

Summer 2016

Norwalk Early College Academy

Honors Geometry
Summer Packet

In order to be successful in Geometry, you must have certain prerequisite skills mastered. You will be assessed on the content of this packet during the first week of school.

Please make your best effort as you work on this packet. You can work with another person, but keep in mind that each person has to take the quiz. Please show all of your work.

Enjoy your summer!! I look forward to meeting you and working with you when return to school in the fall.

Ms. Quermorllue

Slope

Hints/Guide:

To find the slope of a line given two points, use the formula: $m = \frac{y_2 - y_1}{x_2 - x_1}$

Example: Find the slope of the line passing through (3, -9) and (2, -1)

$$m = \frac{-1 - (-9)}{2 - 3} = \frac{-1 + 9}{-1} = \frac{8}{-1} = -8$$

Exercises: Find the slope of the line that contains the points.

1. (5, 1) and (2, 7)

2. (5, 3) and (2, -3)

3. $\left(\frac{-1}{2}, -2\right)$ and $\left(\frac{-3}{2}, 1\right)$

4. (2, -4) and (2, 6)

5. (-1, 7) and (-3, 18)

6. (0, 4) and (7, 3)

Writing the equation of a line

Hints/Guide:

Slope-intercept form: $y = mx + b$

Standard form: $Ax + By = C$, where A and B are coefficients, and C is a constant

Point-slope form: $y - y_1 = m(x - x_1)$

Example: Write the equation of the line.

- a. Given point (3, 4) and y-intercept of 5

$$y = mx + b$$

$$4 = 3m + 5$$

$$-1 = 3m$$

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

Write the slope-intercept form.

Substitute 5 for b, 3 for x, and 4 for y

Subtract 5 from each side

Divide each side by 3

- b. Given that the line passes through the points (4, 8) and (3, 1)

$$m = \frac{1-8}{3-4} = \frac{-7}{-1} = 7$$

Substitute values to find the slope and simplify

$$1 = 7(3) + b$$

Substitute values into $y = mx + b$

$$1 = 21 + b$$

Multiply

$$-20 = b$$

Solve for b

Exercises: Determine the equation for each line, using the information given.

1. Slope 5, containing the point (3, 2)
2. Containing the points (0, 2) and (2, 0)
3. Y-intercept of 12, containing the point (-5, 3)

Solving Equations

Hints/Guide:

The key in equation solving is to isolate the variable, to get the letter by itself. In two-step equations, we must undo addition and subtraction first, then multiplication and division. Remember the golden rule of equation solving: If we do something to one side of the equation, we must do the exact same thing to the other side. Examples:

$$1. 4x - 6 = -14$$

$$+ 6 \quad + 6$$

$$\underline{4x} \quad = \underline{-8}$$

$$4 \quad 4$$

$$x = -2$$

$$\text{Solve: } 4(-2) - 6 = -14$$

$$-8 - 6 = -14$$

$$-14 = -14$$

$$2. \frac{x}{-6} - 4 = -8$$

$$+ 4 \quad + 4$$

$$-6 \cdot \frac{x}{-6} = -4 \cdot -6$$

$$x = 24$$

$$\text{Solve: } (24/-6) - 4 = -8$$

$$-4 - 4 = -8$$

$$-8 = -8$$

Exercises: Solve the following problems: No Calculators!

SHOW ALL WORK. Use a separate sheet of paper (if necessary) and staple to this page.

$$1. -4t - 6 = 22$$

$$2. \frac{m}{-5} + 6 = -4$$

$$3. (6x - 8) - (5x + 9) = 3$$

$$4. 7x - 8x + 4 = 5x - 2$$

$$5. (3x + 2) - 2(x + 4) = 7$$

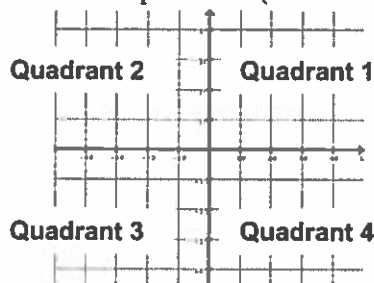
$$6. \frac{5}{7} = \frac{10}{x+2}$$

Graphing

Hints/Guide:

Points in a plane using 2 numbers, called a coordinate pair. The first number is called the x-coordinate. The x-coordinate is positive if the point is to the right of the origin and negative if the point is to the left of the origin. The second number is called the y-coordinate. The y-coordinate is positive if the point is above the origin and negative if the point is below the origin.

The x-y plane is divided into 4 quadrants (4 sections) as described below.



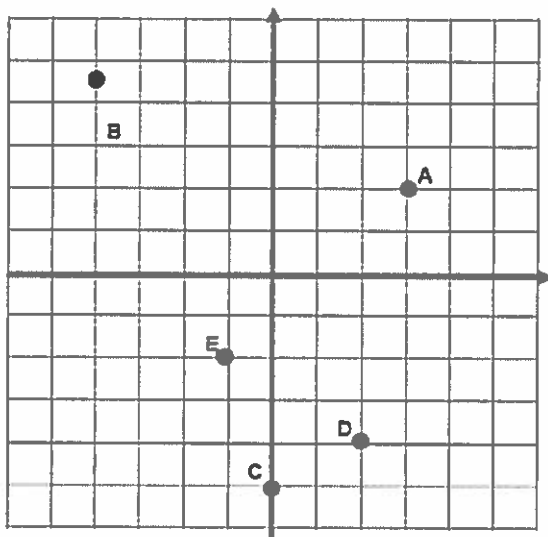
Quadrant 1 has a **positive** x-coordinate and a **positive** y-coordinate (+ x, + y).

Quadrant 2 has a **negative** x-coordinate and a **positive** y-coordinate (- x, + y).

Quadrant 3 has a **negative** x-coordinate and a **negative** y-coordinate (- x, - y).

Quadrant 4 has a **positive** x-coordinate and a **negative** y-coordinate (+ x, - y).

Exercises:



1. Give the coordinates of each lettered point. (each block represents one unit)

A _____ B _____ C _____ D _____ E _____

2. Tell what quadrant each point is in.

A _____ B _____ C _____ D _____ E _____

Graphing Points and Determining the Slope

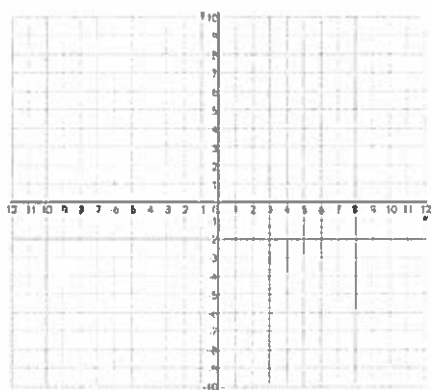
Hints/Guide:

$$\text{Slope } (m) = \frac{\text{change in } y}{\text{change in } x} = \frac{\text{rise}}{\text{run}} = \frac{\text{number of units up / down}}{\text{number of units left / right}}$$

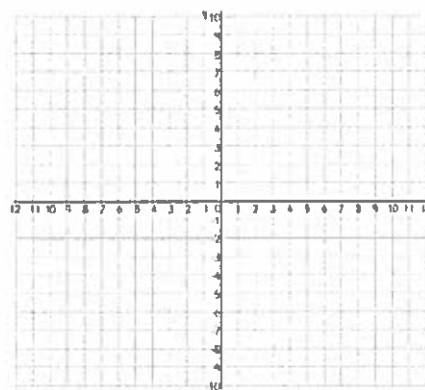
Exercise:

Graph the set of points and then determine the slope

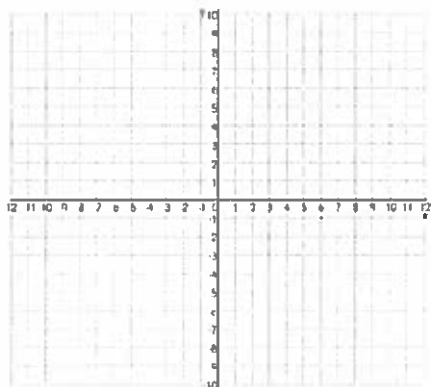
1. $(2, -1)$ and $(4, 2)$; $m = \underline{\hspace{2cm}}$



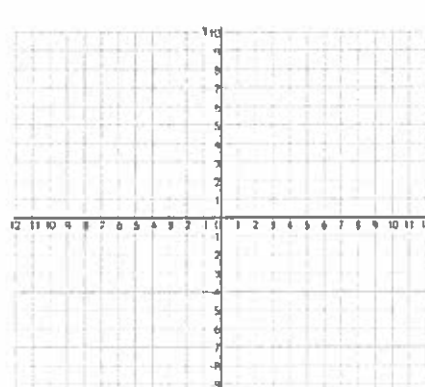
2. $(-2, 1)$ and $(2, 5)$; $m = \underline{\hspace{2cm}}$



3. $(0, 0)$ and $(3, 6)$; $m = \underline{\hspace{2cm}}$



4. $(-3, 0)$ and $(0, 5)$; $m = \underline{\hspace{2cm}}$



Simplifying Exponential Expressions

Hints/Guide:

Remember the rules when performing operations with exponents

$$a^m \cdot a^n = a^{m+n}$$

$$(a^m)^n = a^{m \cdot n}$$

$$\left(\frac{a^c}{b^d}\right)^x = \frac{a^{cx}}{b^{dx}}$$

$$\frac{a^x}{a^y} = a^{x-y}$$

Negative Exponents:

When ever you see a negative exponent, move the term to the opposite place in the expression;

- i. If there is a negative exponent in the denominator, move the number up to the numerator.
- ii. If there is a negative exponent in the numerator, move the term down to the denominator.

Examples:

$$1. (4a^4b)(9a^2b^3) = 4 \cdot 9a^{4+2}b^{1+3} = 36a^6b^4$$

$$2. \frac{x^{10}}{x^7} = x^{10-7} = x^3$$

$$3. (3y^5z)^2 = 3^2 y^{5 \cdot 2} z^{1 \cdot 2} = 9y^{10}z^2$$

$$4. \frac{x^{25}y^{10}}{x^{10}y^5} = x^{25-10}y^{10-5} = x^{15}y^5$$

Exercises: Simplify

$$1. \sqrt{81}$$

$$5. \frac{32x^3y^2z^5}{-8xyz^2}$$

$$2. x^3x^6$$

$$6. (9xy^6)^2$$

$$3. \frac{4x^5y^2}{2x^8y}$$

$$7. \frac{x^{-6}}{x^4}$$

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

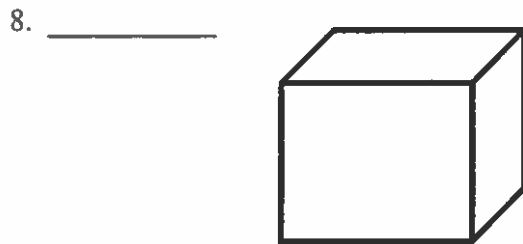
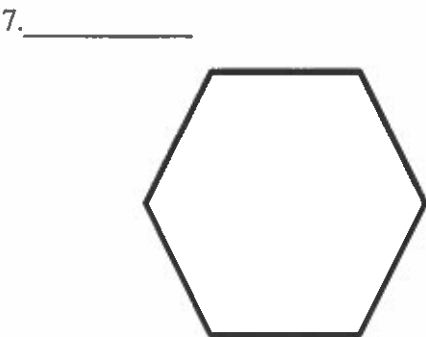
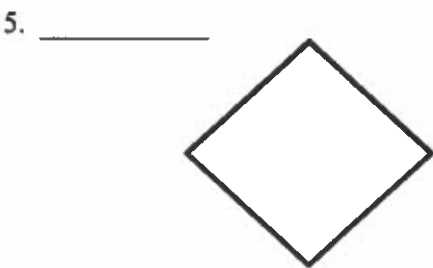
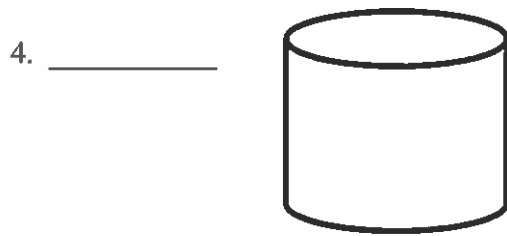
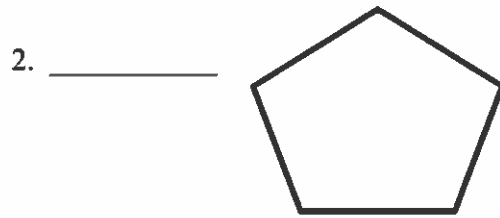
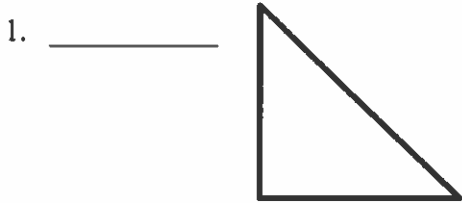
$$8. (20x^2y^4)(3x^3y^2)$$

Identifying Figures

Hints/Guide:

Remember that shapes are often named by the number of sides that the figure has

Exercises: Identify each figure by name



Pythagorean Theorem

Hints/Guide:

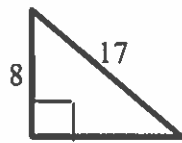
The Pythagorean Theorem:

$$a^2 + b^2 = c^2 \quad c \text{ is the longest side (opposite the right angle)}$$

a and b are the other sides

**Pythagorean Theorem can only be used on right triangles

Example: Determine the length of the missing side of the triangle.



17 is opposite the right angle, so it is c

$$a^2 + b^2 = c^2$$

$$a^2 + 8^2 = 17^2$$

$$a^2 + 64 = 289$$

$$a^2 = 225$$

$$a = 15$$

Pythagorean Theorem

Substitute b and c

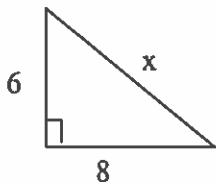
Square both numbers

Subtract 64

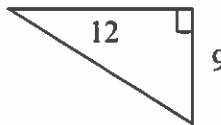
Square root both sides

Exercise: Use the Pythagorean Theorem to determine the missing side. Write your answer as a simplified radical or as a decimal.

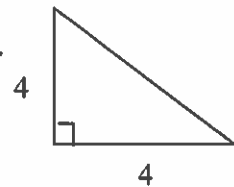
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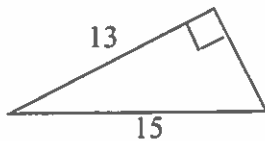
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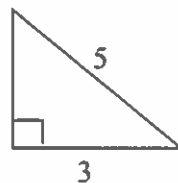
3.



4.



5.



6.

