; $\left(2\frac{1}{4}, \frac{1}{2}\right)$; $\left(\frac{1}{4}, 2\right)$; and $\left(2\frac{1}{4}, 2\right)$.

What is the scale factor? $\frac{1}{4}$

NAME _____ DATE _____ PERIOD _____

5-2

Real-Life Career Activity

Statistician

The Benson School District superintendent asked the cafeteria managers at the three schools in her district to determine what kind of food the students like. A group of students at each school was asked if they liked pizza, hot dogs, tacos, and hamburgers. The superintendent received these results of the survey:

Elementary School: 3 of every 4 students said they like pizza.
3 of every 5 students said they like hot dogs.
4 of every 7 students said they like tacos.
1 of every 6 students said they like hamburgers.

Middle School: 5 of every 6 students said they like pizza.
4 of every 5 students said they like hot dogs.
1 of every 3 students said they like tacos.
1 of every 9 students said they like hamburgers.

High School: 2 of every 3 students said they like pizza.
7 of every 12 students said they like hot dogs.
3 of every 10 students said they like tacos.
2 of every 9 students said they like hamburgers.

Solve. Write each answer as a whole number, a fraction, a decimal, and a percent. Round decimals to the nearest hundredths place if necessary.

1. There were 420 students surveyed at the elementary school. How many elementary students liked each food?

a. pizza **b.** hot dogs

c. tacos **d.** hamburgers

2. There were 90 students surveyed at the middle school. How many middle school students liked each food?

a. pizza **b.** hot dogs

c. tacos **d.** hamburgers

3. There were 180 students surveyed at the high school. How many high school students liked each food?

a. pizza **b.** hot dogs

c. tacos **d.** hamburgers

NAME _____ DATE _____ PERIOD _____

5-2 Real-Life Career Activity

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1 of every 6 students said they like hamburgers.

Middle School: 5 of every 6 students said they like pizza.
4 of every 5 students said they like hot dogs.
1 of every 3 students said they like tacos.
1 of every 9 students said they like hamburgers.

High School: 2 of every 3 students said they like pizza.
7 of every 12 students said they like hot dogs.
3 of every 10 students said they like tacos.
2 of every 9 students said they like hamburgers.

Solve. Write each answer as a whole number, a fraction, a decimal, and a percent. Round decimals to the nearest hundredths place if necessary.

1. There were 420 students surveyed at the elementary school. How many elementary students liked each food?

a. pizza **315, $\frac{3}{4}$, 0.75, 75%** **b.** hot dogs **252, $\frac{3}{5}$, 0.6, 60%**

c. tacos **240, $\frac{4}{7}$, 0.57, 57%** **d.** hamburgers **70, $\frac{1}{6}$, 0.17, 17%**

2. There were 90 students surveyed at the middle school. How many middle school students liked each food?

a. pizza **75, $\frac{5}{6}$, 0.83, 83%** **b.** hot dogs **72, $\frac{4}{5}$, 0.8, 80%**

c. tacos **30, $\frac{1}{3}$, 0.33, 33%** **d.** hamburgers **10, $\frac{1}{9}$, 0.11, 11%**

3. There were 180 students surveyed at the high school. How many high school students liked each food?

a. pizza **120, $\frac{2}{3}$, 0.67, 67%** **b.** hot dogs **105, $\frac{7}{12}$, 0.58, 58%**

c. tacos **54, $\frac{3}{10}$, 0.3, 30%** **d.** hamburgers **40, $\frac{2}{9}$, 0.22, 22%**

6-8

Real-Life Career Activity

Animator

Although today's animators are generally skilled at drawing by hand, most animators draw using computer software. They must not only be good artists, but must also know how to use computer graphics and animation software. As computer software improves, animators must master it to help them create better animation sequences efficiently.

Suppose an animator draws a van parked by a lake. The corners of the van are at coordinates (1, 1), (5, 1), (1, 12), and (5, 12). The animator wants to show the van reflected in the water of the lake. To find the coordinates of the reflection, the animator multiplies each y-coordinate by -1.

(1, 1), (5, 1), (1, 12), and (5, 12), reflected over the x-axis are (1, -1), (5, -1), (1, -12), and (5, -12).

The coordinates of the van's reflection are (1, -1), (5, -1), (1, -12), and (5, -12).

Solve.

1. The van moves so that its corners are at coordinates (-2, 1), (2, 1), (-2, 12), and (2, 12). Calculate the coordinates of the van's reflection in the lake.

2. The van moves so that its corners are at (-2, 7), (2, 7), (-2, 18), and (2, 18). Calculate the coordinates of the van's reflection in the lake.

3. The corners of a park bench are at (8, 7), (12, 7), (8, 18), and (12, 18). Identify which of the following coordinates cannot be a coordinate of the bench's reflection in the lake: (8, -7), (-12, 7), (8, -18), and (12, -18).

NAME _____ DATE _____ PERIOD _____

6-8 Real-Life Career Activity

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The coordinates of the van's reflection are (1, -1), (5, -1), (1, -12), and (5, -12).

Solve.

1. The van moves so that its corners are at coordinates (-2, 1), (2, 1), (-2, 12), and (2, 12). Calculate the coordinates of the van's reflection in the lake. **(-2, -1), (2, -1), (-2, -12), and (2, -12)**

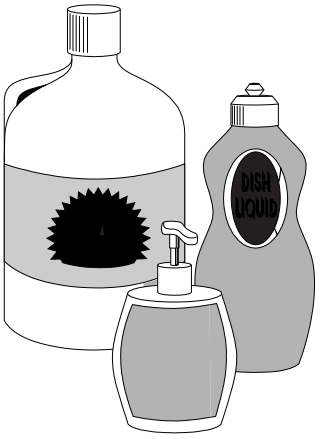
2. The van moves so that its corners are at (-2, 7), (2, 7), (-2, 18), and (2, 18). Calculate the coordinates of the van's reflection in the lake. **(-2, -7), (2, -7), (-2, -18), and (2, -18)**

3. The corners of a park bench are at (8, 7), (12, 7), (8, 18), and (12, 18). Identify which of the following coordinates cannot be a coordinate of the bench's reflection in the lake: (8, -7), (-12, 7), (8, -18), and (12, -18). **(-12, 7)**

7-7

Real-Life Career Activity

Packaging Designer



Packaging designers create containers for consumer goods. Some factors the designer considers in creating the containers are: the type of product the container will hold, whether the product needs protection from sunlight or heat, and whether the container should be hard or soft. Packaging designers also consider how to label the container based on the type of product being packaged. For some products, the label should be colorful and appealing. For others, the label should be plain or contain a safety warning in large type that is easy to read.

The packaging designer must base the size of the label on the size of the container. The designer can use area formulas to calculate the surface area of the container.

Suppose the designer is making labels for cylindrical cans. The designer can use the formula below to calculate the area of the curved surface of the can. The labels will have the same area as the curved surface of the can and will not overlap at the seams. Most cans have no labeling at the top or bottom, so the designer will consider only the curved surface.

$$\text{area} = 2\pi rh$$

In this formula, r is the radius of the can, and h is the height of the can.

Suppose a designer must make a label for a can with radius 1.5 inches and height 5 inches. What is the area of the label rounded to the nearest whole number?

$$\text{area} = 2 \times \pi \times 1.5 \times 5$$

$$= 2 \ \boxed{\times} \ \boxed{\pi} \ \boxed{\times} \ 1.5 \ \boxed{\times} \ 5 \ \boxed{=} \ 47.1238898$$

The label has an area of about 47 square inches.

Solve. Round to the nearest whole number.

1. Calculate the area of the label for a can with radius 4 inches and height 8 inches.

2. Calculate the area of the label for a barrel with radius 10 inches and height 36 inches.

3. Find the radius of the label for a drum with area 6,786 square inches and height 60 inches.

NAME _____ DATE _____ PERIOD _____

7-7 Real-Life Career Activity

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The label has an area of about 47 square inches.

Answers were calculated using the π key on a calculator and then rounded.

Solve. Round to the nearest whole number.

1. Calculate the area of the label for a can with radius 4 inches and height 8 inches.

201 square inches

2. Calculate the area of the label for a barrel with radius 10 inches and height 36 inches.

2,262 square inches

3. Find the radius of the label for a drum with area 6,786 square inches and height 60 inches.

18 inches

8-7

Real-Life Career Activity

Consumer Safety Inspector

Consumer safety inspectors inspect items such as food, animal feeds, pesticides, cosmetics, and pharmaceuticals. Inspectors visit manufacturing facilities that produce, handle, store, or market consumer products. Part of their job is to ensure that products are labeled correctly and that weights and contents are accurate. They also check for contamination that could have resulted from unsterilized processing equipment or unsanitary food handling.

The health laws that inspectors follow were created to protect consumers. The laws were written from information gathered in studies using samples and populations. For example, a law could state that only 1% of a sample of cereal boxes may be underweight for the boxes to pass inspection. The inspector checks a random sample of cereal boxes and calculates what percent of the sample is underweight.

Suppose an inspector checks the weight of 200 boxes of cereal in a sample. One box is lighter than it should be. What percent of the sample is too light?

$$\frac{1}{200} = 0.005 \text{ or } 0.5\%$$

Of the sample, 0.5% are too light. Therefore, the cereal boxes pass inspection.

Solve.

1. Calculate what percent of a sample is contaminated if 3 candy bars out of a sample of 500 are contaminated.

2. Calculate what percent of a sample is contaminated if 2 gallons of milk out of a sample of 800 are contaminated.

3. One percent of a sample of 1,200 cans of beans did not pass inspection. How many cans of beans did not pass inspection?

NAME _____ DATE _____ PERIOD _____

8-7 Real-Life Career Activity

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Of the sample, 0.5% are too light. Therefore, the cereal boxes pass inspection.

Solve.

1. Calculate what percent of a sample is contaminated if 3 candy bars out of a sample of 500 are contaminated. **0.006 = 0.6%**

2. Calculate what percent of a sample is contaminated if 2 gallons of milk out of a sample of 800 are contaminated. **0.0025 = 0.25%**

3. One percent of a sample of 1,200 cans of beans did not pass inspection. How many cans of beans did not pass inspection? **12**

9-4

Real-Life Career Activity

Climatologist

Climatologists study climate and weather patterns and make summaries from these patterns. The information in these summaries can be used in the design of heating and cooling systems, and sometimes in the design of entire buildings. For example, a building in an area with lots of snow needs to have a more powerful heating system than a building in an area with no snow.

Climatologists use terms such as mean, median, and mode in their climate summaries. Suppose a climatologist wants to find the mean, median, and mode for this set of temperatures.

15°, 17°, 19°, 21°, 21°, 22°, 22°, 22°, 24°, 27°

$$\text{mean} = \frac{15 + 17 + 19 + 21 + 21 + 22 + 22 + 22 + 24 + 27}{10}$$

$$= 21°$$

$$\text{median} = \frac{21 + 22}{2}$$

$$= 21.5°$$

$$\text{mode} = 22°$$

The mean temperature is 21°, the median is 21.5°, and the mode is 22°.

Calculate the mean, median, and mode of each set of temperatures.

1. 51°, 55°, 58°, 59°, 62°, 63°, 63°, 63°, 66°, 70°

2. 0°, 5°, 8°, 9°, 12°, 12°, 13°, 14°, 16°, 17°

3. 50°, 51°, 52°, 52°, 53°, 53°, 53°, 53°, 56°, 57°

NAME _____ DATE _____ PERIOD _____

9-4 Real-Life Career Activity

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$$= 21°$$

$$\text{median} = \frac{21 + 22}{2}$$

$$= 21.5°$$

$$\text{mode} = 22°$$

The mean temperature is 21°, the median is 21.5°, and the mode is 22°.

Calculate the mean, median, and mode of each set of temperatures.

1. 51°, 55°, 58°, 59°, 62°, 63°, 63°, 63°, 66°, 70°

mean = 61°; median = 62.5°; mode = 63°

2. 0°, 5°, 8°, 9°, 12°, 12°, 13°, 14°, 16°, 17°

mean = 10.6°; median = 12°; mode = 12°

3. 50°, 51°, 52°, 52°, 53°, 53°, 53°, 53°, 56°, 57°

mean = 53°; median = 53°; mode = 53°

10-5

Real-Life Career Activity

Purchasing Manager

Purchasing managers buy supplies for their companies. They are responsible for knowing what supplies the company needs and how much money they have available to buy supplies. Purchasing managers compare the prices of supplies from various manufacturers to make sure they are getting the best deal. These managers use math so that they do not spend more money than they have available in their budgets.

Suppose a purchasing manager wants to buy chairs for an office. The manager can use the inequality below to calculate how many chairs to buy.

$$cn \leq t$$

In this formula, c is the cost of each item, n is the number of items the manager can buy within the budgeted amount, and t is the total money budgeted for this item.

Suppose the purchasing manager has a budget of $5,000 for chairs. The manufacturer sells the chairs for $75 each. How many chairs can the manager order?

$$75n \leq 5{,}000$$

$$n \leq 5{,}000 \div 75$$

$$n \leq 66.667$$

The purchasing manager can order 66 chairs.

Solve.

1. Calculate the number of coffee machines a purchasing manager can order with a budget of $2,500, if each machine costs $13.45.

2. Calculate the number of dictionaries a purchasing manager can order with a budget of $3,500, if each dictionary costs $18.05.

3. A purchasing manager ordered 430 staplers, each costing $4.65. Calculate how much money the purchasing manager had to spend on staplers.

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10-5 Real-Life Career Activity

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Suppose the purchasing manager has a budget of $5,000 for chairs. The manufacturer sells the chairs for $75 each. How many chairs can the manager order?

$$75n \leq 5{,}000$$

$$n \leq 5{,}000 \div 75$$

$$n \leq 66.667$$

The purchasing manager can order 66 chairs.

Solve.

1. Calculate the number of coffee machines a purchasing manager can order with a budget of $2,500, if each machine costs $13.45. **185**

2. Calculate the number of dictionaries a purchasing manager can order with a budget of $3,500, if each dictionary costs $18.05. **193**

3. A purchasing manager ordered 430 staplers, each costing $4.65. Calculate how much money the purchasing manager had to spend on staplers. **The staplers cost $1,999.50, so the manager most likely had $2,000.**

NAME _____ DATE _____ PERIOD _____

11-3

Real-Life Career Activity

Electrician

The electric company charges you for the amount of electricity that you use. It is measured in units called **kilowatt hours.** If you know the price per kilowatt hour, then you can make a **function table.** The input will be the amount of electricity used per hour, and the output will be the cost per hour. If the electric company charges 9 cents per kilowatt hour (kWh), the function table is as follows:

Function Rule: $f(x) = 0.09x$

Input (x) (kWh)		Output ($0.09x$) ($ per hour)
Clothes Dryer	4.00	$0.36
Clothes Washer	0.25	
Stereo	0.10	
Color Television	0.23	
Microwave Oven	1.50	
Water Heater	16.00	
Vacuum Cleaner	0.75	
Water Bed	3.80	
Refrigerator	5.50	

1. Compute the output for the function table above.

Select the three most expensive appliances and make a function table to show the cost of running each for different lengths of time.
The input will be: h = hours appliance is used.
The output will be: f(h) = cost per hour × h. (The cost per hour comes from the table above.)
Use input values of 1, 2, 3, 4, 8, and 168 hours (1 full week).
Write the name of each appliance after the exercise number.

2. Water Heater

$f(h) = \$1.44 \times h$

h	total cost
1	$1.44
2	
3	
4	
8	
168	

3.

$f(h) = \qquad \times h$

h	total cost
1	
2	
3	
4	
8	
168	

4.

$f(h) = \qquad \times h$

h	total cost
1	
2	
3	
4	
8	
168	

5. Choose an appliance and graph the cost of running it for 2, 4, 6, 8, 10, 12, 14, 16, 18, and 20 hours. Use a separate sheet of paper.

NAME _____ DATE _____ PERIOD _____

11-3 Real-Life Career Activity

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Function Rule: $f(x) = 0.09x$

Input (x) (kWh)		Output ($0.09x$) ($ per hour)
Clothes Dryer	4.00	$0.36
Clothes Washer	0.25	$0.02
Stereo	0.10	$0.01
Color Television	0.23	$0.02
Microwave Oven	1.50	$0.14
Water Heater	16.00	$1.44
Vacuum Cleaner	0.75	$0.07
Water Bed	3.80	$0.34
Refrigerator	5.50	$0.50

1. Compute the output for the function table above.

Select the three most expensive appliances and make a function table to show the cost of running each for different lengths of time. The input will be: h = hours appliance is used. The output will be: f(h) = cost per hour × h. (The cost per hour comes from the table above.) Use input values of 1, 2, 3, 4, 8, and 168 hours (1 full week). Write the name of each appliance after the exercise number.

2. Water Heater

$f(h) = \$1.44 \times h$

h	total cost
1	$1.44
2	$2.88
3	$4.32
4	$5.76
8	$11.52
168	$241.92

3. Refrigerator

$f(h) = \$0.50 \times h$

h	total cost
1	$0.50
2	$1.00
3	$1.50
4	$2.00
8	$4.00
168	$84.00

4. Clothes Dryer

$f(h) = \$0.36 \times h$

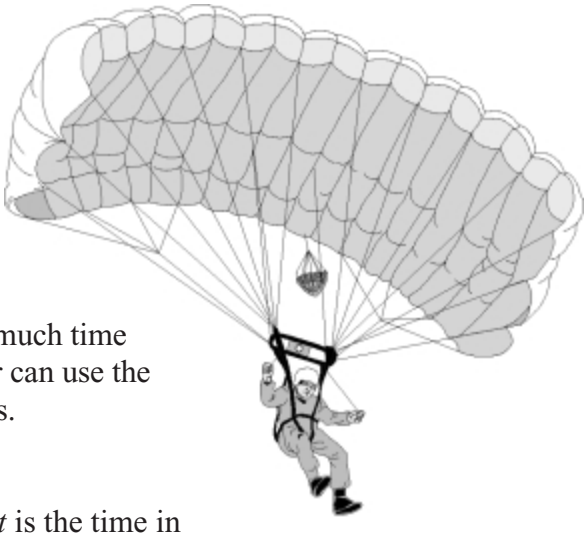
h	total cost
1	$0.36
2	$0.72
3	$1.08
4	$1.44
8	$2.88
168	$60.48

5. Choose an appliance and graph the cost of running it for 2, 4, 6, 8, 10, 12, 14, 16, 18, and 20 hours. Use a separate sheet of paper. See students' work.

12-3

Real-Life Career Activity

Skydiver



Skydiving teams, such as the United States Army's "Golden Knights," perform aerial demonstrations around the world. They also compete at national and international skydiving competitions. Many of the exhibition dives require exciting formation freefalls.

To plan formation falls, skydivers must calculate how much time they have in freefall. Ignoring air resistance, a skydiver can use the formula below to calculate the distance fallen in meters.

$$d = 4.9t^2$$

In this formula, d is the distance fallen in meters, and t is the time in seconds during which the freefall occurs.

Suppose a skydiver freefalls for 10 seconds. What distance d does the skydiver freefall during that time?

$$d = 4.9 \times 10^2$$
$$= 490$$

The skydiver freefalls 490 meters in 10 seconds.

Solve.

1. The United States Parachute Association issues a basic "A License" to persons who have completed, among other things, at least three 40-second freefalls. What distance would a skydiver drop during a 40-second freefall? What is the total distance needed to qualify for the "A License"?

2. To earn an intermediate "B License," skydivers must complete at least three 45-second freefalls. What distance would a skydiver drop during a 45-second freefall? What is the total distance needed to qualify for the "B License"?

3. To earn an intermediate "D License," skydivers must complete at least ten 60-second freefalls. What distance would a skydiver drop during a 60-second freefall? What is the total distance needed to qualify for the "D License"?

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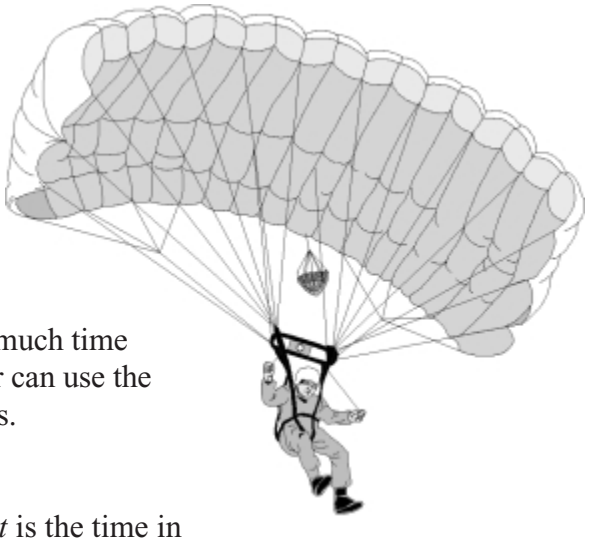
12-3 Real-Life Career Activity

Skydiver



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Solve.

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2. To earn an intermediate "B License," skydivers must complete at least three 45-second freefalls. What distance would a skydiver drop during a 45-second freefall? What is the total distance needed to qualify for the "B License"? **9,922.5 m each; 29,767.5 m total**

3. To earn an intermediate "D License," skydivers must complete at least ten 60-second freefalls. What distance would a skydiver drop during a 60-second freefall? What is the total distacne needed to qualify for the "D License"? **17,640 m each; 176,400 m total**