

Beginning-of-Course Diagnostic Test

For Exercises 1–2, write the value of the underlined digit.

1. 842,976 2. 761.0325
3. Write seven and ninety-six thousandths as a decimal.
4. Write 9.204 in words.
5. Write 0.000073 in words.

For Exercises 6–7, use $<$, $>$, or $=$ to compare the decimals.

6. 0.008 ? 0.06
7. 0.000307 ? 0.003007

For Exercises 8–11, write the decimals in order from least to greatest.

8. 7.21 0.712 72.1 0.721
9. 0.01010 0.10101 0.01001 0.00101
10. Round 15,763 to the nearest thousand.
11. Round 96.853 to the nearest tenth.

For Exercises 12–13, round to the place of the underlined digit.

12. 123.9847
13. 147.48

For Exercises 14–17, find each sum or difference.

14.
$$\begin{array}{r} 76.87 \\ - 45.91 \\ \hline \end{array}$$
15.
$$\begin{array}{r} 21.283 \\ + 9.72 \\ \hline \end{array}$$
16. $9 - 3.245$
17. $1.309 + 2.46 + 2.6$

For Exercises 18–24, multiply or divide.

18.
$$\begin{array}{r} 38.6 \\ \times 0.4 \\ \hline \end{array}$$
19. $0.0027 \cdot 0.04$
20. $16.8 \div 4$
21. $7,354 \div 0.01$
22. $5.697 \times 10,000$
23. $3.813 \div 4.1$
24. $0.002847 \div 0.73$

For Exercises 25–26, write each improper fraction as a mixed number.

25. $\frac{11}{3}$
26. $\frac{48}{11}$

For Exercises 27–28, write each mixed number as an improper fraction.

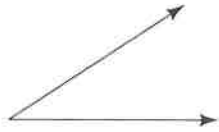
27. $6\frac{4}{7}$
28. $9\frac{1}{8}$

For Exercises 29–32, add or subtract. Write each answer in simplest form.

29. $\frac{9}{12} + \frac{5}{12}$
30. $\frac{7}{14} - \frac{5}{14}$
31. $6\frac{3}{8} + 8\frac{5}{8}$
32. $9\frac{8}{10} - 7\frac{3}{10}$

For Exercises 33–34, measure each angle. Classify it as *acute*, *right*, *obtuse*, or *straight*.

33.



34.

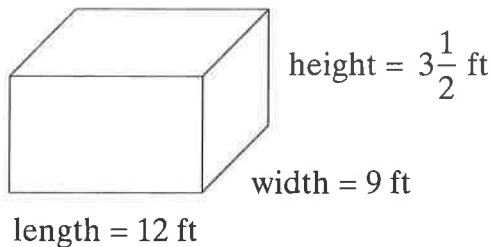


For Exercises 35–36, draw an angle with the given measure.

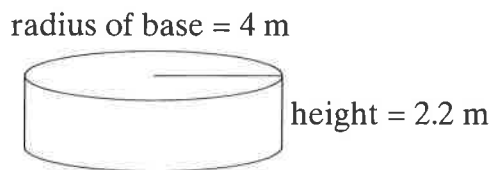
35. 75°

36. 130°

37. Find the volume of the rectangular prism.



38. Find the volume of the cylinder.



39. Draw a line graph for the data below.

Forest Service Expenditures for Emergency Fire Suppression

Year	Cost Per Acre Burned
1	\$388.40
2	\$740.65
3	\$545.45
4	\$818.71
5	\$487.56
6	\$623.08
7	\$575.87
8	\$932.54
9	\$376.12
10	\$640.03
11	\$716.67
12	\$976.86

40. Draw a double line graph for the data below.

Average Temperatures

Month	Avg. High (°F)	Avg. Low (°F)
January	61	43
February	64	45
March	70	52
April	76	58
May	83	66
June	89	72
July	91	75
August	90	74
September	87	70
October	79	60
November	70	51
December	63	45

Draw a Picture

When to Use This Strategy Some word problems are hard to solve mentally. In such cases, you can *Draw a Picture* of the problem.

The tail of a kite steadies the kite in the air. One of the longest kites is a Chinese dragon kite. The length of one dragon kite, including its tail, is 21 ft. If the tail is 15 ft longer than the kite body, how long is the body of the kite?

Understand

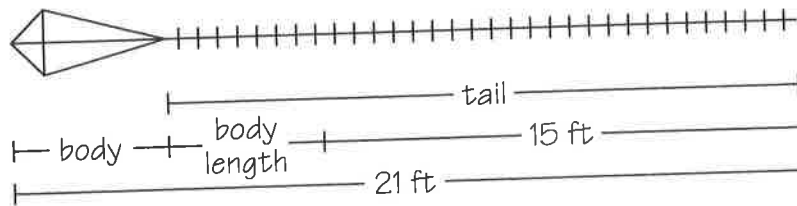
The combined length of the kite tail and body is 21 ft. The tail is 15 ft longer than the kite body. The goal is to find the length of the kite body.

Plan

Draw a Picture to show that the kite with its tail is 21 ft long and the tail is 15 ft longer than the body.

Carry Out

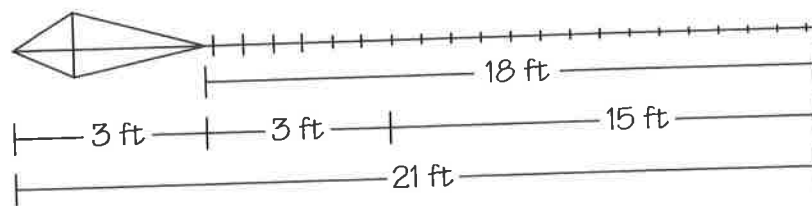
The diagram shows that the total length of 21 ft is equal to 15 ft plus two body lengths.



Subtracting 15 ft from 21 ft results in 6 ft, which is twice the body length. The kite's body length is 3 ft.

Check

If the body is 3 ft, then the length of the tail is $3 \text{ ft} + 15 \text{ ft} = 18 \text{ ft}$. The length of the kite is then $3 \text{ ft} + 18 \text{ ft} = 21 \text{ ft}$. The answer checks.



Practice

1. Your aunt is building a garden in her backyard. She has 90 ft of fencing to surround it. If she wants the length to be 15 feet longer than the width, what should the dimensions of her garden be?
2. You bike 32 mi in two days. On the second day, you bike 9 mi more than on the first day. How many miles do you bike each day?
3. **Multiple Choice** If you have 20 yards of ribbon and need to cut it into 2-yard lengths, how many cuts do you have to make?
 - A. 5 cuts
 - B. 9 cuts
 - C. 10 cuts
 - D. 12 cuts
4. A bricklayer is removing a rectangular section of a square patio. The patio is 25 feet long by 25 feet wide. She needs to remove a $6\text{ ft} \times 7\text{ ft}$ section. What is the area of the patio after the square section is removed?
5. Look at the figures below.



Figure 1



Figure 2

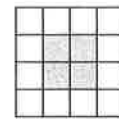
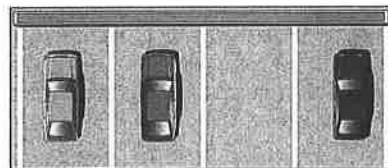


Figure 3

How many white squares will figure 13 have?

6. The boss of a company drives the yellow car and always gets the parking space all the way to the left, as shown.



In how many ways can the owners of the green and red cars park in the other spaces? *Hint: One possibility is shown.*

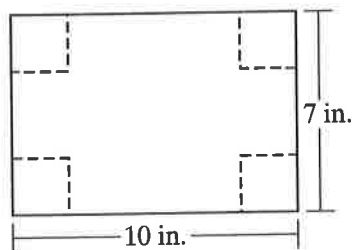
Make a Table

When to Use This Strategy You can *Make a Table* to help you keep track of possible solutions to a problem. A table can help you organize your data and compare solutions.

A company makes boxes without tops by cutting square corners out of the corners of rectangular sheets of cardboard. Each rectangular sheet is 7 in. by 10 in. Using whole-inch lengths only, find the dimensions of the box with the greatest possible volume.

Understand

The goal is to find the dimensions of a box that will result in the greatest volume.



The piece of cardboard used to make the box is 7 in. by 10 in.

Plan

Make a Table to organize the information in the problem. Start with square cuts 1 in. on each side. Then increase the size 1 in. at a time.

Carry Out

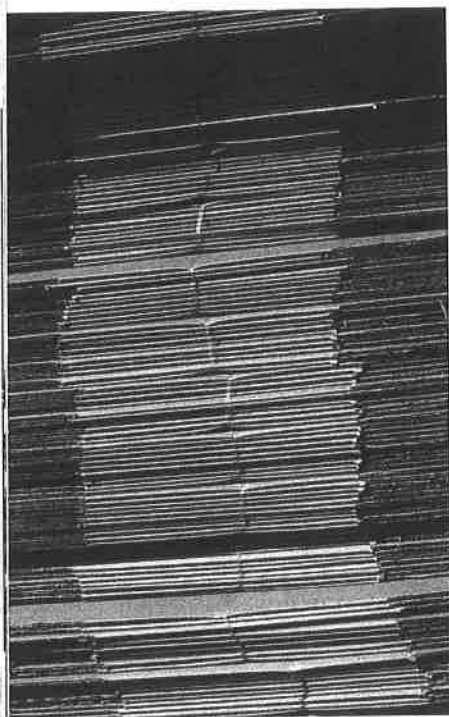
Let x represent the size of the squares. The length of the box is represented by $10 - 2x$. The width of the box is represented by $7 - 2x$. The expression $x(10 - 2x)(7 - 2x)$ represents volume.

Height (Size of Cut) x	Length $10 - 2x$	Width $7 - 2x$	Volume $x(10 - 2x)(7 - 2x)$
1 in.	8 in.	5 in.	40 in.^3
2 in.	6 in.	3 in.	36 in.^3
3 in.	4 in.	1 in.	12 in.^3

As the size of the square cut increases, the volume decreases. Square cuts of 1 in. result in the maximum volume of 40 in.^3 .

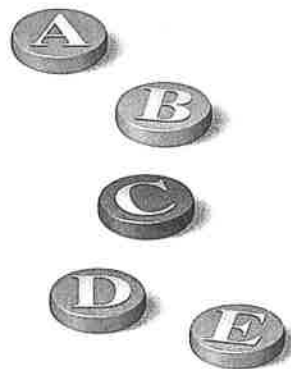
Check

A value of 4 for x makes the expression $(7 - 2x)$ negative, which is an impossible value for length. The possible lengths are 1, 2, and 3 in.



● Practice

- 1. Multiple Choice** A dog owner has 200 ft of fencing and wants to enclose the greatest possible rectangular area for her dog. What dimensions should she use?
 - A. 15 ft by 85 ft
 - B. 25 ft by 75 ft
 - C. 30 ft by 70 ft
 - D. 50 ft by 50 ft
- A customer gives a cashier a \$100 bill for a \$64 shirt. The customer will accept no more than six \$1 bills. In what ways can the cashier give change using bills only? Assume that the cashier has no \$2 bills.
- A family drives 86 miles on their first day of vacation. Each day after that, they drive $1\frac{1}{2}$ times as many miles as the previous day.
 - a. On which day will they travel approximately 435 miles?
 - b. How many total miles will they travel in the first 4 days?
- A bag contains the following letter tiles. How many different 3-letter combinations are possible?



- A ball is dropped from a height of 2 feet and it bounces. The rebound height decreases by $\frac{1}{2}$ after each bounce.
 - a. How high does it bounce on its 3rd bounce?
 - b. How many total inches upward has the ball traveled after its fifth bounce?

Write an Equation

When to Use This Strategy You can *Write an Equation* when a real-world situation involves two related variables.

You plan a party at a restaurant. A buffet dinner costs \$15 per person. For dessert, you plan to buy a birthday cake for \$30. You have \$275 to spend. How much will you have left if there are 16 people at the party?

Understand

Your goal is to find out how much money you will have left out of \$275. You must spend \$15 for each person plus an additional \$30 for the cake.

Plan

Write an Equation to represent the total cost of the party. Subtract the total cost from \$275 to see how much money you will have left.

Carry Out Write an equation to represent the total cost.

Words total cost is cost per person times number of people plus cost of cake



Let t = the total cost.

Equation Let p = the number of people.

$$t = 15 \cdot p + 30$$
$$t = 15p + 30$$

Substitute 16 for p .

This gives $t = 15 \cdot 16 + 30 = 240 + 30 = 270$.

Now subtract the total cost from \$275.

This gives $\$275 - \$270 = \$5$.

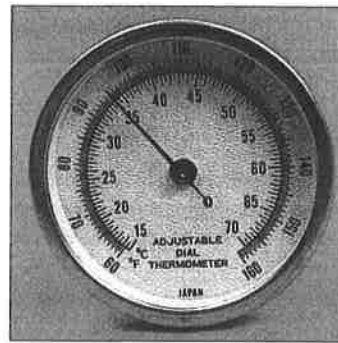
Check

Estimate. The cost for 20 people would be $\$300 + \$30 = \$330$, which is more than \$270. Similarly, the cost for 10 people would be $\$150 + \$30 = \$180$, which is less than \$270. A cost of \$270 is reasonable.



● Practice

- 1. Multiple Choice** Multiple Choice You buy a belt for \$10 and some socks. Each pair of socks costs \$3. The total shipping cost is \$3. What is the total cost if you buy 11 pairs of socks?
A. \$36
B. \$43
C. \$46
D. \$50
- 2.** You mix 8 oz of concentrate with 64 oz of water to make orange juice. If you need a total of 288 oz of juice, how much concentrate should you buy?
- 3.** An oven preheats at 15 degrees per minute. Every time the oven door is opened, it loses 5 degrees. If the oven door is opened three times during preheating, how long will it take for it to reach 375 degrees?



- 4.** A courier service ships packages at a cost of \$49.99 for the first 45 pounds. It costs an additional \$.79 for each additional pound plus a one time \$5 fee. The weight of a package is shown below.



How much will it cost to ship this package?

- 5.** A store is selling hats for \$12.50 each and gloves for \$17.95 a pair. How much will it cost to buy 4 hats and 5 pairs of gloves?