MAGRUDER HIGH SCHOOL

Honors Geometry/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!! We look forward to meeting you and working with you when return to school in the fall.

The Geometry Team

Slope

Hints/Guide:

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

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) band (-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	Write the slope-intercept form.
4 = 3m + 5	Substitute 5 for b, 3 for x, and 4 for y
-1 = 3m	Subtract 5 from each side
$\frac{-1}{3} = m$	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 vales 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. $4x - 6 = -14$

$$\begin{aligned} 4x - 6 &= -14 \\ +6 \quad &\quad +6 \\ \underline{4x} \quad &= \underline{-8} \\ 4 \quad &\quad\ 4 \\ x &= -2 \end{aligned}$$

Solve: $4(-2) - 6 = -14$

$-8 - 6 = -14$

$-14 = -14$

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

$$+4 \quad +4$$

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

$$x = 24$$

Solve: $(24/-6) - 4 = -8$

$-4 - 4 = -8$

$-8 = -8$

Exercises: Solve the following problems: No Calculators!

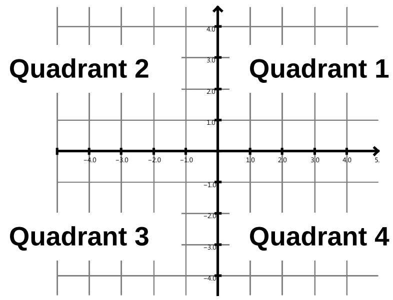
SHOW ALL WORK. Use a separate sheet of paper (if necessary) and staple to this page.

1. $-4t - 6 = 22$
2. $\dfrac{m}{-5} + 6 = -4$
3. $(6x - 8) - (5x + 9) = 3$
4. $7x - 8x + 4 = 5x - 2$
5. $(3x + 2) - 2(x + 4) = 7$
6. $\dfrac{5}{7} = \dfrac{10}{x+2}$

Graphing

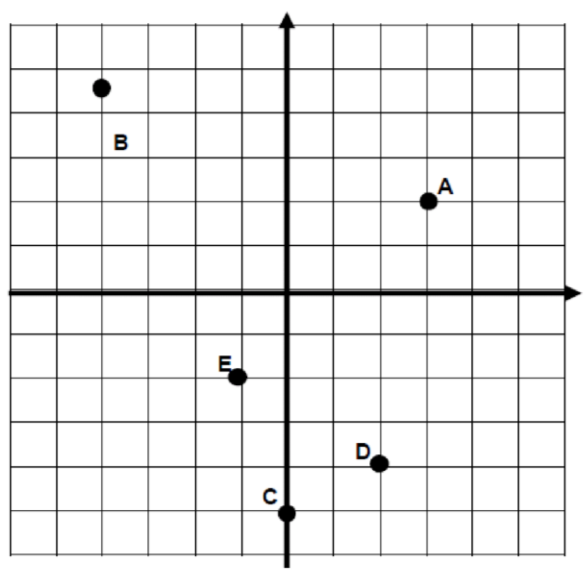
Hints/Guide:
Points in a plane using 2 numbers, called a coordinate pair. The first number is called the x-coordinate. The x-coordinate is positive if the point is to the right of the origin and negative if the point is to the left of the origin. The second number is called the y-coordinate. The y-coordinate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

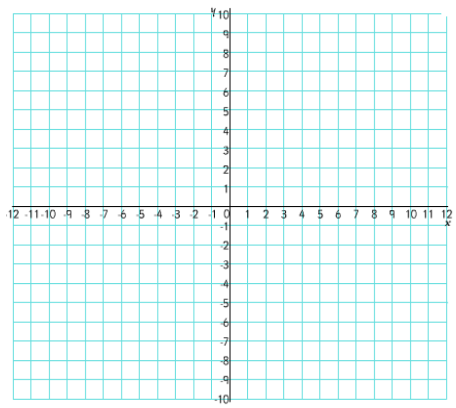
Graphing Points and Determining the Slope

Hints/Guide:

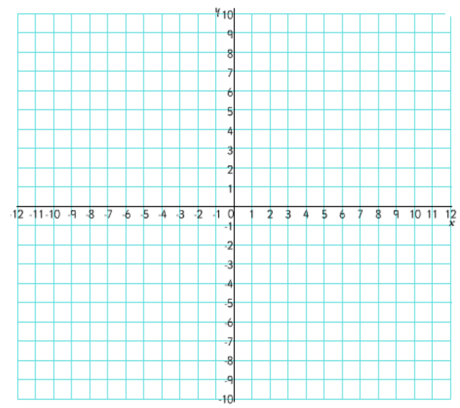
$$Slope\ (m) = \frac{change\ in\ y}{change\ in\ x} = \frac{rise}{run} = \frac{number\ of\ units\ up\,/\,down}{number\ of\ units\ left\,/\,right}$$

Exercise:
Graph the set of points and then determine the slope

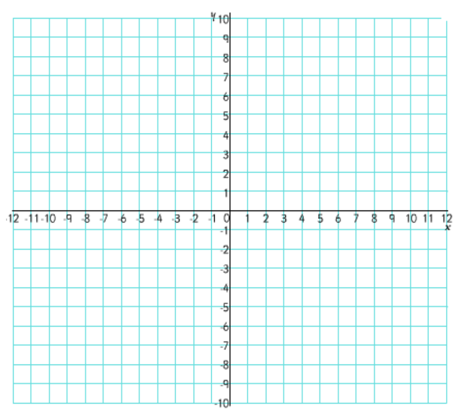
1. $(2, -1)$ and $(4, 2)$; m= ____



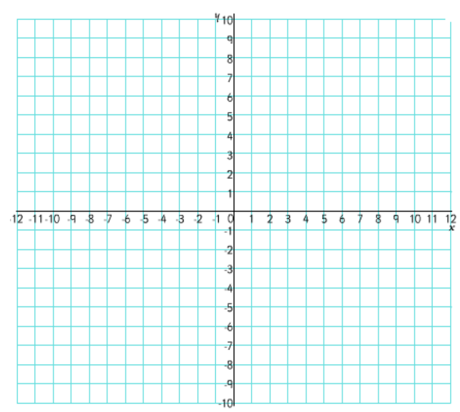
2. $(-2, 1)$ and $(2, 5)$; $m =$ ____



3. $(0, 0)$ and $(3, 6)$; $m =$ ____



4. $(-3, 0)$ and $(0, 5)$; $m =$ ____



Simplifying Exponential Expressions

Hints/Guide:
Remember the rules when performing operations with exponents

$a^m \bullet a^n = a^{m+n}$ $\qquad$ $(a^m)^n = a^{m \bullet n}$

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

Negative Exponents:

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

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

Examples:

1. $(4a^4b)(9a^2b^3) = 4 \bullet 9a^{4+2}b^{1+3} = 36a^6b^4$
2. $\frac{x^{10}}{x^7} = x^{10-7} = x^3$
3. $(3y^5z)^2 = 3^2 y^{5x2} z^{1x2} = 9y^{10}z^2$
4. $\frac{x^{25}y^{10}}{x^{10}y^5} = x^{25-10}y^{10-5} = x^{15}y^5$

Exercises: Simplify

1. $\sqrt{81}$
2. x^3x^6
3. $\frac{4x^5y^2}{2x^8y}$
4. $(5x^3y^2)^2$
5. $\frac{32x^3y^2z^5}{-8xyz^2}$
6. $(9xy^6)^2$
7. $\frac{x^{-6}}{x^4}$
8. $(20x^2y^4)(3x^3y^2)$

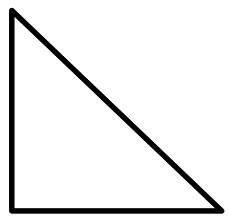
Identifying Figures

Hints/Guide:

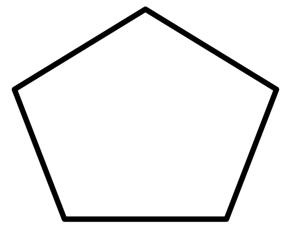
Remember that shapes are often named by the number of sides that the figure has

Exercises: Identify each figure by name

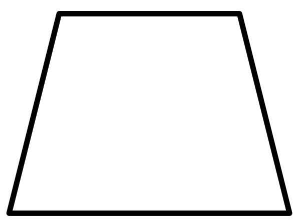
1. ____________



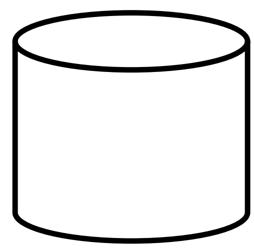
2. ____________



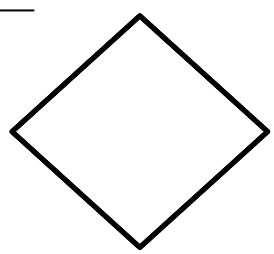
3. ____________



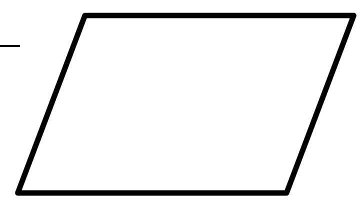
4. ____________



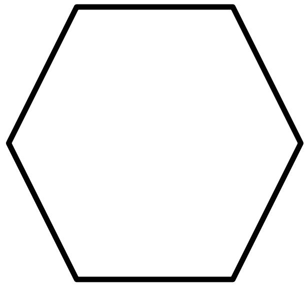
5. ____________



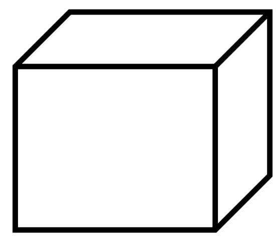
6. ____________



7. ____________



8. ____________



Solving Equations by Factoring or Quadratic Formula

Hints/Guide:

When factoring a quadratic expression of the form $ax^2 + bx + c = 0$, you are looking for factors of a x c that add to b

Quadratic Formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

**Remember that one side of your equation must equal zero when solving by factoring and when using the quadratic formula

Example:

1. Solve by factoring: $x^2 + 5x + 6 = 0$

What two numbers multiply to 6 (a x c)?
Do those numbers add to give you 5 (b)?

$(x + 3)(x + 2) = 0$

$x + 3 = 0$ or $x + 2 = 0$ — Set each factor equal to 0

$-3 \quad -3$ $\quad -2 \quad -2$ — Isolate the variable

$x = -3$ $\quad x = -2$

2. Solve using the quadratic formula: $x^2 - 4x - 8 = 0$

$x = \frac{4 \pm \sqrt{(-4)^2 - 4(1)(-8)}}{2(1)}$ — Plug a, b, and c into formula

$x = \frac{4 \pm \sqrt{16 - (-32)}}{2}$ — Simplify

$x = \frac{4 \pm \sqrt{48}}{2}$

$x = \frac{4 \pm 6.93}{2}$

$x = 2 \pm 3.465$

$x = 2 + 3.465 \quad or \quad 2 - 3.465$

$x = 5.465 \quad or \quad x = -1.465$

Exercise:

Solve each equation either by factoring or by using the quadratic formula

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

1. $x^2 + 3x = 0$

2. $x^2 - 5x - 24 = 0$

3. $3x^2 + x - 4 = 0$

4. $2x^2 - 5x + 3 = 0$

5. $x^2 + 3x - 40 = 0$

6. $x^2 + 2x - 8 = 0$

Pythagorean Theorem

Hints/Guide:

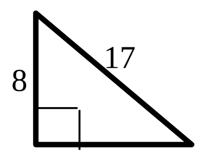
The Pythagorean Theorem:

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

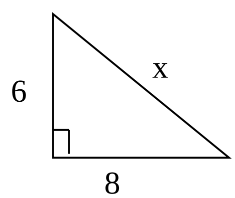


17 is opposite the right angel, so it is c

$a^2 + b^2 = c^2$	Pythagorean Theorem
$a^2 + 8^2 = 172$	Substitute b and c
$a^2 + 64 = 289$	Square both numbers
$a^2 = 225$	Subtract 64
$a = 15$	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.

1.



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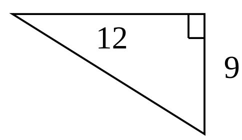

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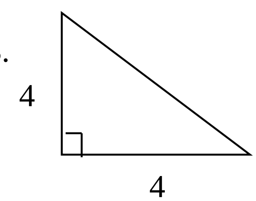

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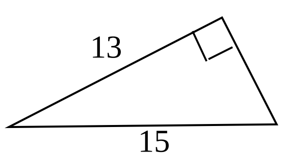

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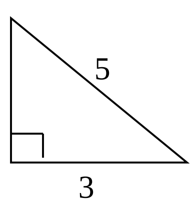

6.