Welcome to Freshman Year Math!

This summer packet is for all incoming freshman students enrolled in IM1, IM1 S and all honors classes for the fall at Proviso East, Proviso West, and PMSA.

This summer assignment is not *required*, but it is *strongly recommended.* The exercises will give you the opportunity to self-assess how prepared you are for math this year. Success in our first unit will depend on how well you understand the topics included, so put your best effort into it! Feel free to use old notes and online resources as needed to ensure that you understand the content. You will be tested on these topics in the first few weeks of school.

Complete the work for this packet on a separate piece of paper. Do as many of the problems as you can WITHOUT the use of a calculator. It is important to spend time keeping these skills and concepts fresh in your mind – especially your mental math! We will provide you with a key at the start of next year for you to check your work. Be sure to keep track of sticky spots and ask questions when we return.

This packet will also be available on the Proviso Website(s).

Have a great summer – we are looking forward to meeting you in August!

As you work through the packet, keep track of the following:

"Things (math skills) I learned, but forgot how to do"	"Things (math skills) I never learned"

Welcome to Proviso East/West High School/PMSA Summer Math Packet

This summer packet is for all students enrolled in IM1, IM1 S, and honors at Proviso East, West High School for Fall.

This summer assignment is not *required*, but it is *strongly recommended!*

The exercises will give you the opportunity to self-assess how prepared you are for math this year. Success in our first unit will depend on how well you understand the topics included, so put your best effort into it! Feel free to use old notes and online resources as needed to ensure that you understand the content. You will be assessed on this material in the first few weeks of school.

Some tips for your summer review:

- ✓ DeltaMath - Click the link, create a DeltaMath account and join the class **"Summer Math Packet 2024"**
    - You will use DeltaMath to practice any skills you are struggling with. There is a playlist of skills that are aligned with the summer packet. In every section of the summer packet, there are recommended topics that will strengthen your skills on that topic.
- ✓ Print this packet OR complete it on a separate piece of paper.
- ✓ Try to work on one page a day for about 20 minutes, and you'll be done in no time! Within each section, we've provided a link to a video that reviews the concept if you need it.
- ✓ You don't have to do the pages in order. Feel free to skip around. If you remember how to solve some of the problems on the page, but not all of them – that's okay too! Just do your best!
- ✓ Do as many of the problems as you can without the use of a calculator. It is important to spend time keeping these skills and concepts fresh in your mind – especially your mental math! However, if needed, you may use Desmos to help you: https://www.desmos.com/
- ✓ As you work, think about which topics you feel confident in, which you're unsure of, and which you don't think you've ever learned!
- ✓ We will provide you with an answer key at the start of next year for you to check your work.

The Proviso Township High School website(s) will also have this packet posted on our websites.

Have a great summer – we are looking forward to meeting you in August!

Proviso East, West, and PMSA Math Teachers

A. Translations –

Need more review? Check out these videos

Writing Basic Expressions **How to Write Expressions with Variables**

DeltaMath Extra Practice (Try these skills).

- Words to expressions

Use your phones to scan the QR codes if you are using a paper copy of the packet.

Fill in the chart with the math symbol or operation that represents each term:

sum		**difference**		**product**	
of		**twice**		**quotient**	
more than		**times**		**square**	
less than		**divided**		**square root**	
is		**equals**		**is less than**	
is less than or equal to		**is greater than**		**is greater than or equal to**	

Exercises: Translate the following expressions into math symbols.

1. The quotient of a number and twelve.

2. Six less than five times a number.

3. The product of twenty-five and a number equals one hundred.

4. A number squared is sixteen.

5. The square root of thirty-six is less than or equal to a number.

6. One half of the sum of twenty and a number is greater than or equal to forty.

B. Operations with Real Numbers

Need more review? Check out these videos!
Adding and Subtracting **Multiplying and Dividing**

Use your phones to scan the QR codes if you are using a paper copy of the packet.

DeltaMath Extra Practice
(Try these skills).

- Adding and Subtracting Integers
- Multiplying and Dividing Integers

Review sign rules for operations with positive and negative values:

Positive + Positive = _____ Positive • Positive = _____

Negative + Negative = _____ Negative • Negative = _____

Positive + Negative = Hmmmmm? Positive • Negative = _____

Describe why the sum of a positive and negative value can be either positive or negative: _____

Review rules for operations with fractions:

- Adding and subtracting fractions: Find the common _____; add or subtract the _____only.
- Multiplying fractions: Multiply numerators, multiply denominators. Simplify by dividing common factors.
- Dividing fractions: Multiply the dividend (first value) by the reciprocal (flip) of the divisor (second value). Simplify if possible.

Need more review? Check out this videos on fractions!

Use your phones to scan the QR codes if you are using a paper copy of the packet.

Fraction Rules	
Adding Fractions with Common Denominators	$\frac{A}{B}+\frac{C}{B}=\frac{A+C}{B}$
Subtracting Fractions with Common Denominators	$\frac{A}{B}-\frac{C}{B}=\frac{A-C}{B}$
Adding Fractions with Different Denominators	$\frac{A}{B}+\frac{C}{D}=\frac{AD}{BD}+\frac{BC}{BD}=\frac{AD+BC}{BD}$
Subtracting Fractions with Different Denominators	$\frac{A}{B}-\frac{C}{D}=\frac{AD}{BD}-\frac{BC}{BD}=\frac{AD-BC}{BD}$
Multiplying Fractions	$\frac{A}{B}\times\frac{C}{D}=\frac{A\times C}{B\times D}$
Dividing Fractions	$\frac{A}{B}\div\frac{C}{B}=\frac{A}{B}\times\frac{D}{C}=\frac{A\times D}{B\times C}$

DeltaMath Extra Practice (Try these skills)

- Multiply and Divide

Fractions (Level 1 and 2)

- Add and Subtract Fractions (Level 1 and 2)

Directions: Simplify the following.			
1.) $-4+18$	2.) $-5-5$	3.) $7-3-11$	4.) $-3+7-4+6$
5.) $-\frac{1}{3}+\frac{1}{2}$	6.) $3-\frac{1}{7}$	7.) $\frac{13}{16}+\frac{5}{8}$	8.) $7(-6)$
9.) $-2\cdot(-9)$	10.) $-30(7)$	11.) $-2\cdot4\cdot(-3)$	12.) $-\frac{2}{3}\cdot-\frac{3}{4}$
13.) $121\div(-11)$	14.) $-\frac{56}{8}$	15.) $\frac{-108}{-12}$	16.) $14\div\frac{7}{8}$

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Need more review? Check out these videos!

Absolute Value | Exponents | Square Roots | Cube Roots

Use your phones to scan the QR codes if you are using a paper copy of the packet.

DeltaMath Extra Practice
(Try these skills)

- Exponents: Expand and Condense.
- Squares and Square Roots (0-12)
- Simple Basic Cube Roots

Directions: Simplify the following exponents, radicals and absolute value problems.				
17.) 5^2	18.) 3^4	19.) $\sqrt{49}$	20.) $\sqrt[3]{8}$	21.) $\lvert-23\rvert$

C. Order of Operations

Follow the Order of Operations (PEMDAS) when simplifying expressions:

1. Simplify all grouping symbols: parenthesis, brackets, braces, fraction bars, absolute value and radical signs.
2. Simplify all exponents and radicals.
3. Do multiplication and division in order from left to right.
4. Do addition and subtraction in order from left to right.

Need more review? Check out this video

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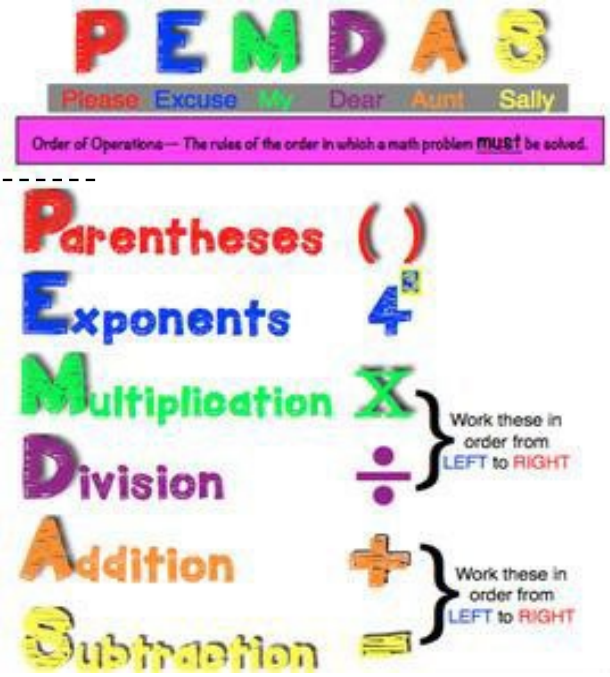
on Order of Operations



Use your phones to scan the QR codes if you are using a paper copy of the packet.

DeltaMath Extra Practice
(Try these skills)

- Order of Operations

DIRECTIONS: Evaluate the following expressions.	
1.) $\frac{24}{4} \cdot 6$	2.) $\frac{3\|2-4\|}{2(4+3)}$
3.) $5 + 6(4 - 1) \div \frac{1}{3}$	4.) $2\sqrt{25} + 10 \div 2(6) - \|-4\|$
5.) **Challenge:** Insert the fewest number of grouping symbols to make the following equation true: $24 \div 3 + 9 \cdot 5 - 2 = 6$	

D. Evaluating Expressions

Replace each variable with its given value and simplify. Use parenthesis when substituting the value to preserve negative signs.

Need more review? Check out this on Evaluating Expressions

Use your phones to scan the QR codes if you are using a paper copy of the packet.

DeltaMath Extra Practice
(Try these skills)

- Evaluate Expressions

Exercises: Evaluate each of the following expressions for the given values of the variables:

$a = 5$ $b = -2$ $c = 0$

$d = -4$ $e = 1$ $f = 3$

1.) $3a + 4e$	2.) $2(d - 2)$	3.) $b^2 - 2df$
4.) $\lvert a - f \rvert - \lvert f - a \rvert$	5.) $\frac{2b-4d^2}{3}$	6.) . $a - bf^2 + 3$

E. Distributive Property and Combining Like Terms

Use the Distributive Property when an expression with the addition or subtraction of terms is a factor.

Examples:

$8(x^2 + y - 3) \rightarrow 8x^2 + 8y - 24$

$-4(3a - 7b) \rightarrow -12a + 28b$

Non-example:

$2(5x)(3) \rightarrow 30x$

The two is not distributed since there is only multiplication and no addition or subtraction.

Combining Like Terms: Like terms have exactly the same variables raised to the same power. Combine by adding or subtracting the coefficients.

Need more review? Check out this video on Combine Like Terms and Distributive Property !

Use your phones to scan the QR codes if you are using a paper copy of the packet.

DeltaMath Extra Practice
(Try these skills)

- Equivalent Expressions
- Distributive Property (Basic)
- Combine Like Terms (Basic – Guided)
- Combine Like Terms (Basic, Integers)
- Distribute a Negative
- Simplify Expressions with Distribution (Level 1,2 and 3)
- Distribution Area Model (Algebraic) and (Algebraic – L2)

Exercises: Simplify.

1. $3x - 2 - 4x$	2. $2a - 7b - 8 + 4a - 3b - 10c + 1$	3. $14x^2 - 6x + 8 - 6x^2 + x - 11$
4. $-2(3x - 4y + 5z)$	5. $(3x^2 + 5x - 9)(6)$	6. $\frac{1}{2}(14 + 10x)$
7. $3x + 6(2x + 4)$	9.) $7(3 - 2x) + 8 - 3(4x - 9)$	

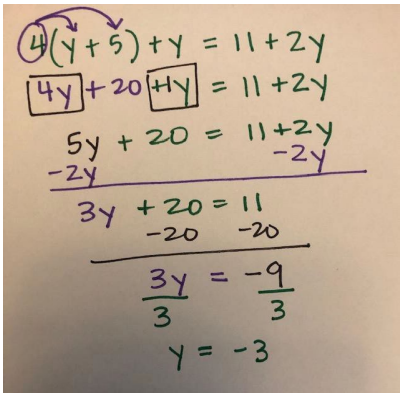
F. Solving Equations

Solve for the variable by isolating it on one side of the equation.

Steps:

1. **Distribute.**
2. **Combine like terms on each side.**
3. **Move all the variables to one side by adding or subtracting.**
4. **Get rid of addition/subtraction.**
5. **Get rid of multiplication/division.**
6. **Check your answer by plugging in the solution.**

Example:



Exercises: Solve:

1. $x-12=-14$	2. $-2y=-20$	3. $-15=-a-7$
4. $-10x+10=0$	5. $3w-6+5w=-2$	6. $21=3(2-a)$
7. $8x+3(2-3x)=28$	8. $5x-2(x+1)=10$	9.) $x-(-3)=4$
10. $3-5x=-8x-9$	11. $3(x-2)=5(x+8)$	12. $-2(d+3)=1-d$

Need more review? Check out these videos!

[Variables on Both Sides] [Equations with Distributive Property]

Use your phones to scan the QR codes if you are using a paper copy of the packet.

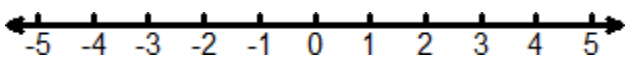
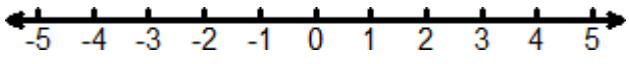
DeltaMath Extra Practice
(Try these skills)

- One Step Equations (Add/Subtract)
- One Step Equations (Multiplication Level 1 and 2)
- One Step Equations (Division)
- Two Step Equations
- Linear Equations with Distribution (Level 1 and 2)

G. Solving Inequalities

Graph the inequalities on a number line. Remember to use the open circle for < and > and the closed circle for ≤ and ≥. Draw the arrow in the direction that represents the solution.

Exercises: Graph each inequality on a number line.

1. $x > -2$ 	2. $x \leq 3$ 

Solve. Remember solving an inequality is just like solving an equation! (See previous section for review if needed!) The only extra step is when you multiply or divide each side of an inequality by a negative number, you must **FLIP** the inequality symbol to maintain a true statement.

Need more review? Check out these videos!

Graphing Inequalities | Solving One Step Inequalities | Solving Multi-Step Equations

DeltaMath Extra Practice (Try these skills)

- One Step Inequalities
- Linear Inequalities (Level 1 and 2)

Use your phones to scan the QR codes if you are using a paper copy of the packet.

Exercises: Solve each inequality. You do not need to graph the solution on a number line.

1. $x+7<10$	2. $-4y \leq 10$	3. $2 > 2x$
4. $-4x + 4 > 8$	5. $-2-3x > 2$	6. $-1 < 26-3x$

7. $2m+3m>85$	8. $x+10\le 3x-8$	9. $5(2h-3)-6(h-6)>5$
10. $-2(7-x)<-14-5x$	11. $\frac{2x-3}{5}<7$	12. $2<8y-(6y-10)$

H. Solve for Y/Put in Slope-Intercept Form

Rewrite the equation so that y is a function of x.
This means solve for y or isolate the y to look like $y = mx + b$!!

Need more review? Check out this on Solving for Y!

Use your phones to scan the QR codes if you are using a paper copy of the packet.

DeltaMath Extra Practice
(Try these skills)

- Standard Form to Slope-Intercept Form

Exercises: Solve each equation for y.

1. $2x + y = 5$	2. $9 - y = 1.5x$	3. $2x = -3y + 10$

I. Identifying Functions, Domain, and Range

A relation is a function if and only if each input *x* has exactly one output *y*.
Domain = the x-values/input of the function.
Range = the y-values/output of the function.

Need more review? Check out these videos!

Graphical Relations and Functions

Finding Domain, Range of a Function Given Its Graph

Use your phones to scan the QR codes if you are using a paper copy of the packet.

DeltaMath Extra Practice
(Try these skills)
Standard Form to Slope-Intercept Form

- Domain and Range from Points or Table.
- Visual Domain and Range

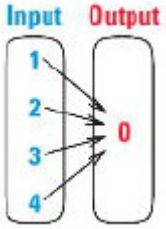
Exercises: Are the following relations functions? Why or why not? For those that are, identify the domain and range in set-builder notation.

1. $\{(2,5),(4,6),(6,5),(8,6)\}$

2.

Input	Output
4	3
13	7
9	4
4	0

3.



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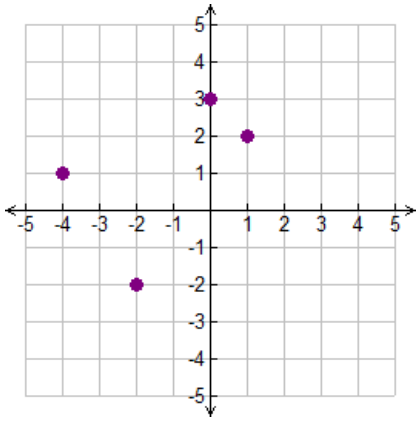

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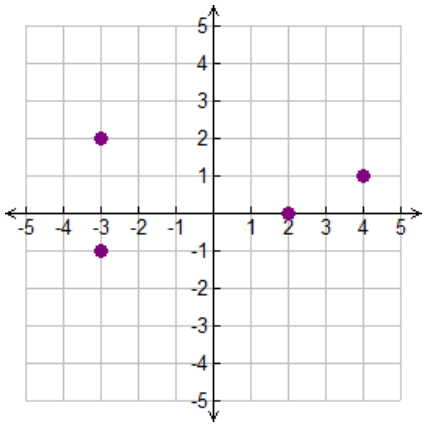

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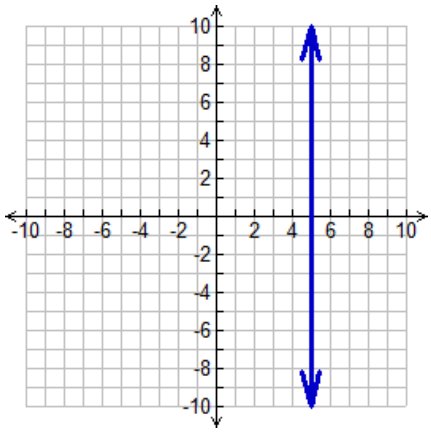
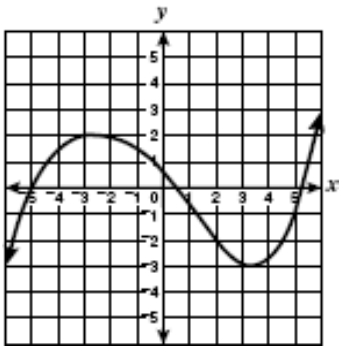


Are the following relations functions? Why or why not? You do not need to identify domain and range.

7.



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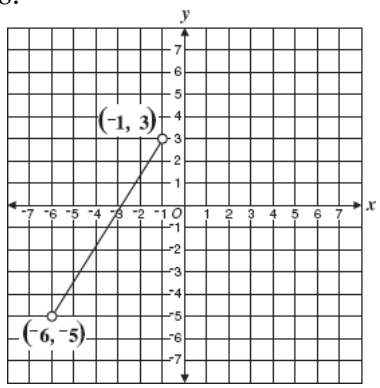

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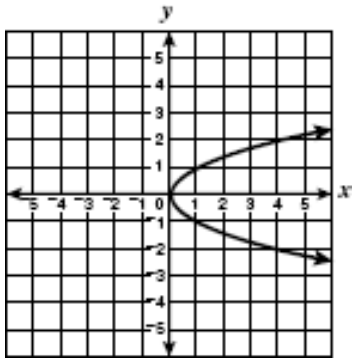


J. Graphing on the Coordinate Plane

The first value in an (x, y) ordered pair represents the distance horizontally from zero. If the x-value is positive, start at the origin (0, 0) and count to the right. If the x-value is negative, count to the left.

The second value in an (x, y) ordered pair represents the distance vertically from zero. If the y-value is positive, start at the origin (0, 0) and count up from zero. If the y-value is negative, count down.

Exercises: If you do not have graph paper at home, you can print some from online, or you can do your best to draw clear graphs with a straight-edge or ruler.

Need more review? Check out this video on
Coordinate Plane: Graphing Points and Naming Quadrants

Use your phones to scan the QR codes if you are using a paper copy of the packet.

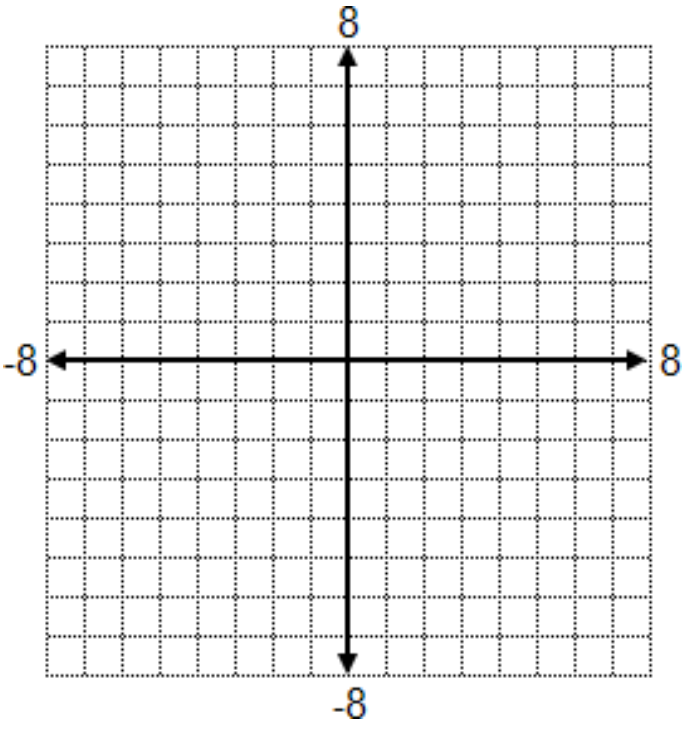
DeltaMath Extra Practice
(Try these skills)

- Plotting Points
- Identifying Points (Level 1 and 2)
- Plot Point and Identify Quadrant

1. Plot and label each of the (x, y) ordered pairs on the coordinate plane.

A (4, 2) B (1, -3) C (-5, -6) D (1, 0)

E (-5, 0) F (0, 4) G (-2, 7) H (0, -2)



K. Slope

Slope describes how steep or flat a line is. It is the rate of change of the line. Slope is often represented by the variable *m*, such as in the slope-intercept form of a line $y = mx + b$. We can use the slope formula to find the slope between two given points: $m = \frac{y_2 - y_1}{x_2 - x_1}$.

Need more review? Check out these videos!

[Slope from Two Ordered Pairs]

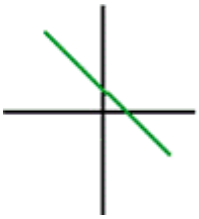
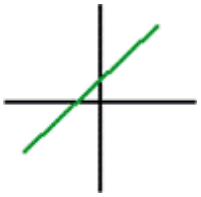
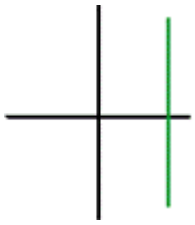
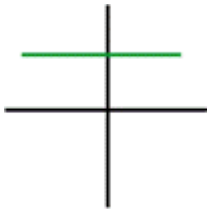
[Slope from the Line From its Graph]

DeltaMath Extra Practice
(Try these skills)

- Find the slope graphically
- Find the slope from points

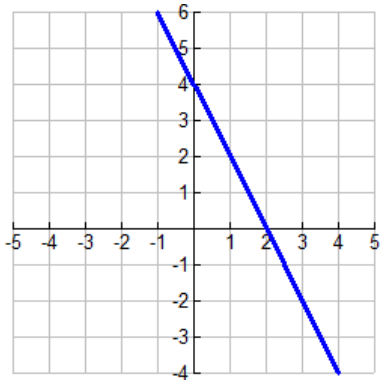
Use your phones to scan the QR codes if you are using a paper copy of the packet.

Exercises: Identify the type of slope shown in each graph.

1.	2.	3.	4.
			

Find the slope of the given line or between the given points.

5.



6.

X	Y
9	-3
4	-6
-6	-12

7. (2,1), (5,3)	8. (2, −9), (4, −3)	9. $y = -2$

L. Graphing Linear Functions

Exercises: Graph each line. If you do not have graph paper at home, you can print some from online, or you can do your best to draw clear graphs with a straight-edge or ruler.

Need more review? Check out this video!

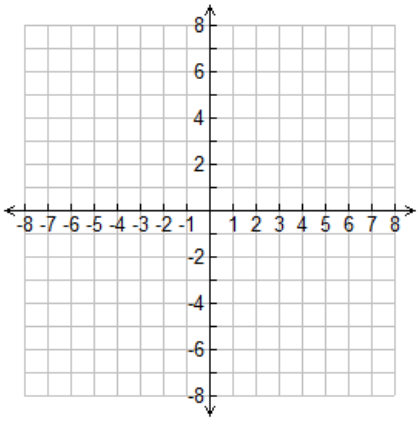
Graph from Slope-Intercept Form

Use your phones to scan the QR codes if you are using a paper copy of the packet.

DeltaMath Extra Practice
(Try these skills)

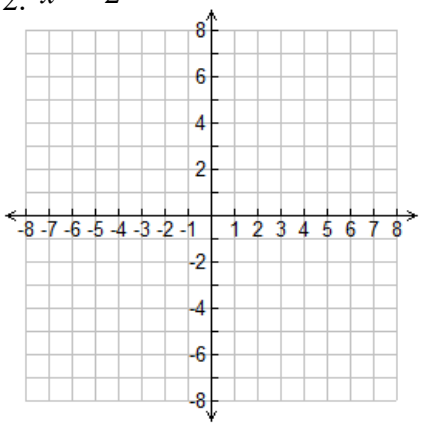
- Graph Line from Slope/Y-Intercept
- Graphing Lines from Equations
- Vertical and Horizontal Lines

1. $y = 3$

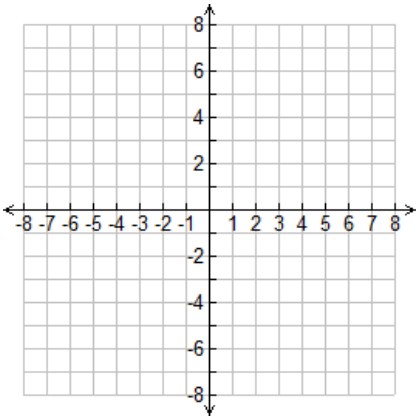


X	Y
-2	
-1	
0	
1	
2	

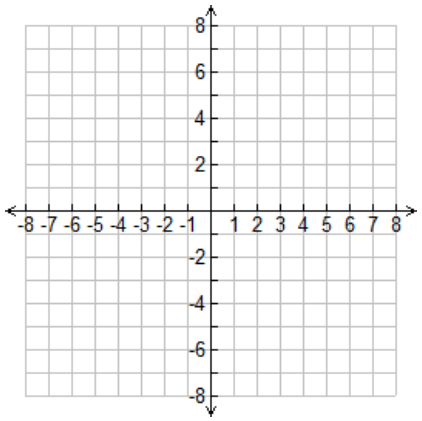
2. $x = -2$

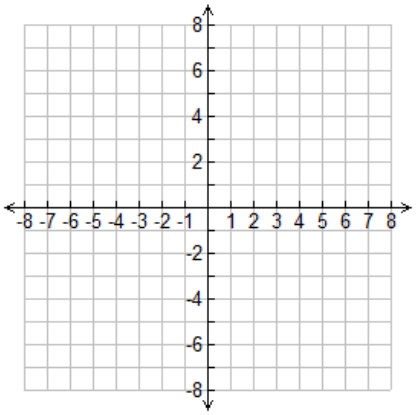
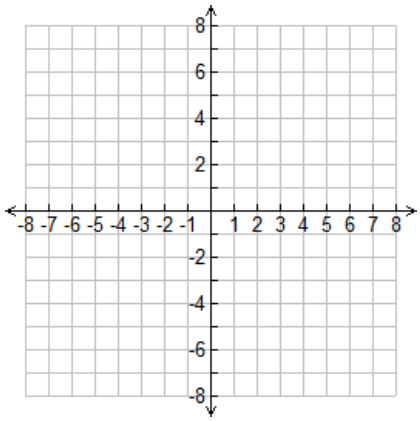


3. $y = 2x + 3$

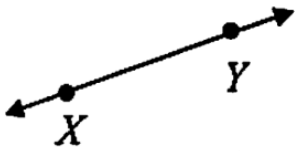
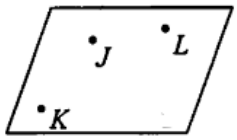
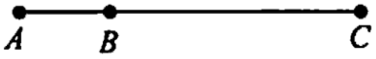


4. $y = 2x - 2$

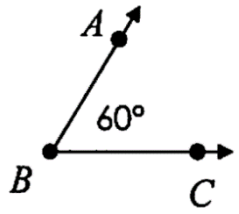


4. $y = -x$ 	5. $y = x$ 

M. Points, Lines, Planes, Segments and Rays

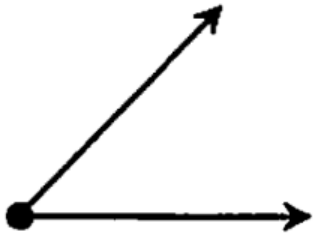
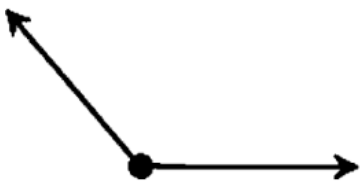
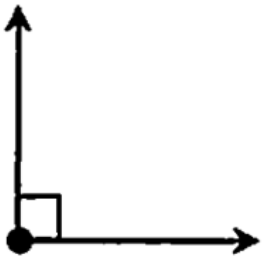
Point	Line	Plane	Rays	Segment
				
A point is a location and has no shape or size. Always use a capital letter	A line is made up of points. Two points form a line. It has no thickness or width. You can name it by any two points.	A plane is a flat surface made up of points. 3 points make up the figure. Extends indefinitely in all directions. Name it by using any three non-collinear points on the plane.	A ray is a line that has one endpoint (point of origin) and extends indefinitely in one direction. Naming starts with the starting point and then any other point.	Segments are the distance between two points.
Look at the figures and answer the questions below.				
Name the Point. _____	Name two ways to name this Line. _____ _____	Name three ways to name this plane. _____ _____ _____	Name the Ray _____	Name the segments you see: _____ _____ _____

N. Types of Angles and Angle Relationships

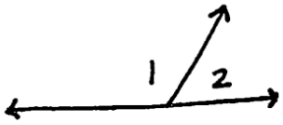
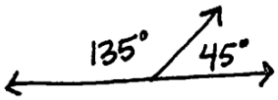
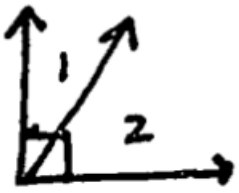
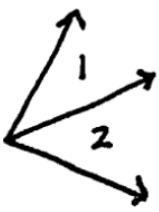


- Angle is formed by two rays with a common endpoint.
- The common endpoint is the _____.
- Name an angle using 3 letters. The middle letter must always be the vertex.
- Use a single letter if there is only one angle located at the vertex.

Types of Angles

Acute	Obtuse	Right	Straight
			
Angle less than 90 degrees.	Angle greater than 90 degrees.	Angle that is equal to 90 degrees	Equal to 180 degrees.

Angle Relationships

Linear Pairs	Supplementary Angles	Complimentary Angles	Adjacent Angles	Vertical Angles
				
Two angles that are adjacent and supplementary. They form a straight line.	Any two angles whose sum is 180 degrees.	Any two angles whose sum is 90 degrees.	Two angles that are next to each other and share a common side.	Two angles that are across from each other on intersecting lines. They are always congruent.

Whew! Feel ready for freshman year math? Believe it or not, you will use all these skills this year.

We will go over topics in this packet in class – be ready with questions! See you soon!