

LESSON  
3.4

## Using Formulas



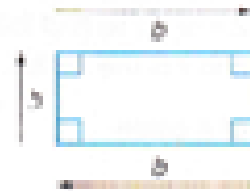
**Example:** Find the perimeter ( $P$ ) of the rectangle shown below.

The variable  $h$  represents the height of the rectangle.



The variable  $b$  represents the base of the rectangle.

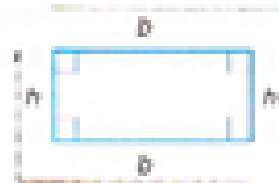
- One way to find the perimeter of the rectangle is to find the sum of the lengths of the sides.



The variable  $P$  represents the perimeter of the rectangle.

$$P = b + h + b + h$$

- Another way is to find the distance halfway around the rectangle and multiply that distance by 2.



$$P = 2 \cdot (b + h)$$

$$P = 2b + 2h$$

$$P = 2(b + h)$$

Use the formula  $P = 2 \cdot (b + h)$  to find the perimeter of a rectangle if  $b = 8.5$  inches and  $h = 4.5$  inches.

### Solution Strategy

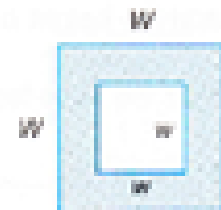
Estimate:  $2 \cdot (9 \text{ in.} + 5 \text{ in.}) = 2 \cdot 14 \text{ in.} = 28 \text{ in.}$

$$\begin{aligned} P &= 2 \cdot (b + h) \\ &= 2 \cdot (8.5 \text{ in.} + 4.5 \text{ in.}) \\ &= 2 \cdot (13 \text{ in.}) \\ &= 26 \text{ in.} \\ P &= 26 \text{ in.} \end{aligned}$$

$$\begin{aligned} b &= 8.5 \text{ in} \\ h &= 4.5 \text{ in} \end{aligned}$$



- The area of the shaded region between the two squares in the diagram can be found by using the formula  $A = W^2 - w^2$ . Find the area of the shaded region if  $W = 20$  inches and  $w = 9$  inches.



Be careful! The capital  $W$  and the lowercase  $w$  stand for different lengths.

\_\_\_\_\_ in.<sup>2</sup>

$$A = W^2 - w^2$$

$$A = 20^2 - 9^2$$

$$A = 400 - 81$$

$$A = 319 \text{ inches}^2$$

$$W = 20$$

$$w = 9$$

$$\begin{array}{r} 20 \\ \times 20 \\ \hline 400 \end{array}$$

## 3.4 Using formulas

I can solve a formula.

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# Evaluating Formulas



1. The formula for the area of a parallelogram is  $A = b \cdot h$ . You can use the formula for the area of a parallelogram to construct the formula for the area of a triangle.



Use the formula  $A = \frac{1}{2} \cdot b \cdot h$  to find the area of a triangle with  $b = 4$  cm and  $h = 2.5$  cm.  $A =$  \_\_\_\_\_  $\text{cm}^2$

2. You can use the formula  $C = 2 \cdot \pi \cdot r$  to find the circumference of a circle, where  $C$  is the circumference and  $r$  is the radius.



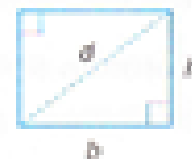
- a. What is the circumference of a circle with a radius of 1 ft? \_\_\_\_\_ ft
- b. What is the circumference of a circle with a radius of 12 in.? \_\_\_\_\_ in.

3. You can use the formula  $c = 1.1 \cdot t$  to find the average number of calories a typical adult uses while lying in bed resting. The variable  $t$  represents the number of minutes a person is resting, and  $c$  is the number of calories used while resting.

- a. How many calories does a resting adult use in 12 minutes? \_\_\_\_\_ (unit)
- b. How many calories does that adult use in 120 seconds? \_\_\_\_\_ (unit)

994  
2, 3, and 4

4. The size of the screen on a television set or computer monitor is reported as its diagonal length. For example, the screen on a 17-inch monitor has a diagonal length of 17 inches.



The two formulas at the right show how the diagonal length  $d$ , the base length  $b$ , and the height  $h$  are related.

$$b = 0.8 \cdot d$$

$$h = 0.6 \cdot d$$

Find the base length and the height of a 21-inch television screen.

- a. base \_\_\_\_\_ (unit)
- b. height \_\_\_\_\_ (unit)

$$\textcircled{1} A = \frac{1}{2}bh \quad b=4$$

$$A = \frac{1}{2}(4)(2.5)$$

$$h=2.5$$

$$A = \frac{1}{2}(10)$$

$$A = 5\text{cm}^2$$

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## "What's My Rule?"

Spiral

370  
-63  
307

Complete each table according to the rule.

1. Rule:  $y = x - 6.3$

$x$	$y$
37	
-15	
	16.5
0	-6.3
	3

①  $y = x - 6.3$   
 $x = 37 \Rightarrow y = 37 - 6.3$   
 $y = 30.7$

2. Rule:  $b = 4 / a$

$a$	$b$
2	
1	
2	
5	
	1
	$\frac{1}{2}$

3. Rule:  $n = 0.5 + m$

$m$	$n$
2	
10	
0.8	
	0.5
	3

4. The formula  $F = (1.8 + C) + 32$  can be used to convert degrees Celsius to degrees Fahrenheit.

Rule:  $F = (1.8 + C) + 32$

$C$	$F$
$5^{\circ}$	
$10^{\circ}$	
$30^{\circ}$	
	$32^{\circ}$
	$33.8^{\circ}$

5. a. State in words the rule for the "What's My Rule?" table at the right.

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- b. Circle the formula that describes the rule.

$t - s = 0$

$t = s + 5$

$s = t + 3t$

$s$	$t$
5	1
25	5
100	20
0	0
1	$\frac{1}{5}$

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## Math Boxes



1. Three special cases of a pattern are given below. Using one variable, write a number sentence to describe the general pattern.

$$4 + 4 - 9 = (2 + 4) - 3^2$$

$$8 + 8 - 9 = (2 + 8) - 3^2$$

$$3.5 + 3.5 - 9 = (2 + 3.5) - 3^2$$

General pattern:

\_\_\_\_\_



2. Evaluate each expression by substituting 0.25 for  $x$ .

a.  $9 - x$  \_\_\_\_\_

b.  $100x$  \_\_\_\_\_

c.  $x / 10$  \_\_\_\_\_

d.  $4x - 12$  \_\_\_\_\_



3. Write in standard notation.

a.  $2^{-3}$  \_\_\_\_\_

b.  $8^{-2}$  \_\_\_\_\_

c.  $2 + 10^{-3}$  \_\_\_\_\_

d.  $8 + 10^{-1}$  \_\_\_\_\_



4. A company president claims that half of the company's employees earn more than \$60,000 per year and half earn less.

Which landmark best represents the situation described above?

Choose the best answer.

range  mode

mean  median



5. Mark and label each fraction on the number line.



a. Point A =  $\frac{1}{2}$

b. Point B =  $\frac{9}{8}$

c. Point C =  $\frac{7}{8}$

d. Point D =  $1\frac{3}{4}$



6. List all the **factors** of each number.

45 \_\_\_\_\_

15 \_\_\_\_\_

Name the greatest common factor (GCF) of 45 and 15.

\_\_\_\_\_



P 95-96  
SL 3.4