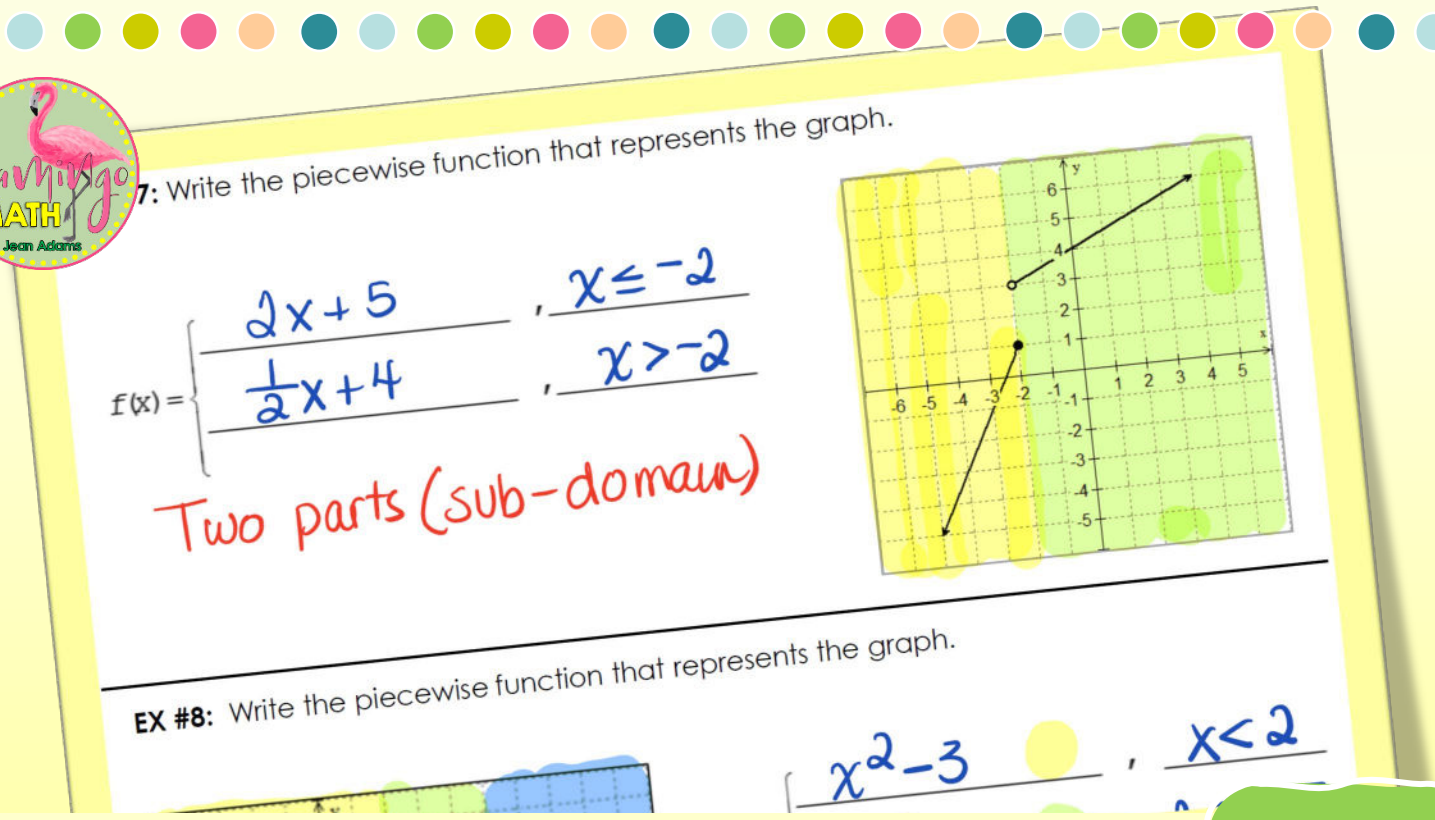
Algebra 2 Honors

Functions Equations & Graphs



Guided Notes 2

Completely Editable

ALGEBRA 2 CURRICULUM

Scope and Sequence

Unit 2: Functions, Equations and Graphs

Lesson	Skills & Learning Objectives
[2.1] Relations and Functions	❑ Identify functions using a variety of representations ❑ Describe, analyze, and graph relationships to identify functions ❑ Interpret data in tables and graphs to identify functions
[2.2] Direct Variation	❑ Understand similarity and proportion in relation to direct variation ❑ Write direct variation equations using similarity and ratios ❑ Interpret the effects of changing parameters in direct variation
[2.3] Linear Functions and Slope-Intercept Form	❑ Understand the properties of lines on graphs ❑ Graph linear equations ❑ Write equations of lines using slope-intercept form ❑ Analyze and describe relationships with linear equations ❑ Interpret real-world data models to write linear equations
[2.4] More About Linear Equations	❑ Write linear equations using point-slope form, standard form, and slope-intercept form. ❑ Write equations given a point and a slope ❑ Write equations given two points ❑ Convert between different forms of linear equations ❑ Use properties of parallel and perpendicular lines ❑ Analyze and interpret linear relationships from real-world data
[2.5] Piecewise Functions	❑ Analyze, graph, evaluate piecewise functions ❑ Graph functions given piecewise defined equations ❑ Given a graph, write the piecewise function

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ALGEBRA 2 CURRICULUM

Scope and Sequence

Unit 2: Functions, Equations and Graphs

Lesson	Skills & Learning Objectives
[2.6] Using Linear Models	❑ Write linear equations that model real-world data ❑ Make predictions from linear models using estimation strategies
[2.7] Families of Functions	❑ Graph transformations of linear, quadratic and absolute value function families ❑ Use rigid and non-rigid transformation properties to graph ❑ Analyze transformations and write equations in standard form
[2.8] Absolute Value Functions and Graphs	❑ Describe, analyze, and graph absolute value functions ❑ Write equations of transformed absolute value graphs
[2.9] Two-Variable Inequalities	❑ Describe, analyze, and graph linear and absolute value inequalities

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Unit 2: Functions, Equations & Graphs

	Lesson Topic	Standards Alignment
1	Relations and Functions	**BEST:** MAFS.912.A-CED.1.1; MAFS.912.A-REI.2.3; MAFS.912.F-BF.1.1; MAFS.912.A-REI-4.10 **CCSS:** HSA.BF.A.1; HSA.CED.A.1; HSA.REI.B.3; HSA.REI.D.10 **TEKS:** A2.1(B), A2.1(F), A2.2(A), A2.7(I)
2	Direct Variation	**BEST:** MAFS.912.SSE.1.1; MAFS.912.F-IF.2.4 **CCSS:** HSA.SSE.A.1; HSF.IF.B.4 **TEKS:** A2.1(C), A.3(C), A2.2(A)
3	Linear Functions and Slope-Intercept Form	**BEST:** MAFS.912.A-CED.1.1; MAFS.912.F-IF.2.6; MAFS.912.F-IF.1.1; MAFS.912.A-REI.4.10; MAFS.912.F-IF.2.4; MAFS.912.F-IF.3.7 **CCSS:** HSF.IF.A.1; HSF.IF.B.4; HSF.IF.B.6; HSF.IF.C.7; HSA.CED.A.1; HSA.REI.D.10 **TEKS:** A2.1(C), A.3(A), A2.2(A)
4	More About Linear Equations	**BEST:** MAFS.912.A-CED.1.1; MAFS.912.A-CED.1.4; MAFS.912.F-IF.2.6; MAFS.912.F-IF.1.1; MAFS.912.A-REI-4.10; MAFS.912.F-IF.2.4; MAFS.912.F-IF.3.7 **CCSS:** HSF.IF.A.1; HSF.IF.B.4; HSF.IF.B.6; HSF.IF.C.7; HSA.CED.A.1; HSA.CED.A.4; HSA.REI.D.10 **TEKS:** A2.1(C), A.3(A), A2.2(A)
5	Piecewise Functions	**BEST:** MAFS.912.F-IF.3.7.b **CCSS:** HSF.IF.C.7.B **TEKS:** A2.1(F), A2.2(A), A2.7(I)
6	Using Linear Models	**BEST:** MAFS.912.F-LE.1.2; MAFS.912.F-BF.1.1; MAFS.912.F-IF.3.7 **CCSS:** HSF.IF.C.7; HSF.LE.A.2; HSF.BF.A.1 **TEKS:** A2.1(C), A.3(A), A2.2(A)
7	Families of Functions	**BEST:** MAFS.912.F-BF.1.1.b; MAFS.912.F-BF.2.3 **CCSS:** HSF.BF.A.1.B; HSF.BF.B.3 **TEKS:** A2.1(F), A2.2(A)
8	Absolute Value Functions and Graphs	**BEST:** MAFS.912.F-IF.3.7.b **CCSS:** HSF.IF.C.7.B **TEKS:** A2.2(A), A2.1(F), A2.6(C), A2.7(I)
9	Two-Variable Inequalities	**BEST:** MAFS.912.A-CED.1.3; MAFS.912.A-REI.4.12; MAFS.912.A-REI-4.10 **CCSS:** HSA.CED.A.3; HSA.REI.D.10; HSA.REI.D.12 **TEKS:** A2.1(B), A2.1(G), A2.3(E), A2.3(F)

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Lesson I: Relations and Functions

_____ – a set of pairs of input and output values. Relations can be represented as ordered pairs, mappings, tables, and graphs.

_____ – the set of all inputs, or x-coordinates, of the ordered pairs.

_____ – the set of all outputs or *y*-coordinates of the ordered pairs.

_____ – a relation in which each element of the domain corresponds with exactly one element of the range.

_____ – a test used to determine whether a relation is a function. If a vertical line passes through more than one point on the graph of a relation, then the relation is ***not*** a function.

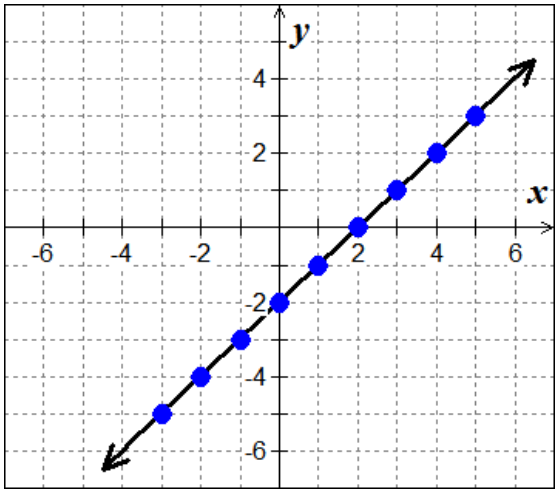
_____ – If *f* is the name of a function, the function notation *f* (x) shows the function name *f* and also represents the range value *f* (x) for the domain value x. You read the function notation *f* (x) as "*f* of x" or "a function of x." Note that *f* (x) does not mean "*f* times x."

_____ – x, represents the input of the function.

_____ – *f* (x), represents the output of the function. The value *depends* on the input value.

Representing Relations

EX #1: Use the graph below to create a table of values.



x	y

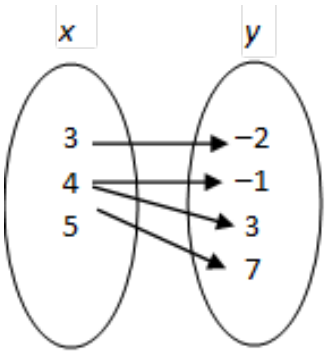
Identifying Functions

EX #4: Is the relation a function? Explain why or why not.

A.

x	y
–2	6
0	3
1	–1
3	–4
1	7

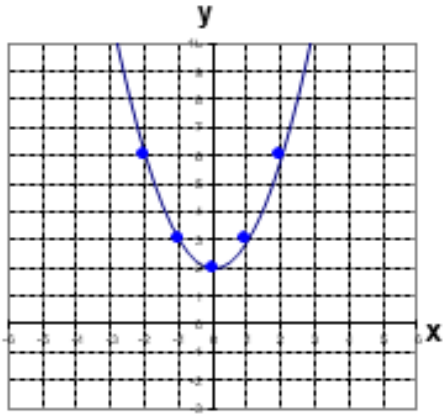
B.



Vertical Line Test

EX #5: Determine whether the relations shown below are functions by using the vertical line test. *Can you name the domain and range for each relation?*

A.

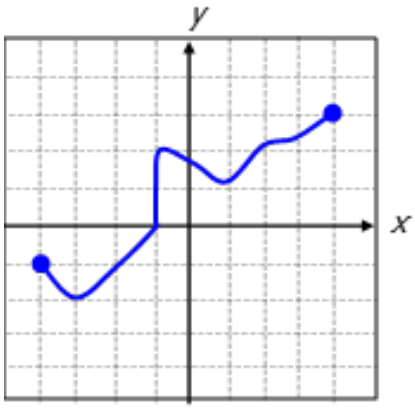


Function: _____

Domain: _____

Range: _____

B.



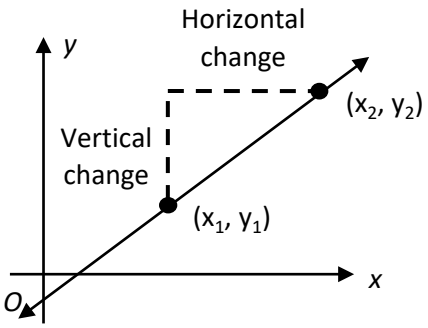
Function: _____

Domain: _____

Range: _____

Lesson 3: Linear Functions & Slope-Intercept Form

_____ – The constant *rate of change* between the vertical distance and the horizontal distance.



_____ – any function whose graph is a line.

_____ – an equation in two variables.

_____, $ax + by = c$ where *a*, *b*, and *c* are constants and $a > 0$.

_____ – the point at which a non-vertical line crosses the *y*-axis.

_____ – the point at which a non-horizontal line crosses the x-axis.

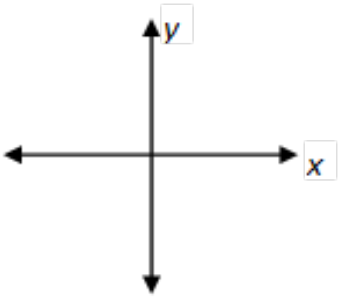
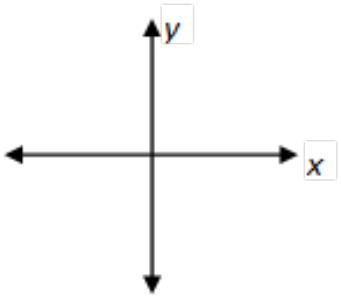
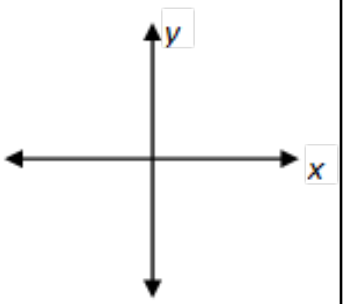
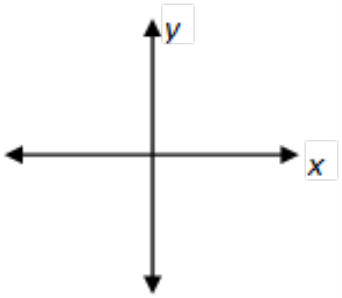
_____ – a special form of a linear equation. $y = mx + b$ where *m* is the slope of the line and $(0, b)$ is the *y*-intercept.

Slope Formula

$$slope = \frac{vertical\ change}{horizontal\ change} = \frac{rise}{run} = \frac{y_2 - y_1}{x_2 - x_1}$$

where $x_2 - x_1 \neq 0$

Four Types of Slope of a Line

POSITIVE SLOPE	NEGATIVE SLOPE	ZERO SLOPE	UNDEFINED SLOPE
			
Line rises from left to right	Line falls from left to right	Horizontal Line	Vertical Line

Evaluating Piecewise Functions

Evaluate each of the following.

EX #3: $f(x) = \begin{cases} -x-3, & x < -2 \\ 1, & -2 \le x < 2 \\ \frac{1}{2}x + 2, & x \ge 2 \end{cases}$

A. $f(8)$

B. $f(0)$

C. $f(-5)$

EX #4: $f(x) = \begin{cases} -2|x-1|, & x \ge -1 \\ 3, & -4 < x < -1 \\ -\frac{1}{2}x - 1, & x \le -4 \end{cases}$

A. $f(6)$

B. $f(-2)$

C. $f(-8)$

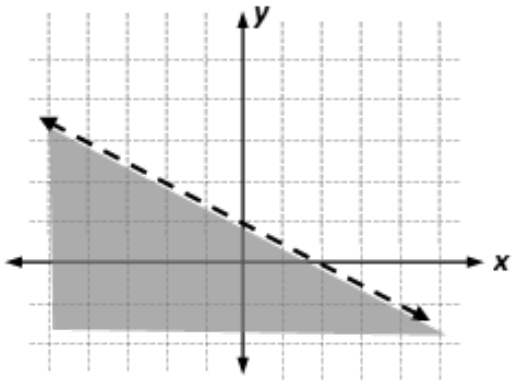
Graphing Step Functions

EX #5: Evaluating the greatest integer function means to answer the question, **"What is the integer *not greater than* some value?"**

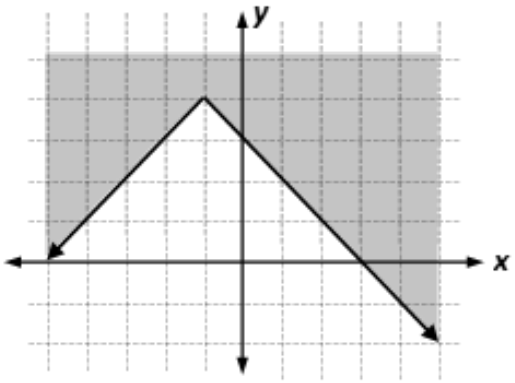
A. $[\lvert 2.3 \rvert]$	**B.** $[\lvert 3.4 \rvert]$	**C.** $[\lvert 0.57 \rvert]$
D. $[\lvert 7.9 \rvert]$	**E.** $[\lvert -4.6 \rvert]$	**F.** $[\lvert -0.85 \rvert]$
G. $[\lvert -2.4 \rvert]$	**H.** $[\lvert 9.7 \rvert]$	**I.** $[\lvert -1.1 \rvert]$

Writing an Inequality Given a Graph

EX #6: What inequality does this graph represent?



EX #7: Write the inequality for the graph shown.

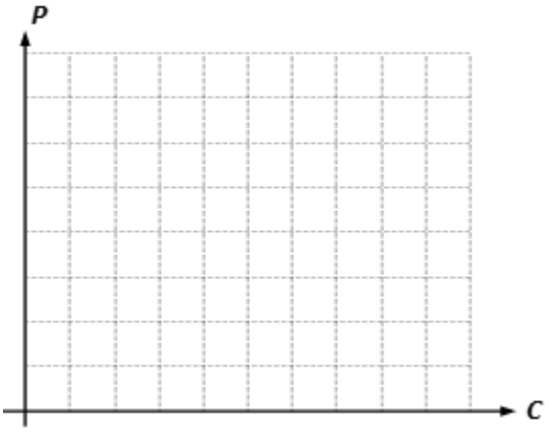


Open-Ended Practice

EX #8: You want to buy your favorite candy bar that cost $1.00 each and your favorite pepperoni snack that cost $1.50 each. You have $4.50 to spend.

A. Write an inequality to represent the situation, where *C* is the number of candy bars you buy and *P* is the number of pepperoni snacks.

B. Graph the inequality.



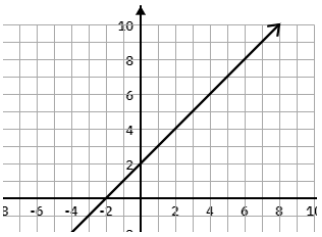
C. Reasoning: Why did the graph in **B** only include quadrant I?

D. Reasoning Can you buy 3 candy bars and 2 pepperoni snacks? Explain.

Name _____ Date _____ Period _____

Lesson 2.1: Relations and Functions — Warm-Up #1

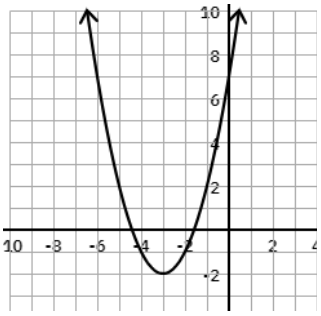
1. Use the graph to create a table of values.



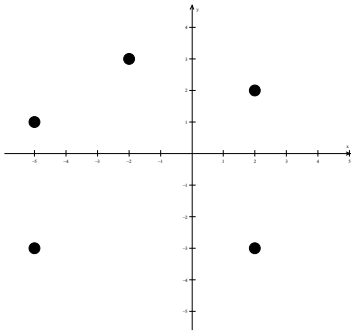
2. Given $F(x) = -\frac{1}{3}x - 2$ find the outputs given the following inputs.

x	-3	0	3	6
$F(x)$				

3. Identify the domain and range of the following relation. Is it a function?



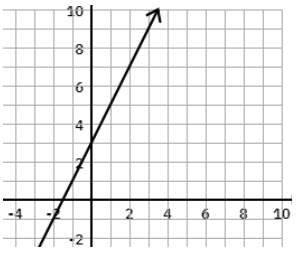
4. Identify the domain and range of the following relation. Is it a function?



Name _____ Date _____ Period _____

Lesson 2.1: Relations and Functions — Warm-Up # 2

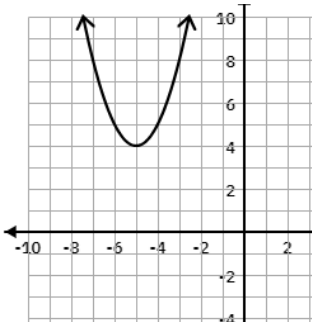
1. Use the graph to create a table of values.



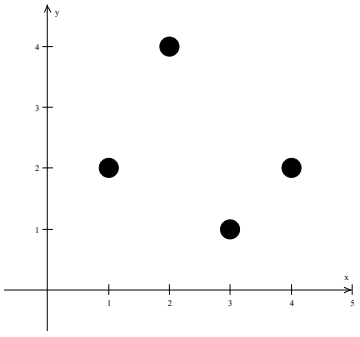
2. Given $F(x) = -\frac{1}{4}x - 3$ find the outputs given the following inputs.

x	-4	0	4	8
$F(x)$				

3. Identify the domain and range of the following relation. Is it a function?



4. Identify the domain and range of the following relation. Is it a function?



Name _____ Date _____ Period _____

Lesson 2.5: Piecewise Functions — Warm-Up #1

1. Given. $f(x) = \begin{cases} x+3, x>0 \\ -x, x \le 0 \end{cases}$, find

a) $f(0)$

b) $f(-1)$

c) $f(1)$

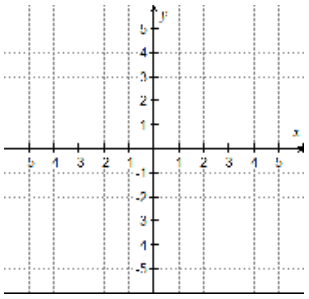
2. Given. $g(x) = \begin{cases} \frac{1}{3}x+3, x>-2 \\ -2x, x \le -2 \end{cases}$, find

a) $f(-2)$

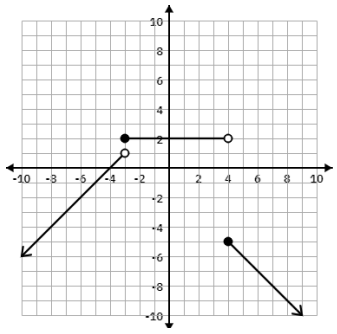
b) $f(-3)$

c) $f(-1)$

3. Graph the piecewise function from #1.



4. Write the piecewise function that represents the graph.



Name _____ Date _____ Period _____

Lesson 2.5: Piecewise Functions — Warm-Up #2

1. Given. $f(x) = \begin{cases} -x+5, & x>0 \\ x-2, & x \le 0 \end{cases}$, find

a) $f(0)$

b) $f(-1)$

c) $f(1)$

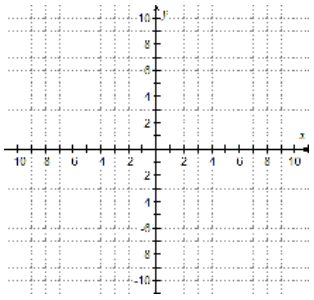
2. Given. $g(x) = \begin{cases} \frac{1}{4}x-1, & x>-4 \\ -2x, & x \le -4 \end{cases}$, find

a) $f(-4)$

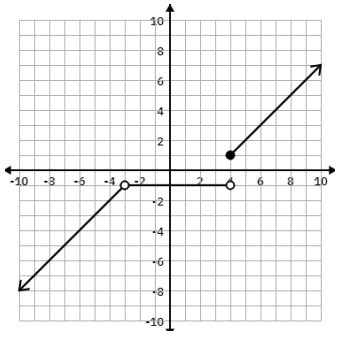
b) $f(-3)$

c) $f(-5)$

3. Graph the piecewise function from #2.



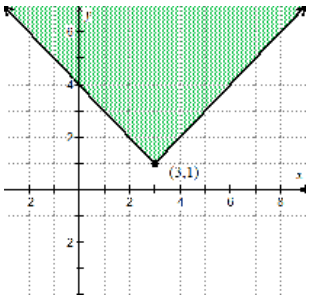
4. Write the piecewise function that represents the graph.



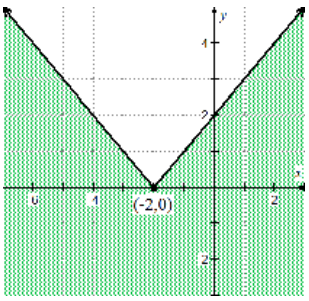
Name _____ Date _____ Period _____

Lesson 2.9 Two Variable Inequalities — Warm-Up #1

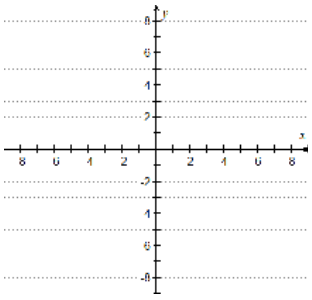
1. Write an inequality for the graph.



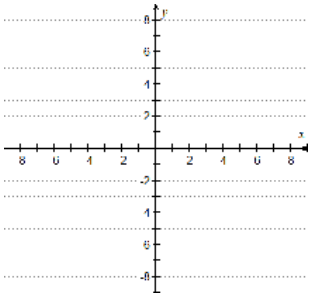
2. Write an inequality for the graph.



3. Graph $-2y > 2x - 4$



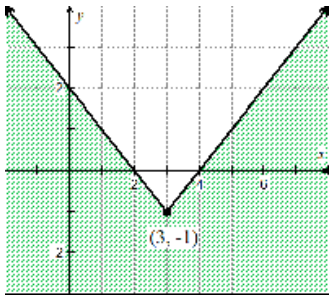
4. Graph $3y > 4x + 6$



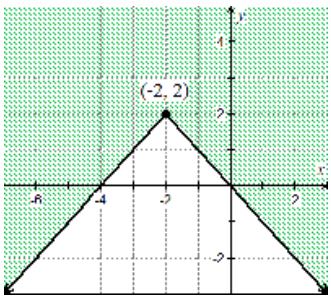
Name _____ Date _____ Period _____

Lesson 2.9 Two Variable Inequalities — Warm-Up #2

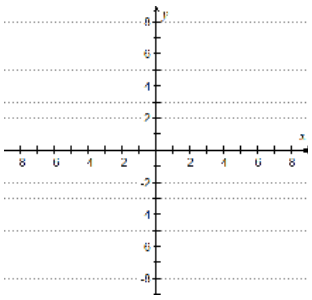
1. Write an inequality for the graph.



2. Write an inequality for the graph.



3. Graph $-3y \leq 2x + 6$



4. Graph $3x + 2y > 8$

