

Unit: Knowledge of Algebra, Patterns, and Functions**Objective:** Evaluate an algebraic expression using one unknown and no more than 2 operations.**Example 1:** Evaluate $6x - 7$ if $x = 8$.

$$\begin{aligned} 6x - 7 &= 6(8) - 7 && \text{Replace } x \text{ with } 8. \\ &= 48 - 7 && \text{Use order of operations.} \\ &= 41 && \text{Subtract } 7 \text{ from } 48. \end{aligned}$$

Example 2: Evaluate $5m - 15$ if $m = 6$.

$$\begin{aligned} 5m - 15 &= 5(6) - 15 && \text{Replace } m \text{ with } 6. \\ &= 30 - 15 && \text{Use order of operations.} \\ &= 15 && \text{Subtract } 15 \text{ from } 30. \end{aligned}$$

Example 3: Evaluate $\frac{7b}{3}$ if $b = 6$.

$$\begin{aligned} \frac{7b}{3} &= \frac{(7)(6)}{3} && \text{Replace } b \text{ with } 6. \\ &= \frac{42}{3} && \text{Multiply } 6 \text{ by } 7. \\ &= 14 && \text{Divide.} \end{aligned}$$

Example 4: Evaluate $x^3 + 4$ if $x = 3$.

$$\begin{aligned} x^3 + 4 &= 3^3 + 4 && \text{Replace } x \text{ with } 3. \\ &= 27 + 4 && \text{Use order of operations.} \\ &= 31 && \text{Add } 27 \text{ and } 4. \end{aligned}$$

Evaluate the following expressions using the given values for a, b, and c. Show each step!

1. Evaluate $6 + 3b$ if $b = 7$

2. Evaluate $6a^2$ if $a = 4$

3. Evaluate $5(6) - c$ if $c = 7$

4. Evaluate $\frac{b^4}{4}$ if $b = 2$

Unit: Knowledge of Algebra, Patterns, and Functions

Objective: Evaluate numeric expressions using order of operations with no more than 4 operations.

Use the order of operations to evaluate numerical expressions.

1. Do all operations within grouping symbols first.
2. Evaluate all powers before other operations.
3. Multiply and divide in order from left to right.
4. Add and subtract in order from left to right.

Example 1: Evaluate $14 + 3(7 - 2) - 2 \cdot 5$

$$\begin{aligned} &14 + 3(7 - 2) - 2 \cdot 5 \\ &= 14 + 3(5) - 2 \cdot 5 && \text{Subtract first since } 7 - 2 \text{ is in parentheses} \\ &= 14 + 15 - 2 \cdot 5 && \text{Multiply left to right, } 3 \cdot 5 = 15 \\ &= 14 + 15 - 10 && \text{Multiply left to right, } 2 \cdot 5 = 10 \\ &= 29 - 10 && \text{Add left to right, } 14 + 15 = 29 \\ &= 19 && \text{Subtract 10 from 29} \end{aligned}$$

Example 2: $8 + (1 + 5)^2 \div 4$

$$\begin{aligned} &8 + (1 + 5)^2 \div 4 \\ &= 8 + (6)^2 \div 4 && \text{Add first since } 1 + 5 \text{ is in parentheses} \\ &= 8 + 36 \div 4 && \text{Find the value of } 6^2 \\ &= 8 + 9 && \text{Divide 36 by 4} \\ &= 17 && \text{Add 8 and 9} \end{aligned}$$

Evaluate each of the following. Show each step!

5. $(2 + 10)^2 \div 4$

6. $(6 + 5) \cdot (8 - 6)$

7. $72 \div 3 - 5(2.8) + 9$

8. $3 \cdot 14(10 - 8) - 60$

Unit: Knowledge of Algebra, Patterns, and Functions**Objective:** Determine the unknown in a linear equation with 1 or 2 operations

Remember, equations must always remain balanced.

- If you add or subtract the same number from each side of an equation, the two sides remain equal.
- If you multiply or divide the same number from each side of an equation, the two sides remain equal.

Example 1: Solve $x + 5 = 11$

$$\begin{array}{l} x + 5 = 11 \quad \text{Write the equation} \\ \underline{-5 = -5} \quad \text{Subtract 5 from both sides} \\ x = 6 \quad \text{Simplify} \end{array}$$



$$\begin{array}{l} x + 5 = 11 \quad \text{Write the equation} \\ 6 + 5 = 11 \quad \text{Replace } x \text{ with } 6 \\ 11 = 11 \checkmark \quad \text{The sentence is true} \end{array}$$

Example 2: Solve $-21 = -3y$

$$\begin{array}{l} -21 = -3y \quad \text{Write the equation} \\ \underline{-3 = -3} \quad \text{Divide each side by } -3 \\ 7 = y \quad \text{Simplify} \end{array}$$



$$\begin{array}{l} -21 = -3y \quad \text{Write the equation} \\ -21 = -3(7) \quad \text{Replace the } y \text{ with } 7 \\ -21 = -21? \quad \text{Multiply } - \text{ is the sentence true?} \end{array}$$

Example 3: Solve $3x + 2 = 23$

$$\begin{array}{l} 3x + 2 = 23 \quad \text{Write the equation} \\ \underline{-2 = -2} \quad \text{Subtract 2 from each side} \\ \frac{3x}{3} = \frac{21}{3} \quad \text{Simplify} \\ x = 7 \quad \text{Divide each side by } 3 \end{array}$$



$$\begin{array}{l} 3x + 2 = 23 \quad \text{Write the equation} \\ 3(7) + 2 = 23? \quad \text{Replace } x \text{ with } 7 \\ 21 + 2 = 23? \quad \text{Multiply} \\ 23 = 23? \quad \text{Add } - \text{ is the sentence true?} \end{array}$$

9. Solve $x - 9 = -12$

10. Solve $48 = -6r$

11. Solve $2t + 7 = -1$

12. Solve $4t + 3.5 = 12.5$

13. Solve $\frac{x}{4} = 21$

14. Solve $\frac{x}{4} + 3 = 10$

15. Solve $5(x-2) = -13$

16. Solve $2x - 3 = 7x + 12$

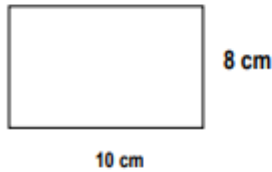
Unit: Knowledge of Algebra, Patterns, and Functions

Objective: Apply given formulas to a problem-solving situation using formulas having no more than three variables.

Example 1:

The perimeter of a rectangle is twice the length (L) plus twice the width (W). $P = 2L + 2W$

Use the given formula to find the perimeter of the rectangle.



$$P = 2L + 2W$$

Write the equation

$$P = 2(10) + 2(8)$$

Replace L and W with the length and width

$$P = 20 + 16$$

Multiply

$$P = 36 \text{ cm}$$

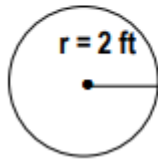
Simplify and add the correct label

Example 2:

The area A of a circle equals the product of pi (π) and the square of its radius (r).

$$A = \pi r^2 \quad (\pi \approx 3.14)$$

Use the given formula to find the area of the circle.



$$A = \pi r^2$$

Write the equation

$$A = 3.14 \cdot (2)^2$$

Replace π with 3.14 and r with 2

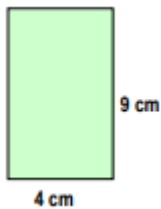
$$A = 3.14 \cdot 4$$

Square the 2

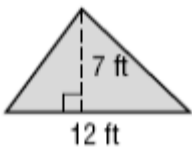
$$A = 12.56 \text{ ft}^2$$

Simplify and add the correct label

17. The formula for finding the area of a rectangle is $A=L \cdot W$. Use this formula to find the area of the rectangle.

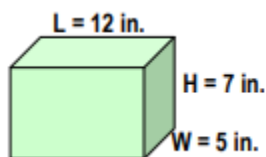


18. The formula for finding the area of a triangle is $A = \frac{1}{2}bh$. Find the area of the triangle below.

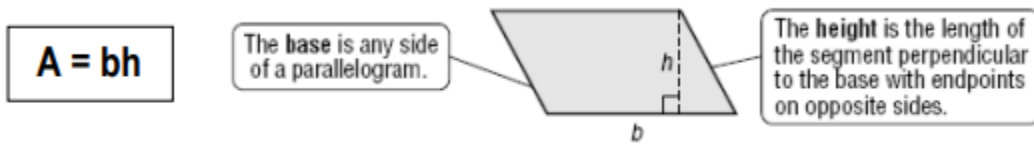


19. Juan ran all the way around a circular track one time. The diameter (d) of the track is 60 meters. The formula for circumference of a circle is $C = \pi d$. Use this formula to find out how far Juan ran.

20. The formula for finding the volume of a rectangular prism is $V=L \cdot W \cdot H$. Find the volume of the box.



The area **A** of a parallelogram equals the product of its base **b** and its height **h**. Because rectangles, rhombuses, and squares are all parallelograms, the formula for finding the area of a parallelogram is also used to find the areas of each of these figures.

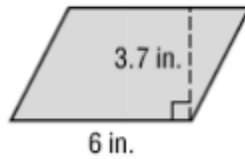


Example: Find the area of a parallelogram if the base is 6 inches and the height is 3.7 inches.

Estimate: $A = 6 \cdot 4$ or 24 in^2

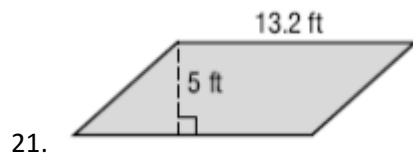
Calculate:

$A = bh$	Area of a parallelogram
$A = 6 \cdot 3.7$	Replace b with 6 and h with 3.7
$A = 22.2$	Multiply

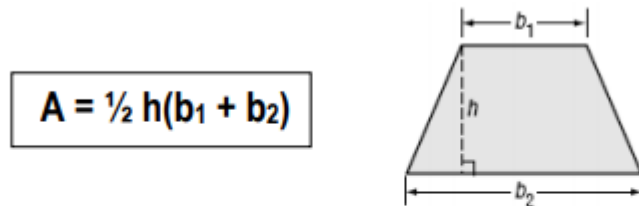


Check: The area of the parallelogram is 22.2 square inches. This is close to the estimate.

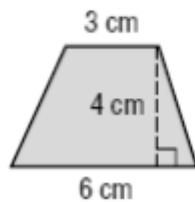
Find the area of each parallelogram. Round to the nearest tenth if necessary.



A trapezoid has two bases, **b₁** and **b₂**. The height of a trapezoid is the distance between the two bases. The area **A** of trapezoid equals half the product of the height **h** and the sum of the bases **b₁** and **b₂**.



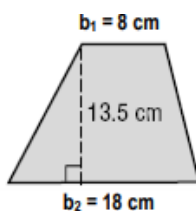
Example: Find the area of the trapezoid.



$A = 1/2 h (b_1 + b_2)$	Area of a trapezoid
$A = 1/2 (4) (3 + 6)$	Replace h with 4, b₁ with 3, and b₂ with 6.
$A = 18$	

The area of the trapezoid is 18 square centimeters.

22. A trapezoid has two bases (**b₁** and **b₂**). The formula for finding the area of a trapezoid is : $A = \frac{1}{2}h(b_1 + b_2)$. Find the area of the trapezoid.



Unit: Knowledge of Algebra, Patterns, and Functions**Objective:** Complete a function table with a given two operation rule.**Examples:**

The solution of an equation with two variables consists of two numbers, one for each variable, that make the equation true. The solution is usually written as an ordered pair.

The cost to rent a bicycle at the beach includes a rental fee of 5 dollars plus 3 dollars for each hour. The equation for the cost of renting a bicycle is:

$$C = 3H + 5$$

C is the total cost and H is the number of hours.

Bicycle Rentals		
Hours	$3H + 5$	Cost (dollars)
1	$3(1) + 5$	8
2	$3(2) + 5$	11
3	$3(3) + 5$	14
4	$3(4) + 5$	17

Complete the following tables:

$C = 3H + 4$

H	$3H + 4$	C
2	$3(2) + 4$	
4		
6		
10		

23.

$Y = 5X + 2$

X	$5X + 2$	Y
3		
6		
9		
12		

24.

$Y = 2 + 10X$

X	$2 + 10X$	Y
3	$2 + 10(3)$	32
4		
5		

25.