

# KEY POINTS

## Section 1.1 Expressions

- Letters are used to represent numbers
- Algebraic expressions represent calculations with numbers
- Algebraic expressions can be read, written, and evaluated
- Terms and factors are used to build expressions
- Recognizing patterns

## Section 1.2 Equations

- What is an equation?
- What is a solution to an equation?
- Writing equations
- What is an identity?
- Using equations to solve problems

# Warm - Up

Section 1.1  
**Expressions**

Write down as many formulas as you can for areas and volumes.

# Share Out

## Section 1.1 Expressions

### Formulas

$$A = \frac{bh}{2}$$

$$A = bh$$

$$V = lwh$$

$$A = \pi r^2$$

$$V = \frac{1}{3}(ab)h$$

$$V = \frac{4}{3}\pi r^3$$

$$V = \pi r^2 h$$

### Characteristics of Expressions

contains variables

Expressions do not have equal signs

Simplified to a different format

Expressions show a process

# Examples

## Section 1.1 Expressions

### Example #1

The formula for body mass index is weight in kilos divided by height, in meters, squared. Write the formula:  $\frac{w}{h^2}$   $\text{K/m}^2$

1. What does the calculation  $\frac{70}{2^2}$  represent?

This represents BMI of a person who weighs 70 kilos and is 2m tall.

2. What is the effect on the body mass index when  $h$  is increased and  $w$  is unchanged?

BMI decreases

3. What is the effect on the body mass index when  $w$  is decreased and  $h$  is unchanged?

BMI decreases

# Examples

## Section 1.1 Expressions

### Example #2

If the tag price on a pair of jeans is  $p$  dollars and the sales tax is 5.6%, how much do you pay?

### Brainstorm!

$$p(5.6)$$

$$(p(.056)) + p$$

### Formulas

$$p + .056p$$

$$p(1 + .056)$$

$$\frac{5.6}{100} = .056$$

# Examples

## Section 1.1 Expressions

### Example #3

Read each of the following expressions and describe to your partner the sequence of operations.

1.  $2(n+1) - 3$

Add 1 to  $n$ , multiply result by 2, subtract 3

2.  $(2n+1) - n$

multiply  $n$  by 2, add 1 to result, subtract  $n$  from result

3.  $2l + w$  and  $2(l + w)$

multiply  $l$  by 2, add  $w$  to the result

add  $w$  to  $l$ , multiply result by 2

4.  $(a+b)^2$  and  $(a^2+b^2)$

add  $b$  to  $a$ , square the result

square  $a$ , square  $b$ , add the results

# Examples

## Example #4

Evaluate  $3x - 4y$  and  $4x^2 + 9x + 7y$  using the following:

1.  $x = 2, y = -5$

$$\begin{aligned} &3x - 4y \\ &3(2) - 4(-5) \\ &6 + 20 \\ &\textcircled{26} \end{aligned}$$

$$\begin{aligned} &4x^2 + 9x + 7y \\ &4(2)^2 + 9(2) + 7(-5) \\ &16 + 18 + -35 \\ &34 + -35 \\ &= -1 \end{aligned}$$

Section 1.1  
Expressions

# Practice

## Section 1.1 Expressions

Evaluate the expressions using the values given

1.  $4x^2 + 2y^4$ ;  $x = 2$ ,  $y = -1$

Subtract 1 from  $x$   
multiply result by 2  
Subtract result from 4

Describe the sequence of operations that produces the expression.

2.  $5(x - 2)$

Subtract 2 from  $x$   
multiply result by 5

3.  $4 - 2(x - 1)$

Subtract 1 from  $x$   
multiply -2 by result  
add 4 to result



# Practice

## Section 1.1 Expressions

Write an expression for the sequence of operations.

4. Add  $x$  to 1, triple, subtract 2

$$3(1+x)-2$$

5. Subtract  $x$  from 2, double, add 8

$$2(2-x)+8$$

# Practice

## Section 1.1 Expressions

Write an expression for the sales tax on a car.

6. Tax rate is 5%, price is \$d

$$.05d$$
$$d(.05)$$

7. Tax rate is 7%, price is \$550 less than the sticker price

$$.07(d - 550)$$

# Practice

## Section 1.1 Expressions

A family buys 12 bags of hamburger buns and 60 hamburger patties. Write an expression that will help us to find the total cost if the hamburger buns cost  $h$  dollars and the hamburger patties cost  $p$  dollars.

$$12h + 60p$$

# Homework

Section 1.1 Pages 6 -7

**Expressions** # 2 - 10 even, 13, 15, 20 - 23, 25, 26, 28, 30, 33,  
34, 56 - 58

# Key Points

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## Section 1.2 Equations

- What is an equation?
- What is a solution to an equation?
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- What is an identity?
- Using equations to solve problems

# Warm-Up

Write an expression for the sales tax on a car.

1. Tax rate is 5%, price is \$d

$.05d$

$$3 - 2(s + 5)$$

Add 5 to s, multiply result by 2, subtract result from 3.

$$22.2(1 - (x + 3))$$

# Discussion

## Section 1.2 Equations

$$3x + 2 = 10 - x$$

This is known as an equation.

Is this equation true or false?

Equations equate 2 expressions



# Discussion

## Section 1.2 Equations

X	$3X + 2$	$10 - X$
-2	$3(-2)+2=-4$	$10-(-2)=12$
-1	-1	11
0	2	10
1	5	9
2	$6+2=8$	8

# Examples

## Section 1.2 Equations

### Example #1

You started with \$ $p$ , paid \$40 for a pair of jeans, and had \$30 left.

Equation:  $p - 40 = 30$

$$p - 40 = 30$$

### Example #2

You started with \$80, paid \$ $p$  for a pair of jeans, and had \$35 left.

Equation:  $80 - p = 35$

$$80 - p = 35$$

# Examples

## Section 1.2 Equations

### Example #3

For each of the following equations, which of the given values is a solution?

a)  $3-4t = 5-(2+t)$ , for the values  $t = -3, 0$

$$\begin{aligned} t &= -3 \\ 3-4(-3) &= 5-(2+(-3)) \\ 3+12 &= 5-(-1) \\ 15 &= 6 \quad \text{X} \end{aligned}$$

$$\begin{aligned} t &= 0 \\ 3-4(0) &= 5-(2+(0)) \\ 3-0 &= 5-2 \\ 3 &= 3 \quad \checkmark \end{aligned}$$

b)  $3x^2 + 5 = 8$ , for the values  $x = -1, 0, 1$

$$\begin{aligned} x &= -1 \\ 3(-1)^2 + 5 &= 8 \\ 3(1) + 5 &= 8 \\ 3 + 5 &= 8 \\ 8 &= 8 \end{aligned}$$

$$\begin{aligned} x &= 0 \\ 3(0)^2 + 5 &= 8 \\ 3(0) + 5 &= 8 \\ 0 + 5 &= 8 \\ 5 &= 8 \end{aligned}$$

$$\begin{aligned} x &= 1 \\ 3(1)^2 + 5 &= 8 \\ 3(1) + 5 &= 8 \\ 3 + 5 &= 8 \end{aligned}$$

# Examples

## Section 1.2 Equations

### Example #4

You have \$10.00 to spend on  $n$  bottles of soda, costing \$1.50 each. Are the following expressions? Equations? Justify your answers.

a)  $1.50n$  expression; no = sign

b)  $1.50n = 6.00$  equation; expressions are =

c)  $10 - 1.50n$  expression; no = sign

d)  $10 - 1.50n = 2.50$  equation; expressions are =

# Practice

## Section 1.2 Equations

Write an equation representing the situation if  $c$  is the cost of movie tickets in dollars.

1. The cost for a family of four to attend the movies is \$42.

$$4c = 42$$

$$\frac{42}{4} = c$$

Write in words the statement represented by the equation.

2.  $0.25x = 12$

One fourth of  $x$  is 12  
twenty five percent of  $x$  is 12  
 $x$  multiplied by .25 is 12.

# Practice

## Section 1.2 Equations

$8 \neq 0$

Determine if the given value of the variable is a solution to the equation.

3.  $x + 4 = x^2 - 16$ ;  $x = 4$ ;  $x = -4$

$x = 4$

$4 + 4 = 4^2 - 16$

$8 = 16 - 16$

$x = -4$

$-4 + 4 = (-4)^2 - 16$

$0 = 16 - 16$

$0 = 0$

Solve the equation.

4.  $v + 5 = 15$

$v = 10$

5.  $x^2 = 49$

$x = 7$

$x = -7$

# Practice

## Section 1.2 Equations

Construct a table showing the values of the expression  $2 + 3x$  for  $x = 0, 1, 2, 3, 4$

$x$	$2 + 3x$
0	2
1	5
2	8
3	11
4	14

# Homework

Section 1.2  
Equations

Pages 11 - 13

# 2, 3, 5 - 13, 16 - 18, 21, 23, 25 - 35 odd, 37, 39,  
40, 42, 43, 44