Algebra Summer Packet

For students going into Algebra A, B, or Honors

ORDER OF OPERATIONS

Objective: To evaluate expressions using the order of operations.

Reminder:

Please Excuse
My
Dear Aunt Sally

Example 1

Simplify $9 \div 3 + 4 \cdot 7 - 20 \div 5$

Solution

$3 + 4 \cdot 7 - 20 \div 5$	**Divide 9 by 3.**
$3 + 28 - 20 \div 5$	**Multiply 4 and 7.**
$3 + 28 - 4$	**Divide 20 by 5.**
$31 - 4$	**Add 3 and 28.**
27	**Subtract 4 from 31.**

Example 2

Simplify $8 - [(3 \cdot 4) - 5]$.

Solution

$8 - [12 - 5]$	**Simplify the innermost parentheses first.**
$8 - 7$	**Then the [ ] grouping.**
1	**Subtract.**

Find the value of each expression. Show ALL work.

1. $8 + [(16 - 6) \div 2]$

2. $16 - 3[9 - 2(5 - 3)]$

3. $[(4 + 8) \div 6] \cdot 3$

4. $(8 + 16) \div (12 - 9)$

5. $\dfrac{30}{3(5 - 3)}$

6. $14 \cdot [(15 - 7) \div 4]$

EVALUATING EXPRESSIONS

Objective: To evaluate an algebraic expression.

Example 1

Evaluate the expression $c+b-23$ if $c=25$ and $b=16$.

Solution

$c+b-23=25+16-23$ **Substitute the given values for the variables.**

$=41-23$ **Simplify by adding 25 and 16.**

$=18$ **Subtract 23 from 41.**

Example 2

Evaluate the expression $2x+(3y-z)+7$ if $x=5,\ y=2,$ and $z=4.$

Solution

$2x+(3y-z)+7=2\cdot5+(3\cdot2-4)+7$ **Substitute the given values.**

$=2\cdot5+(6-4)+7$ **Simplify by multiplying inside parentheses first.**

$=10+2+7$ **Multiply 2 times 5 and subtract 4 from 6.**

$=19$ **Add.**

Evaluate each expression if $x=2$ and $y=-3$. Show ALL work.

1. $2x-y$

2. $3y-(2-x)$

3. $(7+x)(y-1)$

Evaluate each expression if $r=6$ and $t=8$. Show ALL work.

4. $(r-4)+2t$

5. $[10-(r\div3)]+2t$

6. $[3\cdot(t+1)]-r$

COMBINING LIKE TERMS

Objective: To simplify an algebraic expression by combining like terms.

Example 1

Simplify the expression $3x + 5 - 9 - x$.

Solution

$3x - x + 5 - 9$ **Rewrite expression so that like terms are together.**

$2x - 4$ **Combine the like terms.**

Example 2

Simplify the expression $6x - 15 - 4x - (-8)$.

Solution

$6x - 4x - 15 - (-8)$ **Rewrite expression so that like terms are together.**

$2x - 7$ **Combine 6x-4x and -15-(-8).**

Simplify each expression. Show ALL work.

1. $7x + 5 + 2x$

2. $6 + 9x - 3$

3. $4y - 7y + 6$

4. $-8m + 3 + 10 + 3m$

5. $-7w - 6k + 4w$

6. $-11g + 8h - 3g - 7h$

7. $-14b + 7y - 5b - 10y$

8. $6x - 15 - 4x - (-8)$

9. $-2m + 9 - 4m - 13$

DISTRIBUTIVE PROPERTY

Objective: To simplify an algebraic expression by using the distributive property

Example 1

Simplify the expression $2(x+3)$.

Solution

$2(x+3)$ **Distribute the 2 by multiplying it by the x and 3.**

$2x+6$

Example 2

Simplify the expression $3(2x+y-1)$.

Solution

$3(2x+y-1)$ **Distribute the 3 by multiplying it by 2x, y, and -1.**

$6x+3y-3$

Simplify each expression. Show ALL work.

1. $2(x+4)$

2. $-3(x+5)$

3. $2(3x-6)$

4. $8(5-4x)$

5. $-7(1+4x)$

6. $5(3x-10)$

7. $-4(x+y-8)$

8. $2(-x+2y-11)$

9. $\frac{1}{2}(x+4)$

SOLVING ONE STEP EQUATIONS

Objective: To solve equations using one transformation.

Example 1

a. Solve for x.

$x+7=10$

$x+7=10$ **(Isolate x, think opposite of $+7$)**

$-7=-7$ **(Subtract 7 from both sides)**

$x=3$

b. Solve for x.

$\frac{x}{7}=3$

$\frac{x}{7}=3$ **(Isolate x, think opposite of $\div 7$)**

$(7)\frac{x}{7}=3(7)$ **(Multiply both sides by 7)**

$x=21$

Solve for x. Circle your final answer. Show ALL work.

1. $x+2=13$

2. $4x=48$

3. $x+9=8$

4. $x-5=-5$

5. $\frac{x}{4}=-2$

6. $x+14=7$

7. $x-10=23$

8. $-6=\frac{x}{3}$

9. $-6+x=-13$

10. $\frac{2}{3}x=8$

11. $5x=35$

12. $18=-3x$

SOLVING TWO STEP EQUATIONS

Objective: To solve equations using two transformations.

Example 1

a. Solve for x.

$2x+8=14$

$2x+8-8=14-8$ Subtract 8 from both sides

$2x=6$

$\frac{2x}{2}=\frac{6}{2}$ Divide by 2 on both sides

$x=3$

b. Solve for x.

$\frac{x}{5}-3=-6$

$\frac{x}{5}-3+3=-6+3$ Add 3 to both sides

$\frac{x}{5}=-3$

$5\cdot\frac{x}{5}=-3\cdot 5$ Multiply by 5 on both sides

$x=-15$

Solve for x. Circle your final answer. Show ALL work.

1. $2x+4=12$

2. $-3x+8=-4$

3. $15=-x-7$

4. $5x-4=21$

5. $-8=\frac{x}{2}+3$

6. $\frac{x}{5}-3=10$

7. $\frac{x}{4}+5=16$

8. $6x+8=5$

9. $\frac{2}{3}x-1=11$

ONE STEP INEQUALITIES AND GRAPHING

Objective: To solve an inequality and graph the solution on a number line.

Example 1

Solve for $x + 4 > 9$ and graph the solution on a number line.

Reminder:

$\leq$ $\geq$ use a solid dot.

$<$ $>$ use an open dot.

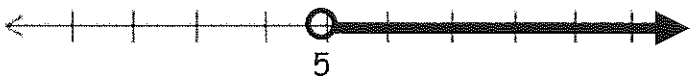
Solution

$x + 4 > 9$

$-4 \quad -4$ **Subtract 4 from both sides.**

$x > 5$

Plot an open dot on 5 and shade everything greater than 5 or to the right of 5.



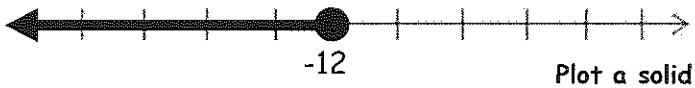
Example 2

Solve for $4 \leq \frac{x}{-3}$ and graph the solution on a number line.

Solution

$-3 \cdot 4 \leq \frac{x}{-3} \cdot -3$ **Multiply -3 by both sides**

$-12 \geq x$ **When you multiply or divide by a negative you must reverse the inequality symbol**



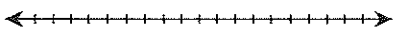
Plot a solid dot on -12 and shade everything less than -12 or to the left of -12.

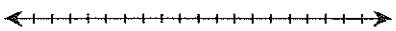
Solve for x and graph the solution on the number line. Show ALL work.

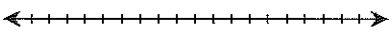
1. $\frac{x}{5} \leq 3$

2. $-3x < 21$

3. $-10 \leq x - 6$



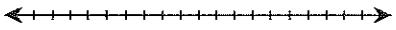


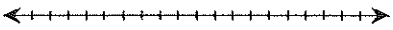


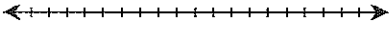
4. $x + 3 < 11$

5. $-14 > 7x$

6. $-9 \leq 5 + x$







TWO STEP INEQUALITIES AND GRAPHING

Objective: To solve an inequality and graph the solution on a number line.

Example 1

Solve for $3x+6\leq 15$ and graph the solution on a number line.

Solution

$3x+6\leq 15$

$-6 \quad -6$ Subtract 6 from both sides.

$\frac{3x}{3}\leq\frac{9}{3}$ Divide both sides by 3.

$x\leq 3$

Plot a solid dot on 3 and shade everything less than 3 or to the left of 3.

Reminder:

$\leq$ $\geq$ use a solid dot.

$<$ $>$ use an open dot.

Example 2

Solve for $-3x-2<10$ and graph the solution on a number line.

Solution

$-3x-2<10$

$+2 \quad +2$ Add 2 to both sides.

$-3x<12$ Divide both sides by 3.

$\frac{-3x}{-3}>\frac{12}{-3}$ When you multiply or divide by a negative you must reverse the inequality symbol

$x>-4$

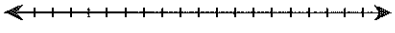
Plot an open dot on -4 and shade everything greater than -4 or to the right of -4.

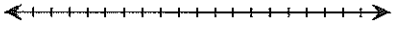
Solve for x and graph the solution on the number line. Show ALL work.

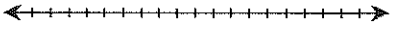
1. $\frac{x}{4}-3\leq 2$

2. $2-2x<-2$

3. $2x+17>25$



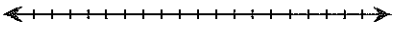


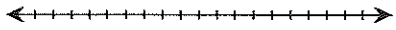


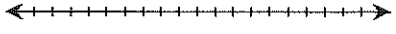
4. $4<3x-2$

5. $-5-x\geq -3$

6. $-4>\frac{x}{-3}+1$







SOLVING PROPORTIONS

Objective: To solve a proportion using cross-multiplication.

Example 1

Solve for x.

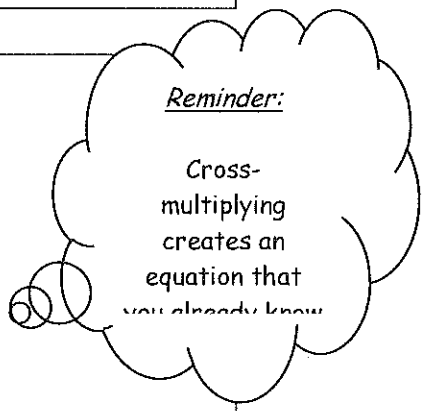
$$\frac{x}{4}=\frac{21}{7}$$

$$\frac{x}{4}\times\frac{21}{7}$$ (Cross-multiply)

$$7x=82$$

$$\frac{7x}{7}=\frac{82}{7}$$ (Divide both sides by 7)

$$x=12$$



Solve each proportion for x using cross multiplication. Circle your final answer. Show ALL work.

1. $\frac{x}{9}=\frac{4}{12}$

2. $\frac{5}{x}=\frac{9}{27}$

3. $\frac{7}{16}=\frac{x}{32}$

4. $\frac{x}{35}=\frac{2}{5}$

5. $\frac{1}{3}=\frac{2x}{18}$

6. $\frac{20}{12}=\frac{5}{3x}$

PYTHAGOREAN THEOREM

Objective: To find the missing side in a right triangle using Pythagorean Theorem

Steps: (Solving for a missing side in a right triangle)

1. Identify the legs and hypotenuse of the right triangle
2. Substitute the values into the formula $a^2 + b^2 = c^2$
3. Solve the equation for the missing side.

Example: (Finding a leg)

$a^2 + 24^2 = 26^2$

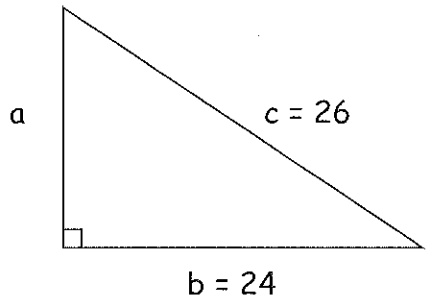
$a^2 + 576 = 676$

$a^2 = 676 - 576$

$a^2 = 100$

$a = \sqrt{100}$

$a = 10$



Example: (Finding the hypotenuse)

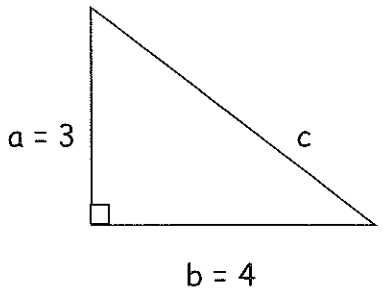
$3^2 + 4^2 = c^2$

$9 + 16 = c^2$

$25 = c^2$

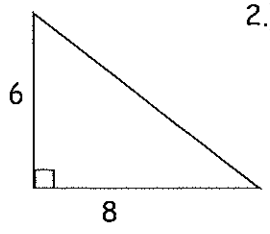
$\sqrt{25} = c^2$

$5 = c$



Find the missing side in each of the following right triangles.

1.)



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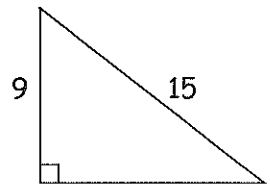
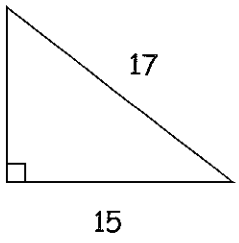
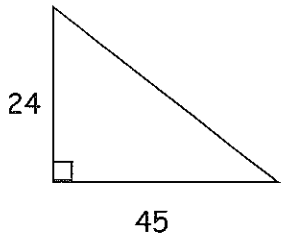


3.)



4.)

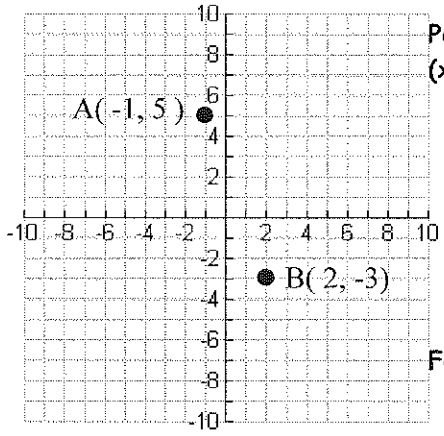


PLOTTING POINTS ON THE COORDINATE PLANE

Objective: To plot points on a coordinate plane.

Example 1

Plot the points $A(-1, 5)$ and $B(2, -3)$ on the coordinate plane.
Label the points using their coordinates.



Points can be located on the plane using an ordered pair (x,y).

(x-coordinate, y-coordinate)
left or right, up or down
(-) (+) (+) (-)

For $(-1, 5)$ you must travel LEFT 1 (-1) and UP 5.

For $(2, -3)$ you must travel RIGHT 2 and DOWN 3 (-3).

Plot the points on the coordinate plane and label them.

1. $A(4, 5)$
2. $B(-3, -2)$
3. $C(0, -4)$
4. $D(1, -5)$

Name the ordered pair where each point is located.

5. E
6. F
7. G
8. H