

Incoming Algebra 2 Refresher Packet

Contains refresher problems for the following Algebra 1 skills:

- Evaluating algebraic expressions
- Solving 1-and 2- step equations
- Solving equations containing distributive property
- Solving equations with variables on both sides
- Graphing a line in slope intercept form
- Graphing a line using intercepts
- Systems of Equations (substitution, and elimination)
- Simplifying Radicals
- Factoring (a = 1, AC method, difference of squares, and grouping)

This packet is due at the beginning of the first full week of school. **ALL WORK MUST BE SHOWN.** There will be a test over the material covered in this packet. Need help with the packet?? Sign up on the KCHS website for math camp!

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Evaluating Algebraic Expressions – Here are some examples

Example 1: Evaluate $ab^2 - ac$
 $a = 2$, $b = -4$, and $c = \frac{1}{2}$

$$\begin{aligned}(2)(-4)^2 - (2)\left(\frac{1}{2}\right) \\ (2)(16) - 1 \\ 32 - 1 \\ 31\end{aligned}$$

Example 3: Evaluate $|2bc + 4a|$
 $a = -8$, $b = 4$, and $c = 2$

$$|2(4)(2) + 4(-8)| \quad |16 + -32| = |-16| = 16$$

Example 2: Evaluate $\frac{4xy^2}{-z+10}$

$$x = 5, y = \frac{1}{2}, \text{ and } z = -15$$

$$\frac{(4)(5)\left(\frac{1}{2}\right)^2}{-(-15)+10} = \frac{(4)(5)\left(\frac{1}{4}\right)}{15+10} = \frac{5}{25} = \frac{1}{5}$$

Example 4: Evaluate $-2|-9xy - z^2|$

$$x = -3, y = 4, \text{ and } z = 5$$

$$-2|-9(-3)(4) - (5)^2|$$

$$-2|108 - 25| = -2|83| = -2(83) = -166$$

Try these without a calculator:

1. Evaluate $bc^3 - ad$ for $a = -2$, $b = 3$, $c = -4$, and $d = 4$.

2. Evaluate $|a(b + d)^2 + c|$ for $a = 4$, $b = -7$, $c = 5$, and $d = -1$.

3. Evaluate $\frac{x-y}{y^2+7}$ for $x = 15$ and $y = -1$

4. Evaluate $\frac{1}{2} |a + 3b^2| + 8$ for $a = 7$ and $b = -3$

5. Evaluate $5x^4 + 2x^3 - 8x + 8$ for $x = -1$

Answer key:

1. -184

2. 261

3. 2

4. 25

5. 19

Solving 1- and 2-step equations – Here are some examples.

$$\begin{aligned}\frac{x}{5} + 7 &= -3 \\ \frac{x}{5} + 7 - 7 &= -3 - 7 \\ \frac{x}{5} &= -10 \\ \frac{x}{5} (5) &= -10 (5) \\ x &= 50\end{aligned}$$

$$\begin{aligned}5x + 15 &= 65 \\ \frac{5x}{5} + \frac{15}{5} &= \frac{65}{5} \\ x + 3 &= 13 \\ x + 3 - 3 &= 13 - 3 \\ x &= 10\end{aligned}$$

Try these without a calculator: - SHOW ALL WORK

1. $x + 11 = -30$

2. $x - 21 = 54$

$$3. \frac{x}{4} = -9$$

$$4. -7x = -56$$

$$5. 2x - 9 = 51$$

$$6. -\frac{x}{7} + 5 = 6$$

$$7. 5(x - 9) = 20$$

$$8. -6x + 12 = 85$$

$$9. \frac{2x}{5} = \frac{6}{50}$$

$$10. 5 - 3x = 29$$

Answer Key: 1. $x = -41$ 2. $x = 75$ 3. $x = -36$ 4. $x = 8$ 5. $x = 30$

6. $x = -7$ 7. $x = 13$ 8. $x = -73/6$ 9. $x = 3/10$ 10. $x = -8$

Solving Equations Containing Distributive Property – Here are some examples.

$$2(x + 9) = 13$$

$$2x + 18 = 13$$

$$2x = -5$$

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

$$10 - 4(x + 8) = 28$$

$$\frac{-10 \quad -10}{-4(x + 8) = 18}$$

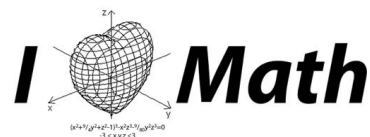
$$-4x - 32 = 18$$

$$-4x - 32 = 18$$

$$\frac{+32 \quad +32}{-4x = 50}$$

$$-4x = 50$$

$$x = -\frac{25}{2} \text{ or } -12.5$$



Try these without a calculator- SHOW ALL WORK

1. $6(2x - 8) = 15$

2. $11 + 4(x + 9) = 0$

3. $2(x - 1) + 3(x + 5) = 7$

4. $32 = 8 - 5(x + 8)$

5. $-9(3x + 10) = 20$

Answer Key: 1. $x = 21/4$ 2. $x = -47/4$ 3. $x = -6/5$ 4. $x = -64/5$ 5. $x = -110/27$

Solving Equations with Variables on Both Sides – Here are some examples.

$$\begin{array}{r} 3x + 2 = 4x - 1 \\ -4x \quad -4x \\ \hline -x + 2 = -1 \\ -2 \quad -2 \\ \hline -x = -3 \\ x = 3 \end{array}$$

$$\begin{array}{r} 8y - 9 = -3y + 2 \\ + 3y \quad + 3y \\ \hline 11y - 9 = 2 \\ + 9 \quad + 9 \\ \hline 11y = 11 \\ y = 1 \end{array}$$

$$\begin{array}{r} 3(x + 4) = 2(x - 1) \\ 3x + 12 = 2x - 2 \\ -2x \quad -2x \\ \hline x + 12 = -2 \\ -12 \quad -12 \\ \hline x = -14 \end{array}$$

$$\begin{array}{r} 2x + 5 = 2x - 3 \\ -2x \quad -2x \\ \hline 5 = -3 \end{array}$$

No Solution

Variables cancelled out
Remaining statement is False.

$$\begin{array}{r} 3(6x - 10) = 2(9x - 15) \\ 18x - 30 = 18x - 30 \\ -18x \quad -18x \\ \hline -30 = -30 \end{array}$$

Infinitely Many Solutions

Variables cancelled out
Remaining statement is true

Try these- SHOW ALL WORK

1. $6x + 7 = 8x - 13$

2. $3 - 4x = 18 + x$

3. $-3 + 12x = 12x - 3$

4. $-8(4 + 9x) = 7(-2 - 11x)$

5. $-8(x + 1) + 3(x - 2) = -3x + 2$

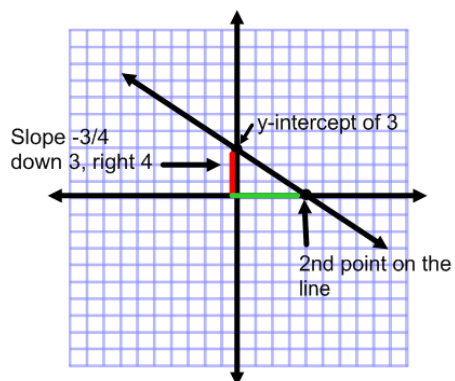
Answer Key: 1. $x = 10$ 2. $x = -3$ 3. Infinitely many solutions

4. $x = 18/5$ 5. $x = -8$

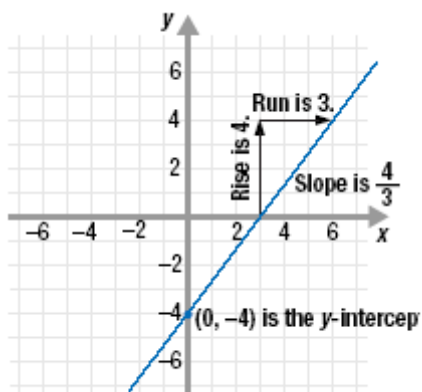
Graphing a Line in Slope Intercept Form – Here are some examples.

Google Images

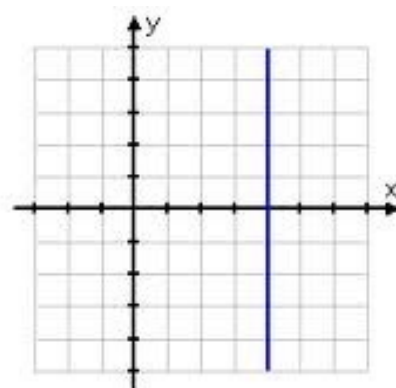
Graph $y = -\frac{3}{4}x + 3$



Graph $y = \frac{4}{3}x - 4$

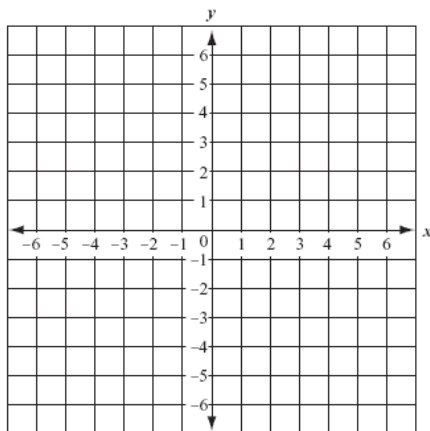


Graph $x = 4$

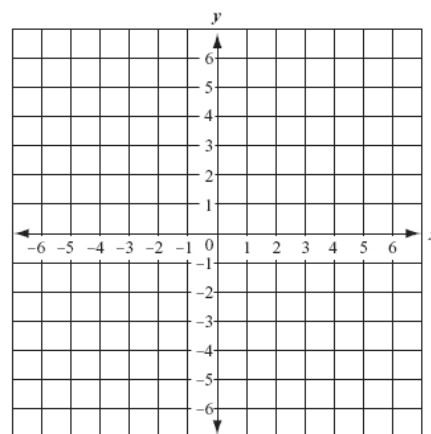


Try these:

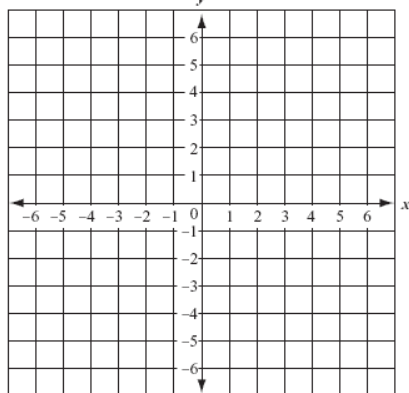
1) $y = \frac{1}{2}x + 3$



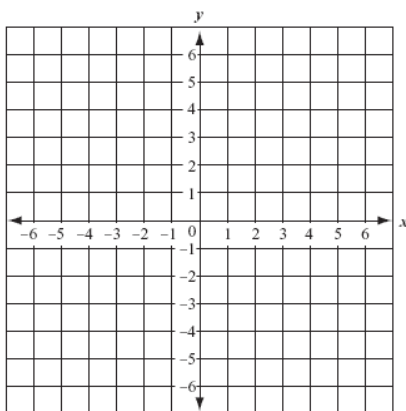
2) $y = -3x + 5$



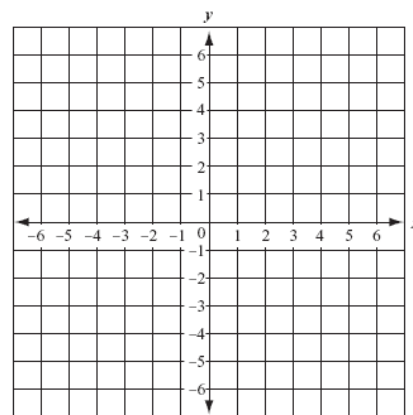
3) $y = -\frac{1}{4}x - 2$



4) $y = -1$

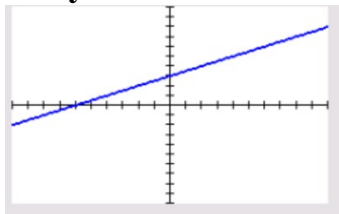


5) $x = 3$

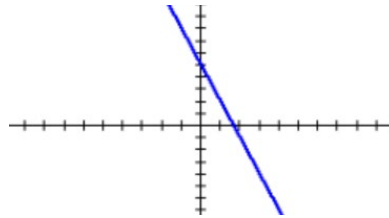


Answer Key:

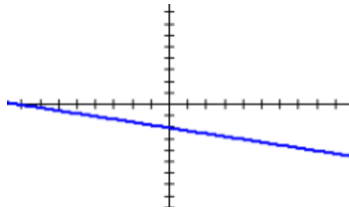
1)



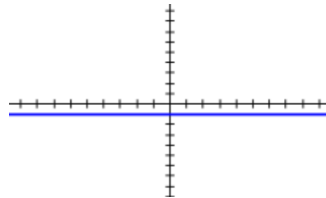
2)



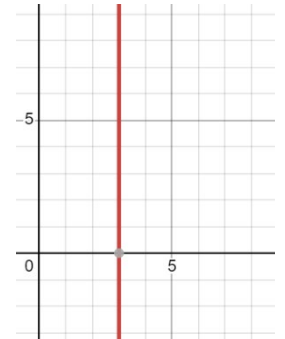
3)



4)



5)



Graphing a Line in Standard Form Using Intercepts – Here are some examples.

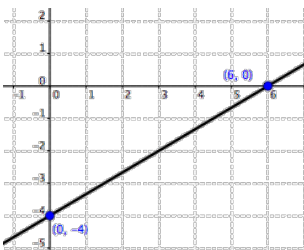
Remember, when you have an x-intercept, you plug in 0 for y then solve for x.

When you have a y-intercept, you plug in 0 for x and solve for y.

$-2x + 3y = -12$

x-int: $-2x + 3(0) = -12$
 $-2x = -12$
 $x = 6$

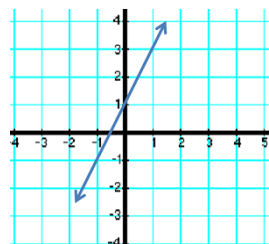
y-int: $-2(0) + 3y = -12$
 $3y = -12$
 $y = -4$



$-2x + y - 1 = 0$

$-2x + y = 1$
 x-int: $-2x + 0 = 1$
 $-2x = 1$
 $x = -\frac{1}{2}$

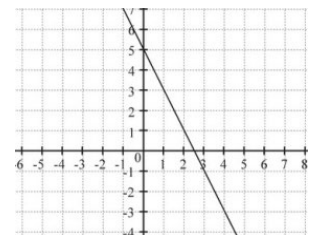
y-int: $-2(0) + y = 1$
 $y = 1$



$4x + 2y = 10$

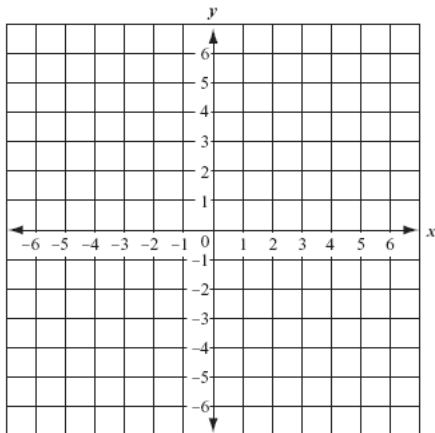
x-int: $4x + 2(0) = 10$
 $4x = 10$
 $x = 2.5$

y-int: $4(0) + 2y = 10$
 $2y = 10$
 $y = 5$

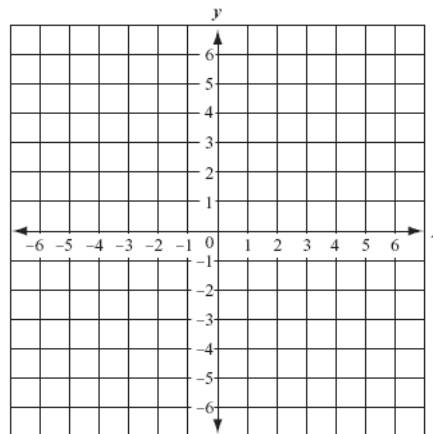


Try these: SHOW WORK FINDING INTERCEPTS

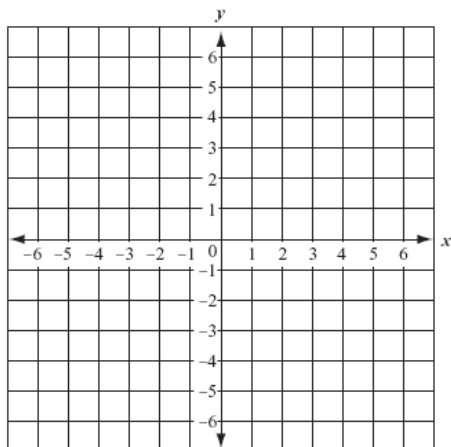
1. $3x - 4y = -12$



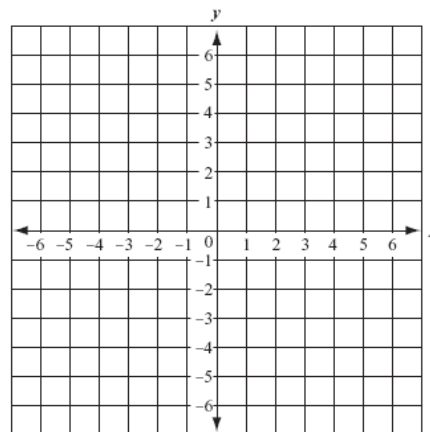
2. $-5x + 3y = -15$



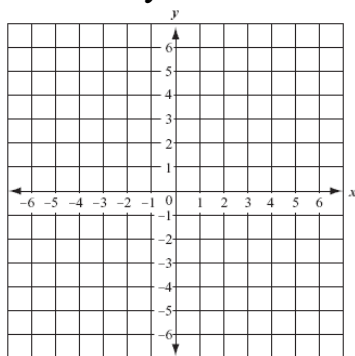
3. $4x - 8y = 12$



4. $\frac{1}{5}x - 2y = 3$

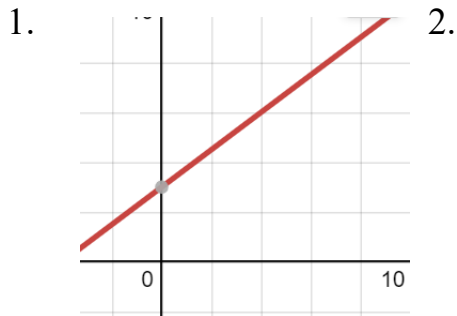


5. $6x - 4y + 10 = 2$

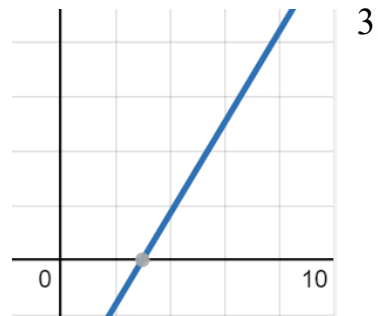


Answer Key:

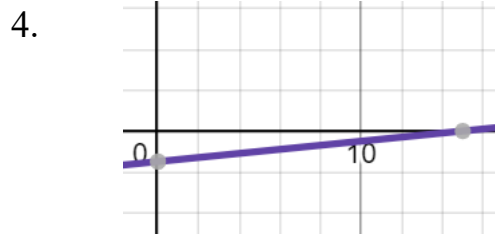
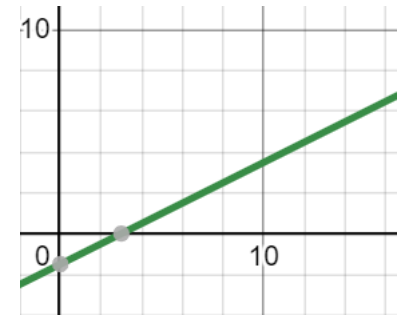
x-int: -4 y-int: 3



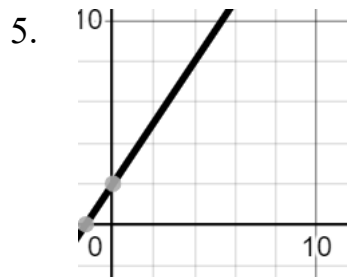
x-int : 3 y-int : -5



x-int : 3 y-int : -1.5



x-int: 15 y-int: -1.5



x-int : -1.3 y-int : 2

Solving systems using substitution – Here are some examples. Sometimes, you have to rewrite an equation so that the variable is by itself on one side.

$$3x - 7y = -14$$

$$x = 2y - 3$$

$$3x - 7y = -14$$

$$x = 2y - 3$$

$$3(2y - 3) - 7y = -14$$

$$6y - 9 - 7y = -14$$

$$-y - 9 = -14$$

$$\begin{array}{r} -y - 9 = -14 \\ +9 \quad +9 \\ \hline -y = -5 \\ y = 5 \end{array}$$

$$x = 2y - 3$$

$$x = 2(5) - 3 = 7$$

$$x = 7$$

Solution: (7, 5)

$$10x + y = 35$$

$$4x - 7y = -23$$

$$10x + y = 35 \rightarrow y = 35 - 10x$$

$$4x - 7y = -23$$

$$4x - 7(35 - 10x) = -23$$

$$4x - 245 + 70x = -23$$

$$74x - 245 = -23$$

$$74x = 222$$

$$x = 3$$

Whew! That was getting icky!

$$x = 3$$

$$y = 35 - 10x$$

$$y = 35 - 10(3)$$

$$y = 5$$

Solution: (3, 5)

$$2x + 4y = -6$$

$$x + 2y = 3$$

$$x = -2y + 3$$

$$2(-2y + 3) + 4y = -6$$

$$-4y + 6 + 4y = -6$$

$$6 = -6$$

No solution

Try these – SHOW ALL WORK

1. $y = 6x - 11$
 $-2x - 3y = -7$

2. $y = -5x - 17$
 $-3x - 3y = 3$

3. $-4x + y = 6$
 $-5x - y = 21$

4. $-3x + 3y = 4$
 $-x + y = 3$

5. $-2x - y = -9$
 $5x - 2y = 18$

6. $-4x + y = 6$
 $-5x - y = 21$

Answer Key: 1) (2, 1) 2) (-4, 3) 3) (-3, -6) 4) no solution 5) (4, 1)
6) (-3, -6)

Solving systems using elimination – here are some examples. Sometimes, you have to multiply one or both of equations to get one of the variables to cancel.

$$\begin{array}{r}
 2x + 3y = 20 \\
 -2x + y = 4 \\
 \hline
 2x + 3y = 20 \\
 + \quad -2x + y = 4 \\
 \hline
 0 + 4y = 24 \\
 4y = 24 \\
 \boxed{y = 6}
 \end{array}$$

$-2x + y = 4$ $y = 6$
 $-2x + 6 = 4$
 $-2x = -2$
 $\boxed{x = 1}$
Solution: (1, 6)

$$\begin{array}{r}
 3x - 4y = -5 \\
 5x - 2y = -6 \\
 \hline
 3x - 4y = -5 \\
 -2(5x - 2y = -6) \\
 \hline
 3x - 4y = -5 \\
 -10x + 4y = 12 \\
 \hline
 -7x + 0 = 7 \\
 -7x = 7 \\
 \boxed{x = -1}
 \end{array}$$

$3(-1) - 4y = -5$
 $-4y = -2$
 $y = \frac{1}{2}$
Solution : (-1, $\frac{1}{2}$)

$$\begin{array}{r}
 2x + 8y = 6 \\
 -5x - 20y = -15 \\
 \hline
 5(2x + 8y = 6) \\
 2(-5x - 20y = -15) \\
 \hline
 10x + 40y = 30 \\
 -10x - 40y = -30 \\
 \hline
 0 = 0
 \end{array}$$

Infinitely Many Solutions

$-3 - 4y = -5$

Try these- SHOW ALL WORK

1. $-4x - 2y = -12$
 $4x + 8y = -24$

2. $x - y = 11$
 $2x + y = 19$

$$\begin{aligned} 3. \quad & 8x + y = -16 \\ & -3x + y = -5 \end{aligned}$$

$$\begin{aligned} 4. \quad & -7x + y = -19 \\ & -2x + 3y = -19 \end{aligned}$$

$$\begin{aligned} 5. \quad & 3x - 2y = 2 \\ & 12x - 8y = 8 \end{aligned}$$

Answer Key: 1. (6, -6) 2. (10, -1) 3. (-1, -8) 4. (2, -5)
5. infinitely many solutions

Simplifying Radicals

Simplifying square roots. Find the highest perfect square that goes into the number, then go from there! Here are some examples.

How to Simplify Radicals

Example #1
Simplify: $\sqrt{48}$
 $\sqrt{48} = \sqrt{16 \times 3}$
 $\downarrow \quad \downarrow$
 $4 \times \sqrt{3}$
 $= 4\sqrt{3}$

Example #2
Simplify: $\sqrt{72}$
 $\sqrt{72} = \sqrt{36 \times 2}$
 $\downarrow \quad \downarrow$
 $6 \times \sqrt{2}$
 $= 6\sqrt{2}$

Example #3
Simplify: $\sqrt{320}$
 $\sqrt{320} = \sqrt{64 \times 5}$
 $\downarrow \quad \downarrow$
 $8 \times \sqrt{5}$
 $= 8\sqrt{5}$

1) $\sqrt{72}$

2) $\sqrt{18}$

3) $\sqrt{96}$

4) $\sqrt{144}$

5) $\sqrt{175}$

6) $\sqrt{12}$

7) $\sqrt{45}$

8) $\sqrt{27}$

9) $\sqrt{216}$

10) $\sqrt{98}$

Answer Key: 1) $6\sqrt{2}$ 2) $3\sqrt{2}$ 3) $4\sqrt{6}$ 4) 12 5) $5\sqrt{7}$ 6) $2\sqrt{3}$
 7) $3\sqrt{5}$ 8) $3\sqrt{3}$ 9) $6\sqrt{6}$ 10) $7\sqrt{2}$

Factoring

WHEN A = 1. Here is an example.

$x^2 + 10x + 24$
a=1 b=10 c=24

FACTORS of 24	SUM of 10
1, 24	25 X
2, 12	14 X
3, 8	11 X
4, 6	10 ✓

$(x + 4)(x + 6)$

1) $x^2 + 7x + 12$

2) $x^2 + 4x - 12$

3) $x^2 - 13x + 40$

4) $x^2 + 2x - 24$

5) $x^2 - 10x + 9$

Answer Key: 1. $(x + 4)(x + 3)$ 2. $(x - 2)(x + 6)$ 3. $(x - 5)(x - 8)$ 4. $(x + 6)(x - 4)$
 5. $(x - 1)(x - 9)$

WHEN $A > 1$ AC METHOD. Here is an example.

$A = 8$	$8x^2 - 10x + 3$	24	Sum
$B = -10$		$1 \cdot 24$	25
$C = 3$	$A \cdot C = 8 \cdot 3 = 24$	$2 \cdot 12$	14
		$3 \cdot 8$	11
	$8x^2 - 4x - 6x + 3$	$4 \cdot 6$	10
	$= 4x(2x-1) - 3(2x-1)$	$-1 \cdot -24$	-25
	$= (2x-1)(4x-3)$	$-2 \cdot -12$	-14
	$= 8x^2 - 6x - 4x + 3$	$-3 \cdot -8$	-11
	$= 8x^2 - 10x + 3$	$-4 \cdot -6$	-10

1) $3x^2 - 2x - 5$

2) $3x^2 - 8x + 4$

3) $5x^2 + 19x + 12$

4) $2x^2 + 11x + 5$

5) $5x^2 - 18x + 9$

Answer Key: 1. $(3x-5)(x+1)$

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

3. $(5x+4)(x+3)$

4. $(2x+1)(x+5)$

5. $(5x-3)(x-3)$

DIFFERENCE OF SQUARES. Here are some examples.

DIFFERENCE OF TWO SQUARES

RULE $a^2 - b^2 = (a + b)(a - b)$

The difference of a^2 and b^2 is equal to the PRODUCT of the sum of a and b and the difference of a and b .

Quick Examples © CHILMATH.COM

$x^2 - 25 = (x + 5)(x - 5)$ ● $m^2 - 49n^2 = (m + 7n)(m - 7n)$
 $4y^2 - 1 = (2y + 1)(2y - 1)$ ● $81a^2 - 9b^2 = (9a + 3b)(9a - 3b)$

1) $81x^2 - 25$

2) $(121x^2 - 4)$

3) $49x^2 - 36$

4) $169x^2 - 9$

5) $64x^2 - 1$

Answer Key: 1. $(9x-5)(9x+5)$ 2. $(11x-2)(11x+2)$ 3. $(7x-6)(7x+6)$

4. $(13x-3)(13x+3)$ 5. $(8x-1)(8x+1)$

FACTOR BY GROUPING. Here is an example.

$$\begin{aligned} & x^3 - 2x^2 + 5x - 10 \\ &= (x^3 - 2x^2) + (5x - 10) \\ &= x^2(x - 2) + 5(x - 2) \\ &= (x - 2)(x^2 + 5) \end{aligned}$$

1) $35xy - 5x - 56y + 8$

2) $x^3 - x^2 + 2x - 2$

3) $3x^3 - 4x^2 + 9x - 12$

4) $2x^3 + 5x^2 + 6x + 15$

5) $12xy - 28x - 15y + 35$

Answer Key: 1. $(5x - 8)(7y - 1)$

2. $(x^2 + 2)(x - 1)$

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

4. $(x^2 + 3)(2x + 5)$

5. $(4x - 5)(3y - 7)$