

**DeBakey High School For Health Professions
Mathematics Department**

Summer review assignment for students who will be entering Geometry in the fall

This is an assignment for students who will be entering Geometry in the fall. These problems cover most of the concepts taught in the Algebra 1 course and in Middle School Math which students are expected to **know** to do well in Geometry course. It is very important to master these skills because they will be applied throughout the Geometry course. Students with a weak foundation in the Algebra 1 and the middle school coursework struggle in Geometry and in subsequent courses. We highly recommend each student work on these problems throughout the summer and come prepared for the Geometry class. Since the students have taken Algebra 1, they are expected to have the necessary background and skills required to solve these problems. **Parents are requested to see that this assignment is completed seriously to ensure success of their child in the Precalculus class.**

A: Order of Operations.

1. Evaluate: $8[6^2 - 3(2 + 5)] \div 8 + 3$

2. Evaluate: $5 \times 7 - 6 \div 2 + 3^2$

3. Evaluate: $5 \times 2^2 - 15 \div 3 + 4$

4. Evaluate: $[3(6) - 4^2]^3 \times 15 \div 5$

B: Solving Equations

Solve for the variable in each equation using any method.

1. $3x + 6 = 24$

2. $\frac{3}{4}(k - 3) = 6$

3. $\frac{6}{2w} = -36$

4. $\frac{8t + 5 - 3t}{4} = -10$

5. $28 = 7(y - 7)$

6. $x - \left(-\frac{3}{7}\right) = -\frac{4}{7}$

7. $9x^2 = 16$

8. $-x - \left(-\frac{5}{6}\right) = \frac{2}{3}$

9. $x^2 = 7x - 10$

10. $-10 = 5n + 15$

B: Simplifying and Evaluating Expressions

1. $f(x) = x^2 - x - 1,$

Evaluate: $f(2)$ and $f(-1)$ *Note: This means evaluate the expression $x^2 - x - 1$, when $x = 2$ and $x = 1$*

2. $f(k) = -x^2 + 2x - 1,$

Evaluate: $f(-2)$ and $f(2)$

3. $f(x) = \frac{x^2 - x + 6}{x + 3}$

Evaluate: $f(2)$ and $f(-1)$

4. *Evaluate: $v^2 - (x^3 - 4b),$*

when $x = 3, v = 5,$ and $b = 5$

5. *Simplify: $7(3x^2y - 4xy^2 + xy)$*

6. $4(3g + 2) - 2(-3g + 1)$

C: Exponents and Radicals**Simplify the following radical expressions.**

1. $\sqrt{50} =$

2. $3\sqrt{27}$

3. $5\sqrt{81}$

4. $4\sqrt{32} + \sqrt{18}$

5. $\sqrt{75} - \sqrt{12}$

6. $(2\sqrt{5}) \times (3\sqrt{20}) =$

7. $\frac{\sqrt{192} - \sqrt{75}}{\sqrt{27}} =$

8. $(3\sqrt{5})^2 =$

9. $(\sqrt{3} - 5)(\sqrt{3} + 5) =$

10. $(2 - \sqrt{5})^2 =$

D. Like and Unlike Terms

Combine any like terms to simplify each of the following expressions.

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

2. $(3p^3 - 2p^2 - 2) - (p^3 + 2p^2 - 1) =$

3. $(m^2 - m + 1) - (m^2 + m - 2) =$

4. $\frac{2}{3}(3x^2 - 6x + 9) - \frac{1}{5}(10x^2 - 15x + 5) =$

5. $\frac{1}{4}(8z^3 - 12z^2) - 2(-z^3 + 3z^2 - 2) =$

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

E: Factoring

Factor each expression or equation, if possible. Solve for x if you are working with an equation.

Solve for x, find the roots, find the solution, find zeros, and find x intercept mean the same.

1. $4x^3 + 20x^2$	2. $x^2 + 10x = -21$
3. $x^2 + x - 6 = 0$	4. $x^2 - 49 = 0$
5. $x^2 + 2x - 1 = 0$	6. $2x^2 - 5x = 3$

7. $3x^2 - 19xy + 20y^2$

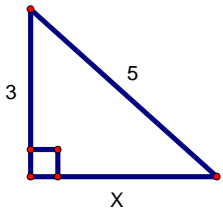
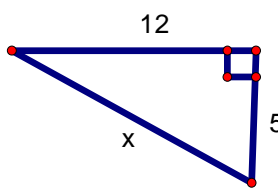
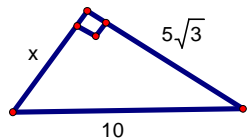
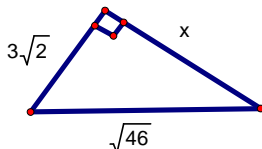
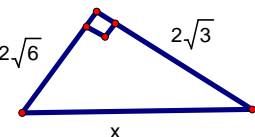
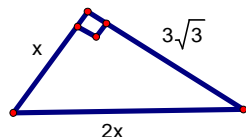
8. $25x^2 - 16y^2$

9. $10x^2 + 17xy + 3y^2$

10. $-4x = 10x^2 - 24x^3$

F: Pythagorean Theorem

Use the Pythagorean Theorem to find x. Express x as a radical in simplest form. Show all steps of your work.

<p>1. </p>	<p>2. </p>
<p>3. </p>	<p>4. </p>
<p>5. </p>	<p>6. </p>

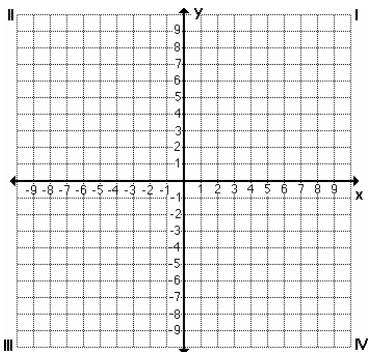
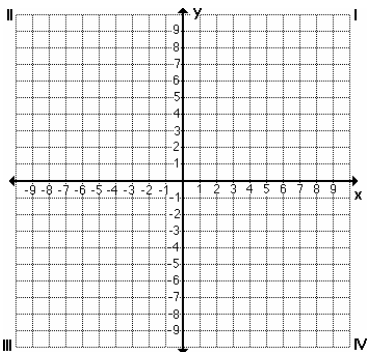
G. WORD Problems.

<p>1. A book costs \$129.95 with a sales tax rate of 8%. What is the total cost of the book?</p>	<p>2. A car rental agency charges a fee of \$35 per day plus \$.20 for each mile driven. How much will it cost to rent the car for 6 days and drive 800 miles?</p>
<p>3. Length of a rectangle is 3 cms. longer than the width. Find the dimensions of the rectangle if it's area is 6 cm^2</p>	<p>4. 3 shirts and 2 pants cost 50 \$. 2 shirts and 3 pants cost 80 \$. What is the cost of one shirt and one pant?</p>

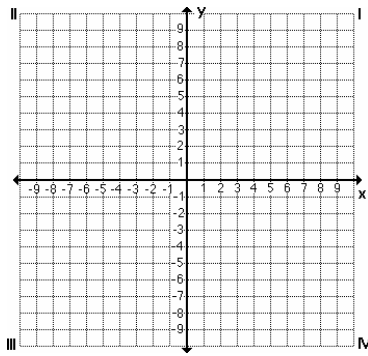
<p>5. Suppose a video store charges non-member \$3 to rent a video. A membership costs \$21 and then videos cost only \$1.50 to rent. How many videos would you need to rent in order to justify a membership?</p>	<p>6. One number is 25 more than a second number. The sum of those numbers is 106. Find the two numbers.</p>
<p>7. The longest loaf of bread ever baked was 2132 ft 2.5 inches. If this loaf was cut into half inch slices, how many slices of bread would there have been?</p>	<p>8. Liquefied Natural Gas is stored in spherical containers. What will be the diameter of a container if you want to store $\frac{500\pi}{3} \text{ met}^3$ of LNG? Use $V = \frac{4}{3}\pi R^3$. Where R is the radius of the container.</p>
<p>9. A ladder is 25 ft long. The ladder needs to reach to a window that is 24 ft above the ground. How far away from the building should the bottom of the ladder be placed?</p>	<p>10. There is a large building on fire. Fire trucks from two different stations respond to the fire. One station is 1 mi east and 2 mi north of the fire. The other station is 2 mi west and 1 mi south of the fire. How far apart are the two fire stations?</p>

H: Graphing

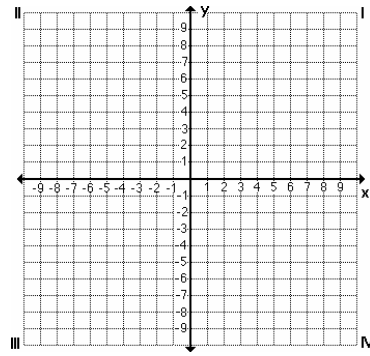
Graph each of the following equations or inequalities.

<p>1. $x + y = 6$</p> 	<p>2. $y < -3$</p> 
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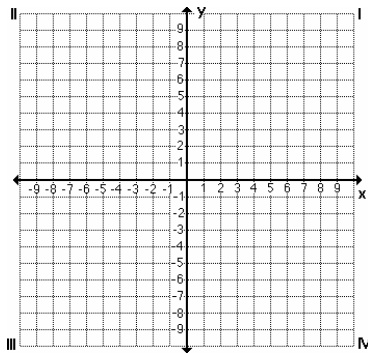
3. $x \geq -3$



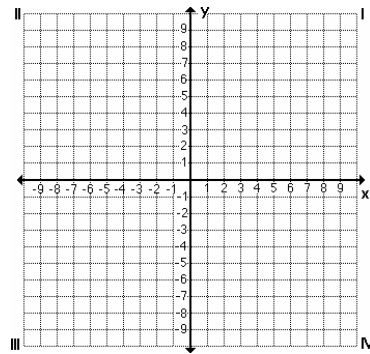
4. $2x + 3y = 6$



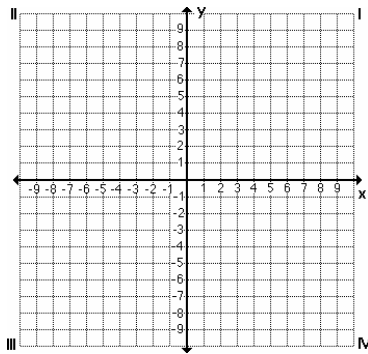
5. $y \leq -\frac{1}{3}x + 4$



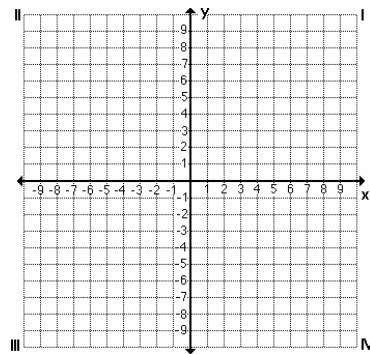
6. $y = -\frac{1}{2}x - 6$



7. $y = -\frac{2}{3}x$



8. $y = -2x + 3$



I: Systems of Equations

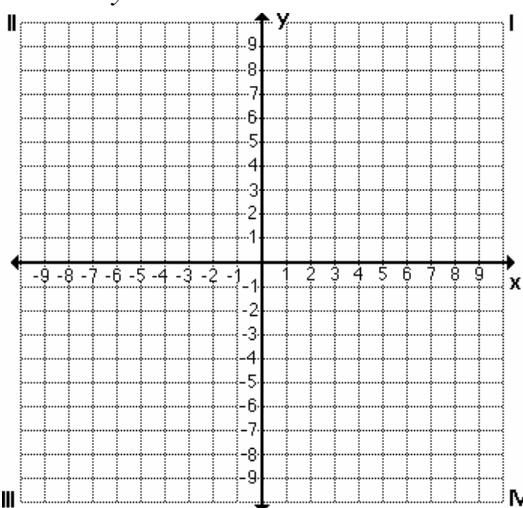
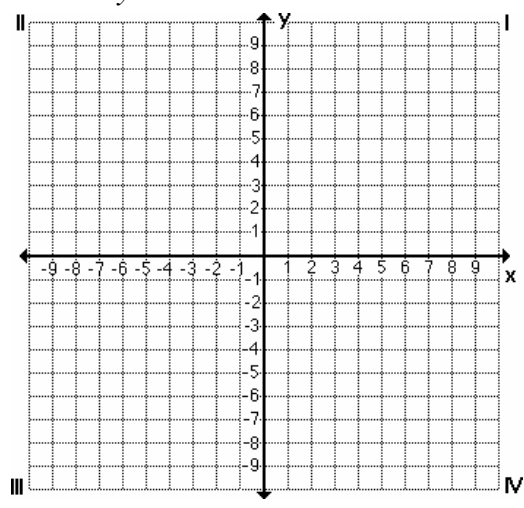
Find the solution to each system of equations using either substitution or elimination.

1. $x + y = 15$
 $x - y = 3$

2. $x + 2y = 1$
 $2x + y = 5$

<p>3. $x - y = 3$ $2x - 2y = 6$</p>	<p>4. $y = \frac{2}{3}x - 5$ $3y = 2x$</p>
<p>5. $\frac{1}{2}x + \frac{1}{3}y = 6$ $y = \frac{1}{2}x + 2$</p>	<p>6. $2x + 4y = 2$ $3x + 6y = 3$</p>
<p>7. $y = -x - 4$ $y = 2x + 14$</p>	<p>8. $2x + 3y = -1$ $3x + 5y = -2$</p>

Find the solution to each system by graphing.

<p>1. $x - y = 3$ $2x - 2y = 6$</p> 	<p>2. $x + y = 5$ $x + y = 2$</p> 
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J. Formulas (Distance, Midpoint, Slope)

Find the distance between each of the following pairs of points. Put all answers in reduced radical form.

$$[d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}]$$

1. B(3, -8) and C(9, -2)	2. X(-5, 3) and Z(4, 1)
3. M(8, 4) and N(-2, 28)	4. E(-4, 4) and F(0, -4)

Find the coordinates of the midpoint between each pair of points. $[M = (\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2})]$

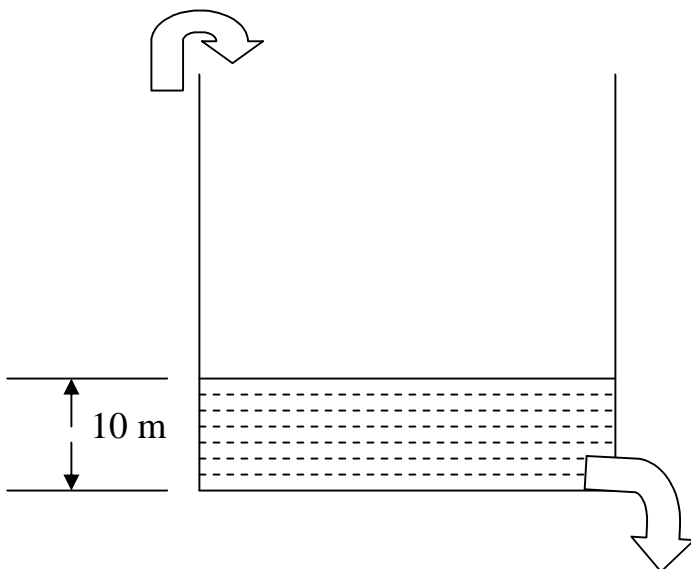
5. A(5, 4) and B(3, 2) M = _____	6. C(3, 3) and D(-2, -1) M = _____
7. T(3, -4) and R(-5, -7) M = _____	8. S(-1, 0) and V(5, -5) M = _____

Find the slope of the line between each pair of points. $[m = \frac{y_2 - y_1}{x_2 - x_1}]$

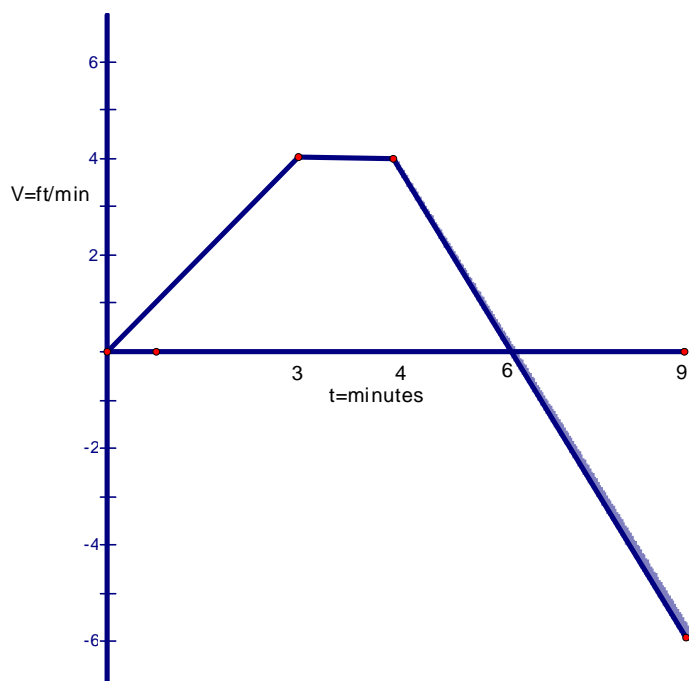
9. A(2, 8) and B(-10, -8) m = _____	10. T(0, -7) and R(10, 2) m = _____
11. B(8, 1) and R(-2, 5) m = _____	12. M(10, 2) and W(10, -5) m = _____

K. Free response type question:

1. A tank is filled with water upto a height of 10 meters. The tap at the top is opened and water is filled in the tank at the rate of 3 meters/min. for $\frac{1}{2}$ hour. Then the tap at the top is closed. After 5 minutes the tap at the bottom of the tank is opened and water is drained out at the rate of 5 meters/min. till the tank is completely empty.
- A) Model the above events in terms of a graph of the level (height) of water in the tank vs. time. Does this graph represent a case of Direct Variation?
- B) What is the slope of the graph when water is being filled in and when it is being drained out of the tank?
- C) What is the significance of positive and negative slope in this situation?
- D) Write equations indicating the relation between level (height) of water in the tank and time when:
- Water is being filled in the tank.
 - The top tap is closed and the bottom tap is opened.
 - Water is being drained out of the tank till it is empty.



2. A particle is moving along the x axis. It's velocity (ft/min) at various times (minutes) is given by the graph below.



- A) Express velocity as a function of time (Write equation representing velocity as a function of time) for the following intervals:
- $0 \leq t \leq 3$ minutes.
 - $3 \leq t \leq 4$ minutes.
 - $4 \leq t \leq 9$ minutes.
- B Write the time intervals when the velocity is increasing, decreasing , and remaining constant.
- C) Write the slopes of the graph for the time intervals when the velocity is increasing, decreasing, and remaining constant.
- D) What is the significance of the slope values in part C?
- E) At what time does the particle change direction?
- F) At what time is the speed of the particle greatest?
- G) Find the area bounded by the graph above the t axis and below the t axis. What does this area signify?
- H) During the time interval $6 \leq t \leq 9$ minutes, “Velocity is decreasing and the speed of the particle is increasing”. Is this statement correct? Explain.