

Unit 2: Solving Equations and Inequalities
Lesson 1: Order of Operations, Solving Equations/Inequalities

When we combine numbers and/or variables using addition, subtraction, multiplication, and division, we form an algebraic expression.

The terms of an algebraic expression are those parts that are separated by addition.

⇒ Parts of an algebraic expression:

$$5x^4 + 3x^2y^3 - 2x + 4$$

Diagram showing the algebraic expression $5x^4 + 3x^2y^3 - 2x + 4$ with annotations:

- Brackets under each term: $5x^4$, $3x^2y^3$, $-2x$, and 4 .
- Arrows pointing to each bracketed term with the label "Terms".
- A circle around the constant term 4 with the label "constant term".

Practice:

Identify the terms of each algebraic expression. If applicable, identify the constant term of the expression.

Algebraic Expression	Terms	Constant Term
$10xy + 5$	$10xy$ 5	5
$4h^2 - 3k^2 - 5h + 9m$	$4h^2, -3k^2, -5h, 9m$	NA
$t^2 - 3t + \frac{1}{t}$	t^2 $-3t$ $\frac{1}{t}$	NA
$-7y^2 + 2y - 8$	$-7y^2$ $2y$ -8	-8

⇒ Parts of a term:

$$5x^4$$

Diagram showing the term $5x^4$ with annotations:

- Label "coefficient" pointing to the number 5.
- Label "base" pointing to the variable x.
- Label "exponent" pointing to the number 4.

Practice:

Identify the parts of each term.

Term	Coefficient	Base	Exponent
$9u^8$	9	u	8
$\frac{5}{3}t$	$\frac{5}{3}$	t	1
$\frac{1}{2} \cdot x^4$	$\frac{1}{2}$	x	4

Handwritten notes on the right side of the page:

- $x^0 = 1$
- $x^1 = x$
- $x^2 = x \cdot x$

Order of Operations:

P: **Par**enthesi**S**

E: **Ex**ponent

M: **M**ultiplicati**o**n

A: **A**dditi**o**n

D: **D**ivisi**o**n

S: **S**ubtracti**o**n

L → R

Please
Excuse
My
Dear
Aunt
Sally

Example:

$$1. 3 + (5-1)^2 - 4$$

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

$$3 + 16 - 4$$

$$19 - 4 = 15$$

$$2. 3 - \frac{6}{2}$$

$$= 3 - 3$$

$$= 0$$

$$3. 5(3+4 \cdot 2) - 6^2$$

$$5(3+8) - 6^2$$

$$5(11) - 6^2$$

$$55 - 36 = 19$$

-6^2
 $= -1 \cdot 6^2$
 $= -1 \cdot 36$
 $= -36$
 $(-6)^2$
 $= (-1 \cdot 6)^2$
 $= (-6)^2$
 $= 36$

$$4. 5 - 4(8-6)$$

$$5 - 4(2)$$

$$5 - 8 = -3$$

$$5. 12 + 16 \div 4 \cdot 3 - 5 \cdot 0$$

$$12 + 4 \cdot 3 - 5 \cdot 0$$

$$12 + 12 - 5 \cdot 0$$

$$12 + 12 - 0 = 24$$

$$6. 2 - 3(x-1)$$

$$= 2 - 3x + 3$$

$$= 5 - 3x$$

$$= -3x + 5$$

Simplify

Some vocabulary:

An **expression** is No "="
 An **equation** is There is "="

To **evaluate** an expression means

To **simplify** an expression means less complicated; expression

To **solve** an equation means $x = \dots$

Example: Simplify.

$$1. 6 - t + 3t - 4 + 2t$$

$$6 + 2t - 4 + 2t$$

$$6 - 4 + 4t$$

$$2 + 4t$$

$$4t + 2$$

$$2. (7x+6) - 2(5x+5)$$

$$7x+6 - 10x - 10$$

$$= -3x - 4$$

3. Josh spent \$425 of his \$1685 budget for home improvements. He would like to replace six interior doors next. What can he afford to spend on each door?

$$\begin{array}{r} 1685 \\ - 425 \\ \hline \$1260 \end{array}$$

$$\frac{1260}{6} = \$210 \text{ for each door}$$

Solving for a variable

An **equation** is a mathematical sentence stating that 2 expressions are equal.

When we solve an equation, we are finding those values of the unknown that make the statement true.

Which would we try to get rid of first when solving for x (the 1 or the 2): $2x+1=5$ The 1 \rightarrow subtract

Which would we try to get rid of first when solving for x (the 1 or the 2): $\frac{x+1}{2}=5$ The 2 \rightarrow multiply

Solve the equation. Put a box around your final answer.

1. Solve for y. $3(y-2) - 2(3y-1) = 53$

$$\begin{aligned} 3y - 6 - 6y + 2 &= 53 \\ -3y - 4 &= 53 \\ -3y &= 57 \\ y &= -19 \end{aligned}$$

Solve the inequality. Graph your solution on a number line and write your solution in interval notation.

1. Solve for y. $3(y-2) - 2(3y-1) > 53$

$$\begin{aligned} 3y - 6 - 6y + 2 &> 53 \\ -3y - 4 &> 53 \\ -3y &> 57 \\ y &< -19 \end{aligned}$$

2. Solve for y. $3x - 6y = 9$

$$\begin{aligned} -6y &= -3x + 9 \\ y &= \frac{-3x + 9}{-6} \\ y &= \frac{-x + 3}{-2} \end{aligned}$$

2. Solve for y. $3x - 6y \leq 9$

$$\begin{aligned} -6y &\leq -3x + 9 \\ y &\geq \frac{-3x + 9}{-6} \\ y &\geq \frac{-x + 3}{-2} \end{aligned}$$

$\frac{3x}{3} < \frac{6}{3}$
 $x < 2$

3. Solve for x. $\frac{x}{3} + 2 = 11$

3. Solve for x. $\frac{x}{3} + 2 < 11$

4. Solve for b. $A = bh$

$$b = \frac{A}{h}$$

4. Solve for b. $A > bh$

5. Solve for x: $-4(3 + x) + 5 = 4(x + 3)$

5. Solve for x: $-4(3 + x) + 5 \geq 4(x + 3)$

6. Solve for x: $3x - 4 = -2x + 6$

6. Solve for x: $3x - 4 \leq -2x + 6$