

Name: _____

Block: _____

Algebra 2H: Relations, Functions, Graphs
Group A

Practice

There are **20 questions** in this test, each worth **2pts**.

There are **2 additional** extra-credit questions, each worth **1pt**.

You have **45 minutes** to complete the test (more if you have accommodations).

=== Start of test

For each of the following, choose the most specific name from "Relation", "Function", or "1-to-1 function":

1) (2,4) (6,8) (-1,4) (0,0)

a) Relation

b) Function

c) 1-to-1 function

2) (-1,2) (2,-1) (-3,4) (4,-3)

a) Relation

b) Function

c) 1-to-1 function

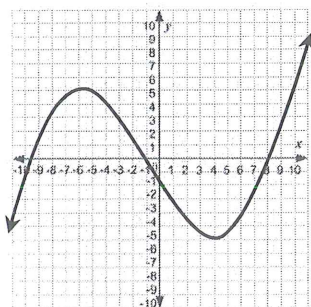
3) (4,2) (1,3) (4,6) (1,1)

a) Relation

b) Function

c) 1-to-1 function

4)



a) Relation

b) Function

c) 1-to-1 function

===

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Find the equation for the following lines:

- 5) With slope $= -2$ and y-intercept $= 1$. Give your result in slope-intercept form.

$$m = -2, b = 1$$

$$\boxed{y = -2x + 1}$$

- 6) Through $(3, -2)$ with slope $= 2$. Give your result in slope-intercept form.

$$(3, -2) \quad m = 2$$

$$(y - (-2)) = 2 \cdot (x - 3)$$

$$y + 2 = 2x - 6 \longrightarrow$$

$$\boxed{y = 2x - 8}$$

- 7) Through $(2, 1)$ and $(1, -2)$. Give your result in slope-intercept form.

$$(2, 1) \quad (1, -2)$$

$$m = \frac{-2 - 1}{1 - 2} = \frac{-3}{-1} = 3$$

$$(y - 1) = 3(x - 2)$$

$$\boxed{y = 3x - 5}$$

check:
 $1 \stackrel{?}{=} 3 \cdot 2 - 5 \quad \checkmark$
 $-2 \stackrel{?}{=} 3 \cdot 1 - 5 \quad \checkmark$

- 8) Perpendicular to the line $y = 4x + 2$, and having x-intercept 5. Give your result in slope-intercept form.

$$m_1 = 4$$

$$\hookrightarrow m_{\perp} = -\frac{1}{4}$$

$$(5, 0)$$

$$(y - 0) = -\frac{1}{4}(x - 5) \longrightarrow$$

$$\boxed{y = -\frac{1}{4}x + \frac{5}{4}}$$

- 9) Parallel to the line $y = 5x + 6$, and containing the point $(1, 3)$. Give your result in slope-intercept form.

$$m_1 = 5$$

$$\hookrightarrow m_{\parallel} = 5$$

$$(1, 3)$$

$$(y - 3) = 5(x - 1) \longrightarrow$$

$$\boxed{y = 5x - 2}$$

- 10) Perpendicular to the line $y = 2 - \frac{1}{2}x$, and having y-intercept 5. Give your result in slope-intercept form.

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

$$(0, 5)$$

$$m_1 = -\frac{1}{2} \longrightarrow m_{\perp} = 2 \longrightarrow$$

$$\boxed{y = 2x + 5}$$

- 11) Write in standard form the equation $(3 - y) \cdot \frac{1}{2} = 5 - (3x + 2) \cdot \frac{1}{2}$

$$\times 2: \quad 3 - y = 10 - (3x + 2)$$

$$0 = 7 + y - 3x - 2 \longrightarrow$$

$$\boxed{-3x + y + 5 = 0}$$

12) What is the slope of the line going through the points (3,0) and (-1,0) ?

$$m = \frac{0-0}{3-(-1)} = \boxed{0}$$

13) What is the slope of the line given by $(2y - 3) = 5 - 3x$?

$$2y - 3 = 5 - 3x \rightarrow 2y = -3x + 8 \rightarrow y = -\frac{3}{2}x + 4$$

$$m = -\frac{3}{2}$$

14) During the summer, I wanted to try a new Gym. The Gym had two plans:

a. Plan I: Registration fee of \$100. Then, \$50 for each month.

b. Plan II: Drop in rate of \$12 per visit.

Explain (preferably with numbers) your answers to the below:

1. If I plan to visit 4 times a month, which plan should I use?

3 months

Plan II: $3 \cdot (4 \cdot 12) = 144$
month ↑ times month

Plan I: $100 + 3 \cdot 50 = 250$

$144 < 250$
Plan II

2. If I plan to visit 8 times a month, which plan should I use?

3 months

Plan II: $3 \cdot (8 \cdot 12) = 296$

Plan I: 250

$296 > 250 \Rightarrow$ Plan I

3. Over how many visits a month would plan I be better?

3 months

Plan II: $3 \cdot (x \cdot 12)$

Plan I: 250

$$3 \cdot x \cdot 12 < 250$$

$$x < 6.94$$

$$7 \times 36 = 252$$

7 times and over

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Given the following definitions:

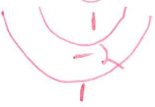
$$f(x) = 2x + 5, \quad g(x) = x^2 - 3, \quad h(x) = |7 - x|$$

Find the following:

15) $f(3)$ $2 \cdot 3 + 5 = \boxed{11}$

16) $g(-1)$ $(-1)^2 - 3 = \boxed{-2}$

17) $f(g(g(h(8))))$ $= f(1) = 2 \cdot 1 + 5 = \boxed{7}$



18) $h(-7)$ $|7 - (-7)| = \boxed{14}$

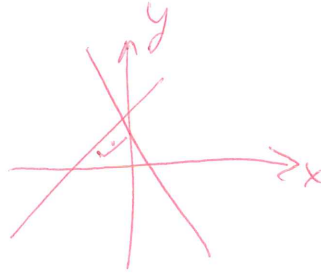
19) $h(3x + 2)$ $|7 - (3x + 2)| = \boxed{|5 - 3x|}$

20) $(h \circ f)(x)$ $h(2x + 5) = |7 - (2x + 5)| = |7 - 2x - 5| = \boxed{|2 - 2x|}$

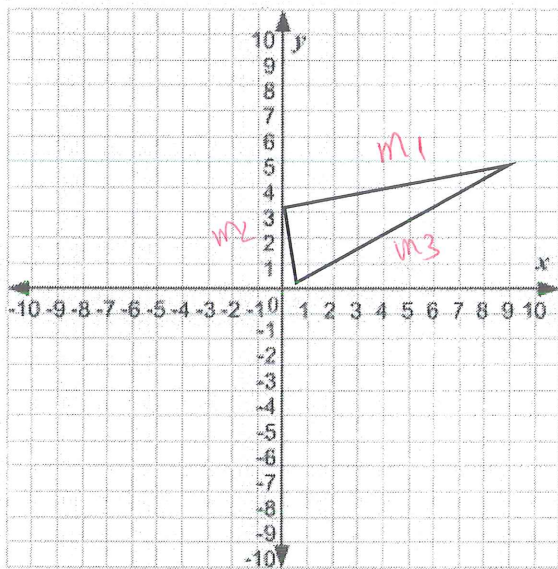
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Extra-credit

21) Two lines are perpendicular, and neither is vertical. How many quadrants must the lines pass through? Explain.



22) The picture below describes a right triangle. The 3 sides have slopes denoted as m_1, m_2, m_3 . What can you say about the value of the product $(m_1 \cdot m_2 \cdot m_3)$? See 4 options below. Explain your answer.



$$m_1 \cdot m_2 = -1$$

$$0 < m_3 < \infty$$

$$m_1 \cdot m_2 \cdot m_3 = -1 \cdot m_3$$

- a) $-\infty < (m_1 \cdot m_2 \cdot m_3) \leq -1$
- b) $-1 \leq (m_1 \cdot m_2 \cdot m_3) \leq 0$
- c) $0 \leq (m_1 \cdot m_2 \cdot m_3) \leq 1$
- d) $1 \leq (m_1 \cdot m_2 \cdot m_3) < \infty$

$$-1 \leq m_1 \cdot m_2 \cdot m_3 \leq 0$$

=== End of test