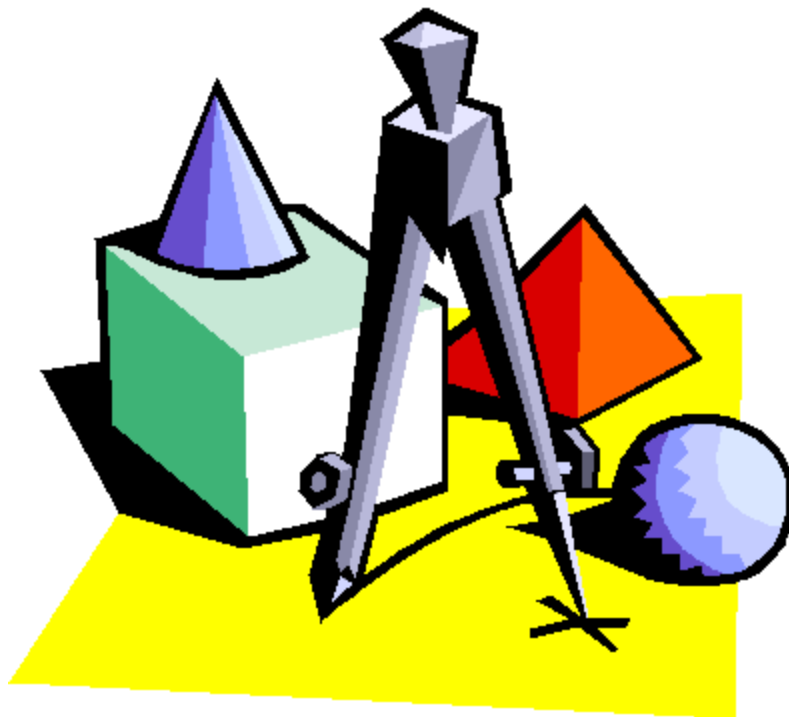


EAST ALLEGHENY

GEOMETRY



SUMMER PACKET

Name _____

Dear Student PLEASE READ,

Please complete the following packet. This packet is a comprehensive review of all of the mathematics that will be necessary to be successful in GEOMETRY next school year. This packet WILL be collected on September 7th, 2010, the first day of school. We will then review problems from the packet on Tuesday, Wednesday and Thursday. You will have a test on the reviewed material on Monday, September 13th, 2010. This packet and test will be worth 25% of your first 9-week grade.

Should you lose or misplace your packet over the summer months, you have two options of recovery. You may go to the high school office and ask for another copy of this packet, or you may go online to eawildcats.net and print out another copy for yourself directly from the EA website.

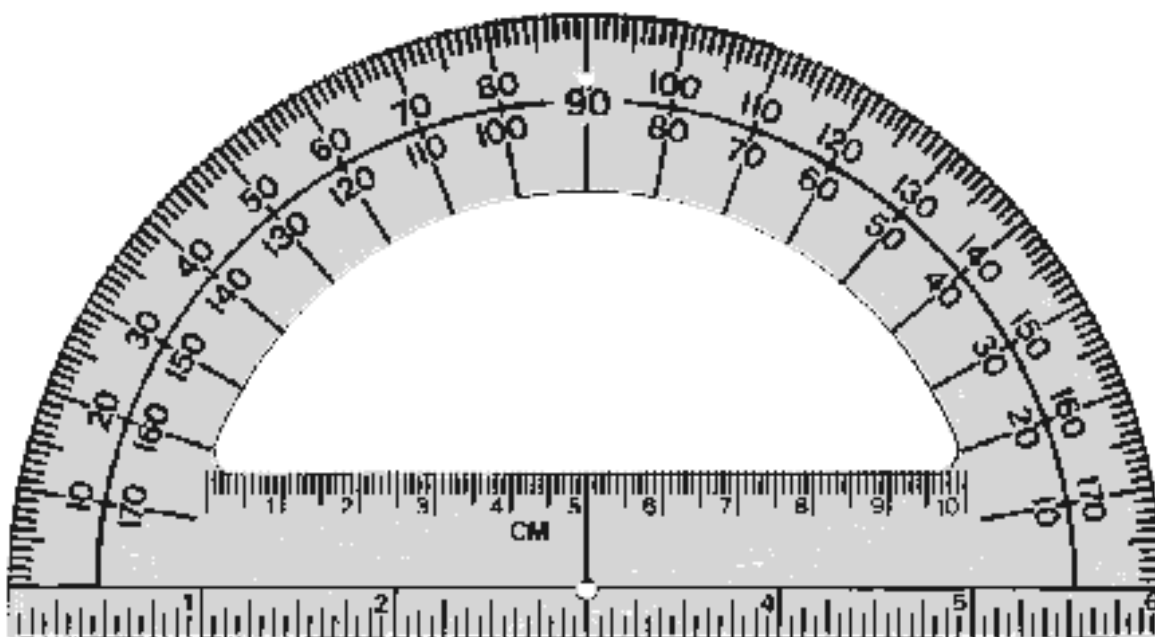
Take your time with this packet as it is very important to your grade at the beginning of next year. You might want to pace yourself with this packet and complete a few pages each week this summer to keep you from getting frustrated and burnt out. Remember, all concepts within the packet are those which you should already know. It is just a review to prepare you for the start of next year!

Good luck and have a wonderful summer break.

Mrs. McCurdy & Mrs. Smith

Honors Geometry and Geometry Teachers

If you do not have a protractor or ruler at home, you may cut this one out. You will need to measure angles and segments in this packet.



SOLVING EQUATIONS

Objective: To solve equations using more than one transformation.

Example 1

Solve for x.

$$3x - 7 = 8$$

$$3x - 7 + 7 = 8 + 7$$

$$3x = 15$$

$$x = 5$$

Add 7 to both sides of the equation

Combine like terms

Divide both sides by 3

Solve for the variable. Show all the steps. All answers will not be integers; write these as a mixed number.

1. $2x + 1 = 15$

2. $-11 + 4x = 25$

3. $13 - 5x = 22$

4. $7 - 3x = -10$

5. $-x + 16 = 28$

6. $7x + 2 = 0$

Example 2

Solve for x

$$12 + 3x = 2 + 5x$$

$$12 + 3x - 3x = 2 + 5x - 3x$$

$$12 = 2 + 2x$$

$$12 - 2 = 2 - 2 + 2x$$

$$10 = 2x$$

$$5 = x$$

Subtract $3x$ from both sides

Combine like terms

Subtract 2 from both sides

Combine like terms

Divide both sides by 2

Solve for the variable. Show all the steps. All answers will not be integers; write these as a mixed number.

7. $2x - 15 + x = 9$

8. $7x - 90 = 120 + x$

9. $8x + 8 = x + 1$

10. $4x + 5 + 5x + 40 = 180$

11. $22 - 13x = -8 - 2x - 18x$

12. $2 + 5x + 18 = -7x + 1$

Multiplying with Monomials

$$(3a^3b)(5a^2b) = 3 \cdot 5a^{3+2}b^{1+1} = 15a^5b^2$$

$$(-2a^2b)^4 = (-2)^4 (a^2)^4 (b)^4 = -2 \cdot -2 \cdot -2 \cdot -2a^{2 \cdot 4}b^{1 \cdot 4} = 16a^8b^4$$

1. $(4c)^2$

7. $(-xy^2)^3 (2x^2y)^2$

2. $(2a^2b)(4ab^2)$

8. $x^2(-2xz)(4z^5)$

3. $(4pq)(-p^2q^3)$

9. $(3pq^2r^3)\left(\frac{1}{3}q^2r\right)$

4. $2x(-xy)(-y^2)$

10. $(-x)(-2xy)(-3xyz)$

5. $a(2a^2)^3$

11. $2x^2(xy^2)^2(xz^2)^2$

6. $3s(-2st)^2$

12. $(2u)^2(u^2v)^3(w)$

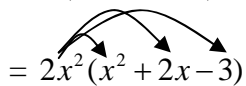
DISTRIBUTIVE PROPERTY

Objective: To multiply a variety of polynomials using the distributive property.

Example

Distribute

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


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

$$= (2x^2 \cdot x^2) + (2x^2 \cdot 2x) - (2x^2 \cdot 3)$$

$$= 2x^4 + 4x^3 - 6x^2$$

Use distributive property

Distribute $2x^2$ to every term in parenthesis

Multiply and write answer in decreasing powers of x

Apply the distributive property.

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

2. $2x(x^2 - 7x)$

3. $8x(x^2 - 2x + 3)$

4. $5x^2(x - 17)$

5. $-4x^2(x^2 + 3x - 12)$

6. $-x^3(4x^2 - 16x - 27)$

7. $-4x^4(x^2 - 25)$

8. $-10x(3x^2 + 6x - 8)$

SOLVING EQUATIONS USING THE DISTRIBUTIVE PROPERTY

Objective: To solve equations involving the distributive property.

Example 1

Solve for x.

$$3(4x - 5) = 9$$

$$12x - 15 = 9$$

$$12x - 15 + 15 = 9 + 15$$

$$12x = 24$$

$$x = 2$$

Distribute the 3

Add 15 to both sides

Combine like terms

Divide both sides by 2

Solve for the variable. Show all the steps. All answers will not be integers; write these as a mixed number.

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

2. $5(x+7) = 0$

3. $6(x-4) + 5 = 11$

4. $-3 = 7(x-2) + 11$

5. $-2(14x+5) = -8$

6. $-(x+7) - 4 = 6$

Example 2

Solve for x.

$$\frac{1}{2}(x+6)=12$$

$$\frac{1}{2}x+3=12$$

Distribute

$$\frac{1}{2}x+3-3=12-3$$

Subtract 3

$$\frac{1}{2}x=9$$

Combine like terms

$$2 \cdot \left(\frac{1}{2}x\right) = (9) \cdot 2$$

Multiply by reciprocal

$$x=18$$

Simplify

Solve for the variable. Show all the steps. All answers will not be integers; write these as a mixed number.

7. $\frac{1}{3}(x-15)=-1$

8. $\frac{2}{5}(x+10)=18$

9. $-\frac{3}{4}(x+12)=-3$

Example 3

Solve for x .

$$\left(\frac{x+3}{4}\right) = 3$$

$$4\left(\frac{x+3}{4}\right) = 3 \cdot 4 \quad \text{Multiply both sides by denominator to clear the fraction}$$

$$x+3 = 12 \quad \text{Simplify}$$

$$x = 9 \quad \text{Subtract 3 from both sides}$$

Solve for the variable. Show all the steps. All answers will not be integers; write these as a mixed number.

10. $\frac{(x-6)}{2} = 11$

11. $-\frac{(x-4)}{6} = 8$

12. $-\frac{(x+7)}{5} = -2$

MULTIPLYING BINOMIALS

Objective: To multiply binomials using the FOIL method.

Example

Multiply

$$(x+2)(x-3)$$

$$= (x+2)(x-3)$$

$$= (x+2)(x-3)$$

$$= (x+2)(x-3)$$

$$= (x+2)(x-3)$$

$$= x^2 - 3x + 2x - 6$$

$$= x^2 - x - 6$$

F (multiply the first terms together)

O (multiply the outside terms together)

I (multiply the inside terms together)

L (multiply the last terms together)

Perform multiplication

Combine Like terms

Use the FOIL method to multiply. Show ALL steps.

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

2. $(x+7)(x-8)$

3. $(x-5)(x+9)$

4. $(x-3)(x-12)$

5. $(2x+6)(x-4)$

6. $(3x-5)(6x+2)$

7. $(x+11)(x-11)$

8. $(x+15)(x+15)$

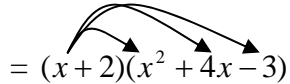
MULTIPLYING POLYNOMIALS

Objective: To multiply binomials and trinomials.

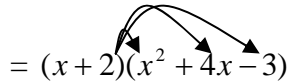
Example

Multiply

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


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

Distribute the x


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

Distribute the 2

$$= (x^3+4x^2-3x)+(2x^2+8x-6)$$

Perform multiplication

$$= x^3+6x^2+5x-6$$

Combine like terms

Multiply the polynomials. Show ALL steps.

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

2. $(x-5)(2x^2-x-8)$

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

4. $(x^2+3)(x^2+6x+12)$

5. $(2x^2-6)(x^2-3x+7)$

6. $(3x-5)(6x^2+2x-3)$

7. $(x+11)(2x^3+3x^2-10)$

8. $(x^3+15)(2x^2+3x-4)$

SLOPE AND THE COORDINATE PLANE

Objective: To determine slope both algebraically and graphically.

$$\text{Slope} = \frac{\text{vertical change}}{\text{horizontal change}}$$

Example 1

Calculate the slope of the line containing points:

(2,4) and (3,7)

$\frac{\text{change in } y}{\text{change in } x}$

Formula to find slope

$$\frac{4-7}{2-3}$$

Substitute x and y values

$$\frac{-3}{-1}$$

Simplify

$$3$$

Simplify

$$\text{Slope} = \frac{\text{change in } y\text{-values}}{\text{change in } x\text{-values}} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$(x_1, y_1) (x_2, y_2)$$

$$(-1, 5) (3, -2)$$

$$\text{slope} = \frac{-2-5}{3-(-1)} = \frac{-7}{4}$$

Calculate the slope of the line containing the pairs of points. You may leave an answer as an improper fraction, but it should be in lowest terms.

1. (3,8) and (0,4)

2. (-1,2) and (6,5)

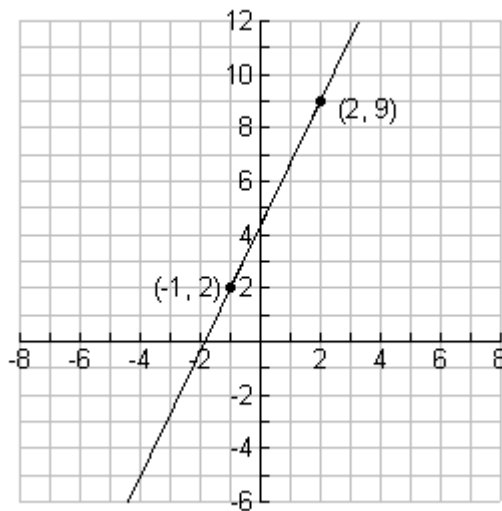
3. (-4, -1) and (9,-3)

4. (4,2) and (-7, -8)

Example 2

Use the graph to:

- determine the slope of the line pictured on the coordinate plane
- determine the point where the graph crosses the y-axis
- write the equation of the line in slope-intercept form.



Choose two ordered pairs that are points on the line:

$(-1, 2)$ and $(2, 9)$

- Use the method outlined in Example 1 to calculate the slope.

$$\frac{2-9}{-1-2} = \frac{-7}{-3} = \frac{7}{3}$$

- The line crosses the y-axis at the point $(0, 4)$.

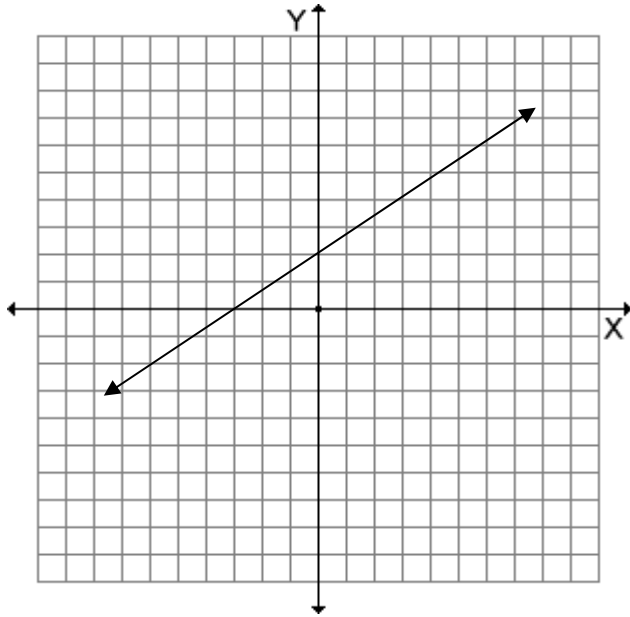
- The equation of the line is $y = \frac{7}{3}x + 4$.

Remember the
slope-intercept
equation:
 $y = mx + b$

Calculate the slope and determine the point where the graph crosses the y-axis. Write the equation of the line in slope-intercept form.

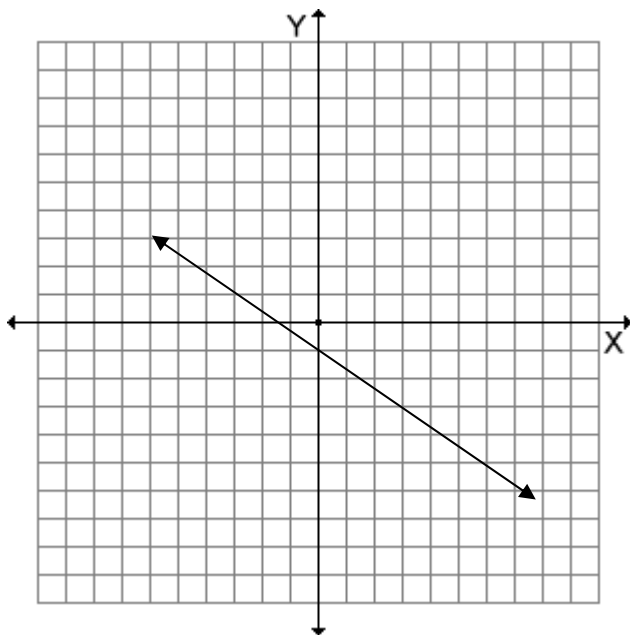
1.

Show work here:



2.

Show work here:



GRAPHING LINEAR EQUATIONS

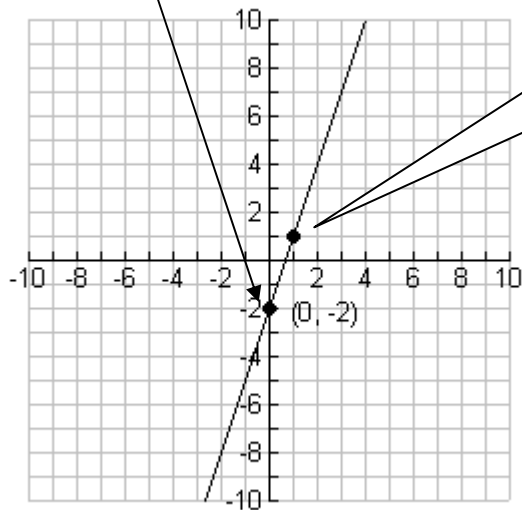
Objective: Graph a line given the equation.

Example

The equation of a line is $y = 3x - 2$.

Identify the slope, y-intercept, and graph the equation.

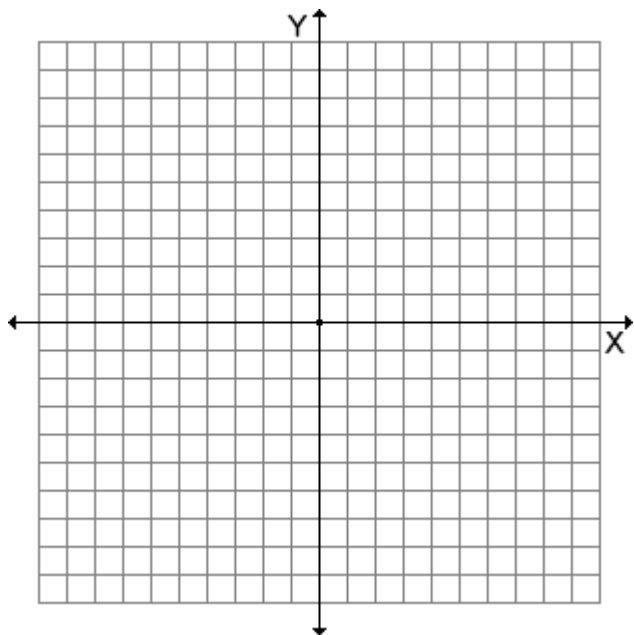
y-intercept is $(0, -2)$



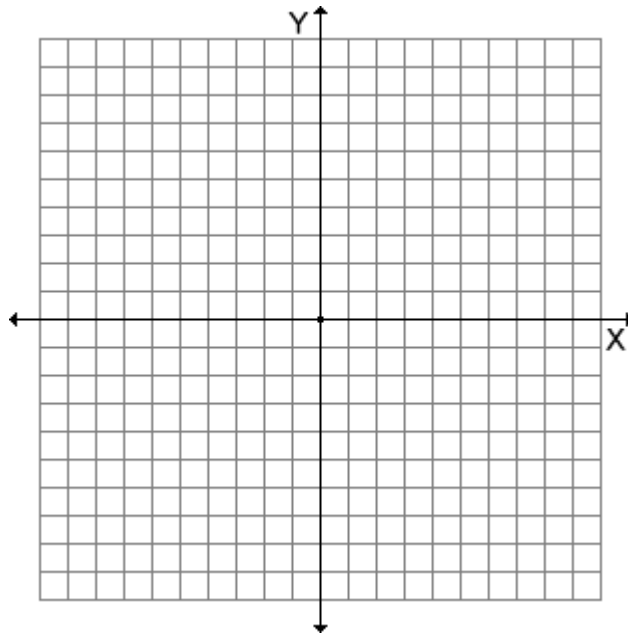
Slope is 3, which can be written as $\frac{3}{1}$
(change in y is +3, change in x is +1)

Use the coordinate planes to graph the following equations.

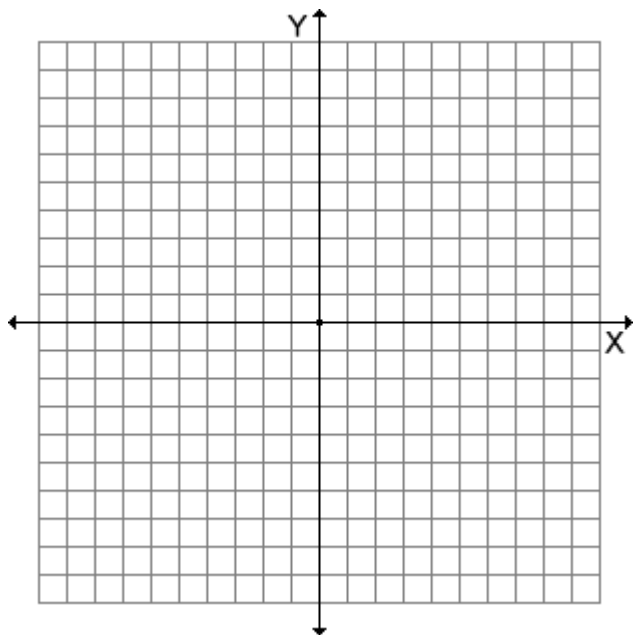
1. $y = -x + 3$



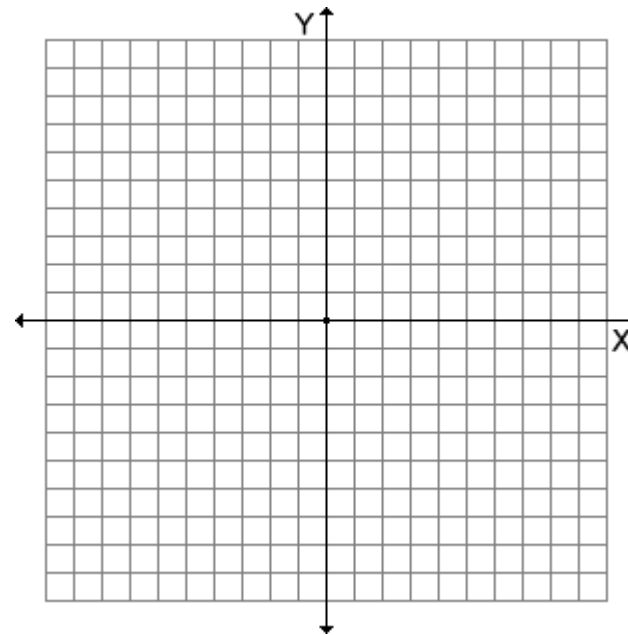
2. $y = -2x - 5$



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



4. $y - \frac{7}{2}x = 0$



FACTORING GCF

Objective: Factor using the greatest common factor (GCF).

Example

Factor

$$2x^3 + 4x^2$$

$$2x^2(x + 2)$$

Factor out the $2x^2$ that all the terms have in common

Factor out the GCF in each polynomial.

1. $3x^2 - 24x$

2. $4x^2 + 16x - 32$

3. $3x^3 - 2x^2$

4. $25x^7 - 50x^3$

5. $40x^3 + 10x^2 - 60x$

6. $3xy - 6y^2 + 12xy^2$

7. $33x^3 + 143x^2 - 121x$

8. $24x^2y^2 + 16x^3y - 96xy$

9. $225x^2 - 90$

10. $60y^2 - 36y^5 + 72y - 84y^3$

FACTORING POLYNOMIALS

Objective: Factor trinomials and difference of two squares.

Example

Factor

$$x^2 - 10x + 16$$

1. Since the coefficient of the x^2 term is one, just think of factors of your last term: +16 that add up to the middle term: -10.
2. The factors of +16 that add up to -10 are -8 and -2.
3. Therefore:

$$x^2 - 10x + 16 = (x - 2)(x - 8)$$

So, the solution is: $(x - 2)(x - 8)$

****Hint:** to check your answer, simply use the foil method. If you come up with the trinomial that you started with, you are correct!

Factor the polynomials.

1. $x^2 - 11x + 24$

2. $x^2 + 15x + 54$

3. $x^2 - 10x + 16$

4. $x^2 + 2x - 63$

5. $x^2 - 5x - 36$

6. $x^2 + 22x + 121$

7. $x^2 - 25$

8. $x^2 - 100$

9. $x^2 - 144$

10. $x^2 + 20x - 125$

11. $3x^2 + 7x + 2$

12. $2x^2 - 3x - 9$

THE QUADRATIC FORMULA

Objective: To find the solution to a quadratic equation using the quadratic formula.

Example

The formula is: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Solve for x using the quadratic formula.

$$x^2 + 2x - 15 = 0$$

$$a = 1, b = 2, c = -15$$

Identify a, b, and c

$$x = \frac{-2 \pm \sqrt{2^2 - 4 \cdot 1 \cdot -15}}{2 \cdot 1}$$

Substitute values into the formula for a, b, and c

$$x = \frac{-2 \pm \sqrt{4 + 60}}{2}$$

$$x = \frac{-2 \pm \sqrt{64}}{2}$$

Simplify

$$x = \frac{-2 \pm 8}{2}$$

$$x = \frac{-2 + 8}{2} \text{ and } x = \frac{-2 - 8}{2}$$

Split the equation to find both solutions

$$x = \frac{6}{2} \text{ and } x = \frac{-10}{2}$$

Simplify and reduce the fractions

$$x = 3 \text{ and } x = -5$$

Use the quadratic formula to solve for x . Not all answers will be integers. Some may contain radicals. Write your answers on the lines below each equation. Show all steps.

1. $x^2 + 10x + 21 = 0$

2. $2x^2 - 5x - 7 = 0$

$X = \underline{\hspace{2cm}}$ & $\underline{\hspace{2cm}}$

$X = \underline{\hspace{2cm}}$ & $\underline{\hspace{2cm}}$

3. $x^2 - x = 9$

4. $x^2 + x = 42$

$X = \underline{\hspace{2cm}}$ & $\underline{\hspace{2cm}}$

$X = \underline{\hspace{2cm}}$ & $\underline{\hspace{2cm}}$

SIMPLIFYING RADICALS

Objective: To simplify radicals without the use of a calculator.

Example

Simplify the radical.

$$\begin{aligned}\sqrt{27} &= \sqrt{9 \cdot 3} \\ &= \sqrt{9} \cdot \sqrt{3} \\ &= 3\sqrt{3}\end{aligned}$$

Simplify the radical.

1. $\sqrt{24}$

2. $\sqrt{200}$

3. $\sqrt{125}$

4. $\sqrt{48}$

5. $\sqrt{363}$

6. $\sqrt{240}$

OPERATIONS WITH RADICALS

Objective: To incorporate operations with radicals.

Example 1

Add

$$3\sqrt{5} + 7\sqrt{5} = 10\sqrt{5}$$

Add the outside terms and keep the same radical
(the same process is used with subtraction)

Example 2

Multiply

$$3\sqrt{5} \cdot 4\sqrt{15}$$

$$= 3 \cdot 4 \cdot \sqrt{5 \cdot 15}$$

$$= 12\sqrt{75} \quad \leftarrow \text{Simplify the radical}$$

$$= 12\sqrt{25 \cdot 3}$$

$$= 12\sqrt{25} \cdot \sqrt{3}$$

$$= 12 \cdot 5 \cdot \sqrt{3}$$

$$= 60\sqrt{3}$$

Example 3

Divide

$$\frac{10\sqrt{2}}{5}$$

$$= 2\sqrt{2}$$

Perform the indicated operation.

1. $6\sqrt{7} + 4\sqrt{7}$

2. $8\sqrt{11} - 7\sqrt{11}$

3. $5\sqrt{6} - \sqrt{6}$

4. $7\sqrt{15} + 8\sqrt{15}$

5. $\frac{12\sqrt{5}}{3}$

6. $\frac{22\sqrt{7}}{2}$

7. $2\sqrt{3} \cdot \sqrt{5}$

8. $7\sqrt{5} \cdot 8\sqrt{20}$

9. $\sqrt{10} \cdot 6\sqrt{5}$

10. $\sqrt{11} \cdot \sqrt{99}$

11. $6\sqrt{2} \cdot 3\sqrt{2}$

12. $2\sqrt{3} \cdot 3\sqrt{48}$

Solving Problems

Set up and solve each equation.

The sum of twice a number and 21 is 83. Find the number.

$$2n + 21 = 83$$
$$2n + 21 - 21 = 83 - 21$$

$$2n = 62$$

$$n = 31$$


The number is 31.

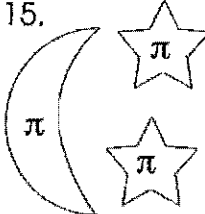
1. Twice a number, diminished by 17 is -3. Find the number.
2. Six times a number, increased by 3 is 27. Find the number.
3. Three times the difference of 5 minus a number is 27. Find the number.
4. Karl's team score is 39 points. This was one point less than twice Todd's team score. Find Todd's team score.
5. The length of a rectangle is 6 feet more than twice the width. If the length is 24 feet, what is the width?
6. Four-fifths of the third grade went on a trip to the zoo. If 64 children made the trip, how many children are in the third grade?
7. The price of a pack of gum today is 63¢. This is 3¢ more than three times the price 10 years ago. What was the price 10 years ago?

Just for Fun

Try and de-code these words and phrases.

STAND → I understand.



1. <div style="border: 1px solid black; padding: 5px; display: inline-block; margin: 10px auto;">SAND</div>	2. MOMANON	3. R E A D	4. WEAR LONG
5. MCE MCE MCE	6. <u>HANDS</u> ACTIVITIES	7. KEND VACATION	8. FALUTING
9. ...SIGN...	10. LET GONES GONES B GONES GONES	11. Thought Clever	12. luck LUCK <i>uck</i> LUCK luck LUCK <i>luck</i> LUCK luck LUCK <i>luck</i>
13. MAN BOARD	14. <div style="border: 1px solid black; border-radius: 50%; width: 60px; height: 60px; display: flex; align-items: center; justify-content: center; margin: 10px auto;">ROSES</div>	15. 	16. T O U C H

MEASURING WITH A RULER AND PROTRACTOR

Objective: To measure with a protractor and ruler.

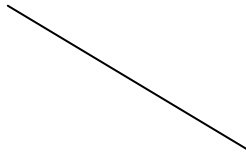
The last page of this packet contains a copy of a protractor and a ruler. If you do not have a protractor at home, you may cut these out to complete this objective. It is strongly suggested that you purchase a ruler and a protractor to use at home.

Measure the following segments. Your answers should be to the nearest $\frac{1}{16}$ ".

1.



2.



3.



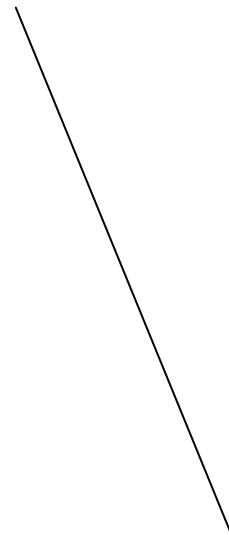
4.



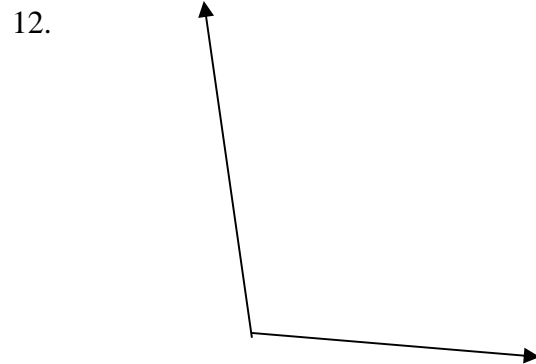
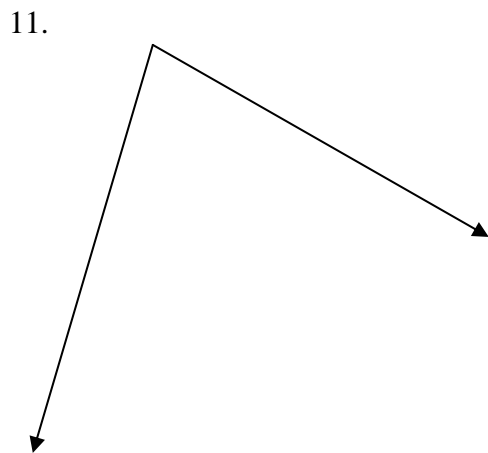
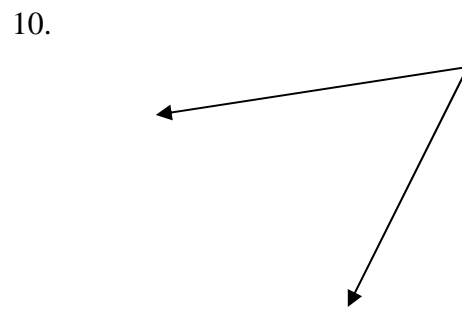
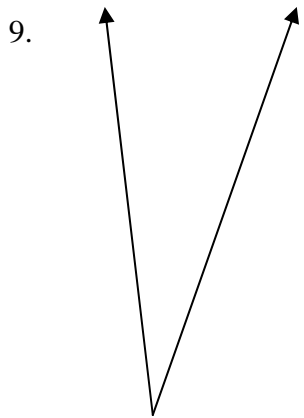
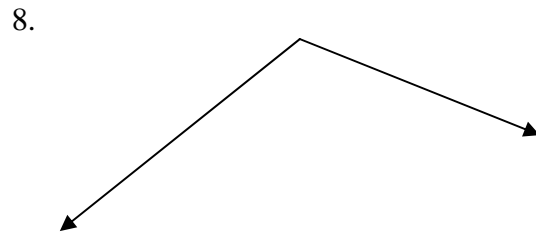
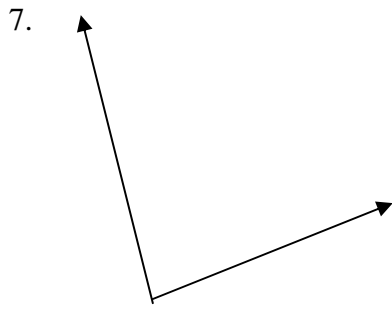
5.



6.



Measure the indicated angle with a protractor.



CONSTRUCTING SEGMENTS AND ANGLES

Objective: To draw segments and angles given the lengths and measures.

Draw horizontal segments next to the given lengths.

1. $3\frac{5}{16}$ ”

2. $1\frac{15}{16}$ ”

3. $5\frac{3}{4}$ ”

4. $4\frac{1}{2}$ ”

5. $\frac{11}{16}$ ”

Draw horizontal segments next to the given lengths.

6. 5 cm

7. 3.2 cm

8. 7.8 cm

9. 9 mm

10. 2.9 mm

11. 15 mm

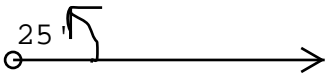
12. 5.5 cm

Start with a Ray. Measure with a protractor.
Draw another Ray.

Draw the following angles.

13. 25°

14. 62°



15. 110°

16. 140°

17. 210°

18. 237°

19. 300°

20. 346°

FRACTIONS

Objective: To add, subtract, multiply and divide fractions.

Example 1

a. Add $\frac{4}{5} + \frac{3}{5}$

$$\frac{4}{5} + \frac{3}{5} = \frac{4+3}{5} = \frac{7}{5} = 1\frac{2}{5}$$

b. Subtract $\frac{5}{9} - \frac{2}{9}$

$$\frac{5}{9} - \frac{2}{9} = \frac{5-2}{9} = \frac{3}{9} = \frac{1}{3}$$

Example 2

Add $\frac{3}{4} + \frac{5}{6}$

$$\frac{3}{4} + \frac{5}{6} = \frac{9}{12} + \frac{10}{12}$$

$$\frac{9+10}{12} = \frac{19}{12} \text{ or } 1\frac{7}{12}$$

Example 3

Multiply $\frac{3}{4} \cdot \frac{8}{13}$

$$\frac{3}{4} \cdot \frac{8}{13}$$

$$\frac{6}{13}$$

Example 4

Divide $\frac{2}{3} \div \frac{1}{9}$

$$\frac{2}{3} \cdot \frac{9}{1}$$

$$6$$

Change to a multiplication problem

Hints for adding and subtracting fractions:

- Find a common denominator
- Do not write as improper fractions
- Add/subtract numerators only
- Check your answer for an improper fraction
- Reduce the answer if necessary

Hints for multiply fractions:

- Write mixed numbers as improper fractions
- Multiply the numerators across
- Multiply the denominators across
- Write product as a mixed number
- Reduce if necessary

Hints for dividing fractions:

- Write mixed numbers as improper fractions
- Dividing by a number is the same as multiplying by the reciprocal
- Follow the last four steps from the hints for multiplying as stated above

Perform the indicated operation. Show ALL work. No calculators!

1. $3\frac{1}{2} + 6\frac{2}{3}$

2. $2\frac{3}{5} + 10\frac{1}{7}$

3. $9\frac{2}{9} + 5\frac{3}{8}$

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

5. $6\frac{4}{5} - 2\frac{9}{10}$

6. $8 - 5\frac{4}{7}$

7. $4 \cdot \frac{6}{11}$

8. $\frac{2}{3} \cdot \frac{5}{9}$

Perform the indicated operation. Show ALL work. No calculators!

9. $3\frac{1}{5} \cdot \frac{3}{8}$

10. $\frac{4}{9} \cdot 2\frac{1}{7}$

11. $8\frac{1}{3} \div 5$

12. $\frac{9}{14} \div \frac{2}{3}$

13. $6\frac{1}{4} \div 2\frac{1}{8}$

SYSTEMS OF EQUATIONS (SUBSTITUTION)

Objective: Solve the system of equations by substitution.

Example

Solve

$$3x - y = 9$$

$$2x + 5y = -11$$

$$3x - y = 9$$

$$3x = 9 + y$$

Solve one of the equations in terms of a variable

$$3x - 9 = y$$

$$2x + 5y = -11$$

$$2x + 5(3x - 9) = -11$$

Plug $3x-9$ in for y in the other equation

$$2x + 15x - 45 = -11$$

$$17x - 45 = -11$$

Solve for x

$$17x = 34$$

$$x = 2$$

$$3x - y = 9$$

$$3(2) - y = 9$$

Plug 2 in for x in one of the equations

$$6 - y = 9$$

Solve for y

$$y = -3$$

$$(2, -3)$$

Write your answer as an ordered pair

Solve each system of equations using substitution. Show ALL work.

1. $x + 2y = 10$
 $4x + 2y = 16$

2. $5x + y = 13$
 $3x + 3y = 15$

3. $4x + 3y = 1$
 $x + y = 1$

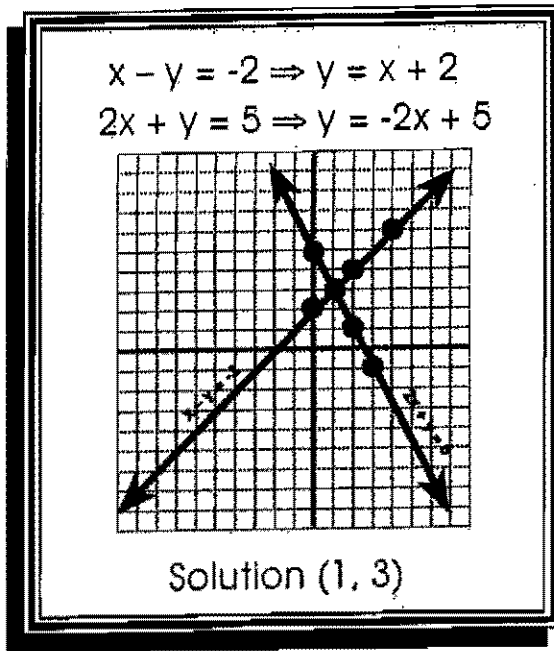
4. $2x - y = 6$
 $-x + y = -1$

5. $6x - y = 3$
 $4x - 2y = -2$

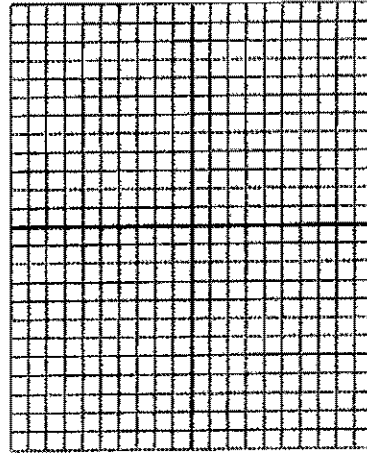
6. $2x + 3y = 7$
 $x = 1 - 4y$

Graphing Systems of Equations

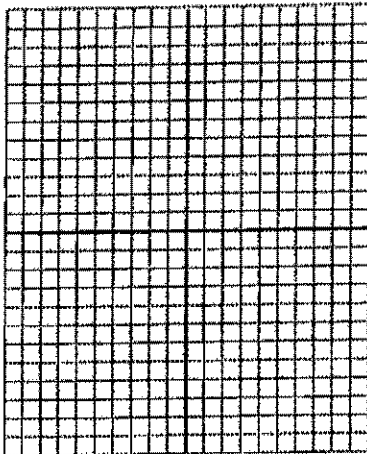
Solve by graphing.



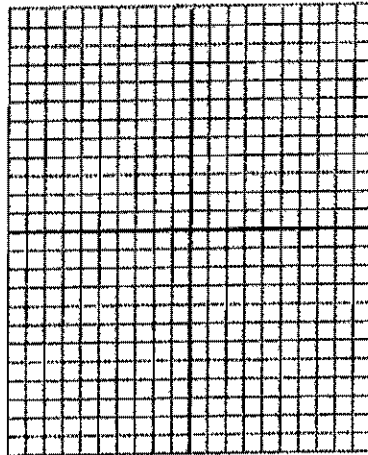
1. $x - y = 6$
 $2x + y = 0$



2. $2x - 2y = -4$
 $y = 2$



3. $2x - y = 1$
 $3x + y = -6$



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

