LESSON 16 More Complicated Evaluations

The procedures discussed in Lesson 14 are also used to evaluate more complicated expressions. The use of parentheses, brackets, and braces is often helpful in preventing mistakes. We will use all of these symbols of inclusion in the following examples.

example 16.1 Evaluate: $-a[-a(p - a)]$ if $p = -2$ and $a = -4$

solution We use parentheses, brackets, and braces as required.

$$-(\ )\{-(\ )[(\ ) - (\ )]\}$$

Now we will insert the numbers inside the parentheses.

$$-(-4)\{-(-4)[(-2) - (-4)]\}$$

Lastly, we simplify.

$$4\{4[2]\} = 4\{8\} = \mathbf{32}$$

example 16.2 Evaluate: $ax[-a(a - x)]$ if $a = -2$ and $x = -6$

solution This time we will not use parentheses. We will replace a with -2, $-a$ with 2, x with -6, and $-x$ with 6.

$$12[2(-2 + 6)]$$

Now we simplify, remembering to begin with the innermost symbol of inclusion.

$$12[2(-2 + 6)] = 12[2(4)] = 12[8] = \mathbf{96}$$

example 16.3 Evaluate: $-b[-b(b - c) - (c - b)]$ if $b = -4$ and $c = -6$

solution We replace b with -4, $-b$ with 4, c with -6, and $-c$ with 6.

$$4[4(-4 + 6) - (-6 + 4)]$$

Now we simplify, remembering to begin within the innermost symbols of inclusion and to multiply before adding.

$$4[4(2) - (-2)] = 4[8 + 2] = 4[10] = \mathbf{40}$$

practice Evaluate:

a. $-a[-a(p - a)]$ if $p = -4$ and $a = 2$

b. $pa[-p(-a)]$ if $p = -2$ and $a = -4$

c. $-x[-x(x - a) - (a - x)]$ if $x = -2$ and $a = -5$

problem set 16

1. (13) Is the product of 4 positive numbers and 7 negative numbers a positive number or a negative number?

2. (4) (a) What do we call the answer to an addition problem?

(b) What do we call the answer to a subtraction problem?

(c) What do we call the answer to a multiplication problem?

(d) What do we call the answer to a division problem?

3. (2) What do you call polygons in which all sides have the same length and all angles have the same measure?

4. (4) Use one unit multiplier to convert 100 centimeters to inches.

5. (10) Use two unit multipliers to convert 152 square centimeters to square inches.

6. (3) The length of a rectangle is 31 inches. The width of the rectangle is 11 inches. Find the perimeter of the rectangle.

7. (8) The length of a rectangle is 17 feet. The width of the rectangle is 13 feet. Find the area of the rectangle.

8. (8) The radius of a circle is 9 yards. Find the area of the circle.

Evaluate:

9. (14) $x - xy$ if $x = -2$ and $y = -3$

10. (14) $x(x - y)$ if $x = -2$ and $y = -3$

11. (14) $(x - y)(y - x)$ if $x = 2$ and $y = -3$

12. (14) $(x - y) - (x - y)$ if $x = -2$ and $y = 3$

13. (14) $-xa(x - a)$ if $a = -2$ and $x = 4$

14. (14) $(-x + a) - (x - a)$ if $x = -4$ and $a = 5$

15. (14) $(p - x)(a - px)$ if $a = -3$, $p = 2$, and $x = -4$

16. (16) $-a[-a(x - a)]$ if $a = -2$ and $x = 3$

17. (16) $-a[(-x - a) - (x - y)]$ if $a = -3$, $x = 4$, and $y = -5$

Simplify:

18. (12) $-3(-1 - 2)(4 - 5) + 6$

19. (12) $-2 + (-3) - |-5 + 2|3$

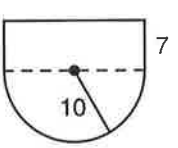
20. (13) $4[2(3 - 2) - (6 - 4)]$

21. (13) $-2(-4) - \{-[-(-6)]\}$

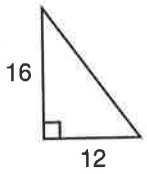
22. (12) $\dfrac{3(-2) - 5}{-3(-2)}$

23. (12) $\dfrac{-3(-6 - 2) + 5}{-3(-2 + 1)}$

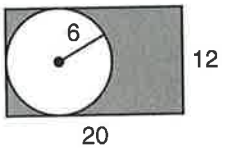
24. (3) Find the perimeter of this figure. Corners that look square are square. Dimensions are in miles.



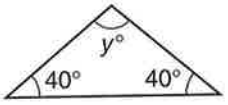
25. (8) Find the area of this right triangle. Dimensions are in centimeters.



26. (8) Find the area of the shaded portion of this rectangle. Dimensions are in meters.



27. (2) Find y.

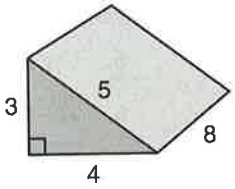


Simplify:

28. (1) $1\frac{7}{12} + 5\frac{5}{6} - 4\frac{2}{3}$

29. (4) $2\frac{2}{5} \times 11\frac{2}{3}$

30. (15) Find the surface area of this right triangular prism. Dimensions are in kilometers.



LESSON 17 *Factors and Coefficients • Terms • The Distributive Property*

17.A factors and coefficients

If the form in which variables and constants are written in an expression indicates that the variables and constants are to be multiplied, we say that the expression is an **indicated product.** If we write

$$4xy$$

we indicate that 4 is to be multiplied by the product of x and y. Each of the symbols is said to be a factor of the expression. Any one factor of an expression or any product of factors of an expression can also be called the **coefficient** of the rest of the expression. Thus, in the expression $4xy$ we can say that

(a) 4 is the coefficient of xy $4(xy)$

(b) x is the coefficient of $4y$ $x(4y)$

(c) y is the coefficient of $4x$ $y(4x)$

(d) xy is the coefficient of 4 $xy(4)$

(e) $4y$ is the coefficient of x $4y(x)$

(f) $4x$ is the coefficient of y $4x(y)$

As mentioned earlier, the value of a product is not affected by the order in which the multiplication is performed, so we may arrange the factors in any order without affecting the value of the expression. Note that we change the order at will in (a) through (f) above.