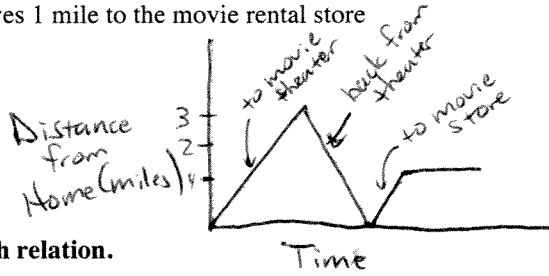## FUNCTIONS AND RULES (equations)

1. Sketch a graph of the situation. Label each section.

The distance from home a family is that drives 3 miles to the movie theater, returns home because they forgot their money, and then drives 1 mile to the movie rental store



**Find the domain and range for each relation.**

2. $\{(3, 9), (1, 5), (2, 9), (5, 11), (3, 12)\}$

Domain is x-values $\{3, 1, 2, 5, 3\}$

Range is: $\{9, 5, 11, 12\}$

**Find the range of function rule $y = 3x + 4$ for each domain.**
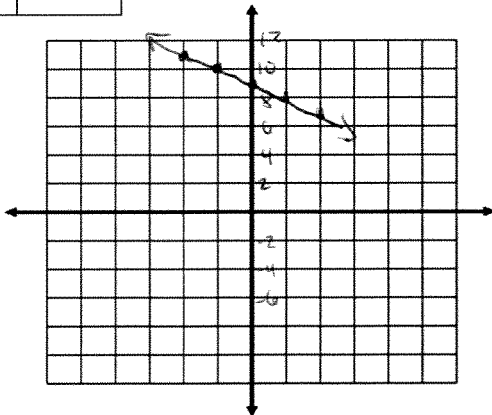
3. $\{2, 9, 11.5\}$

| x | y |
|---|---|
| 2 | 10 |
| 9 | 31 |
| 11.5 | 38.5 |

$y = 3(2) + 4$
$y = 10$

$3(9) + 4$
$31$

$3(11.5) + 4$
$38.5$

Range is: $\{10, 31, 38.5\}$

**Model each rule with a table of values and a graph.**

4. $f(x) = 9 - x$

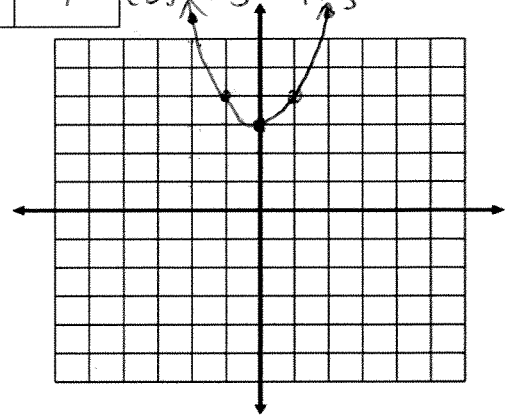| X | y | |
|---|---|---|
| -2 | 11 | $9 - (-2)$ |
| -1 | 10 | $9 - (-1)$ |
| 0 | 9 | $9 - (0)$ |
| 1 | 8 | $9 - (1)$ |
| 2 | 7 | $9 - (2)$ |



5. $f(x) = x^2 + 3$

| X | f(x) | |
|---|---|---|
| -2 | 7 | $(-2)^2 + 3 = 4 + 3$ |
| -1 | 4 | $(-1)^2 + 3 = 1 + 3$ |
| 0 | 3 | $(0)^2 + 3 = 0 + 3$ |
| 1 | 4 | $(1)^2 + 3 = 1 + 3$ |
| 2 | 7 | $(2)^2 + 3 = 4 + 3$ |



6. Label the following situations as **discrete (not connected)** or **continuous (connected)**

a) the graph of your growth from birth to age 12    Continuous

b) the graph of the number of pops you buy at the snack shop    Discrete

c) the graph of the speed of a motorcycle    Continuous

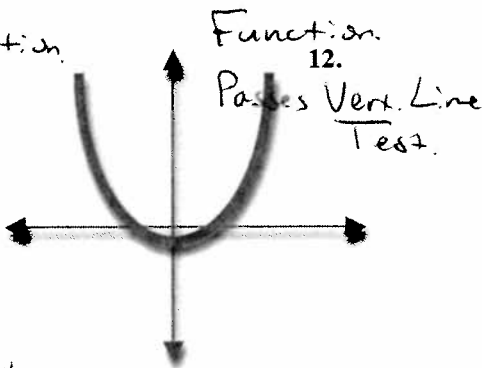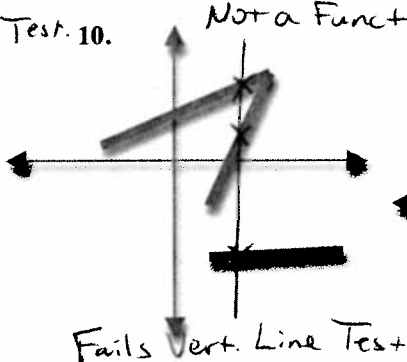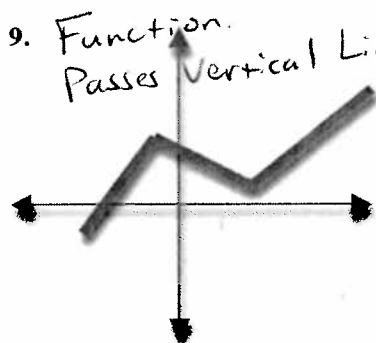**Determine whether each relation is a function.   EXPLAIN WHY OR WHY NOT.**

Input    Output

**3.**

| x | y |
|----|----|
| -4 | 2 |
| -2 | 1 |
| 0 | 0 |
| 1 | 2 |

Function.
Each input has exactly one Output

**4.**

| x | y |
|----|----|
| -3 | -2 |
| 4 | -1 |
| 8 | -1 |
| 4 | -2 |

Not a Function.
4 has 2 different outputs.

**9.** Function. Passes Vertical Line Test.



**10.** Not a Function.



Fails Vert. Line Test

**12.** Function. Passes Vert. Line Test.



**Write a function rule for each table.**

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

m    b

**13.**

| x | y |
|----|----|
| -2 | -3 |
| -1 | -1 |
| 0 | 1 |
| 1 | 3 |
| 2 | 5 |

Rate of Change
2
2
2
2

| X | F(x) |
|----|----|
| 0 | 7 |
| 2 | 10 |
| 4 | 13 |
| 6 | 16 |
| 8 | 19 |
| 10 | 22 |

2 )3
2 )3
2 )3
2 )3
2 )3

**14.**

Changes by 3 every 2 x's.
$m = \frac{3}{2}$

$b = 7$

$\boxed{y = \frac{3}{2}x + 7}$

**Write a function rule for each situation.**

**14.** the cost of staying in a motel at $65 per night    $f(n) = 65n$

**15.** the amount of money you earn working for $7.15 an hour    $f(h) = 7.15h$

**16.** the total cost of your lunches if you spend $3.25 each day and start with $50.    $f(d) = 3.25d + 50$
↑ begin

**17.** You go to candy store to buy jelly beans. Your total price depends on the weight. The cost is $1.15 per pound.
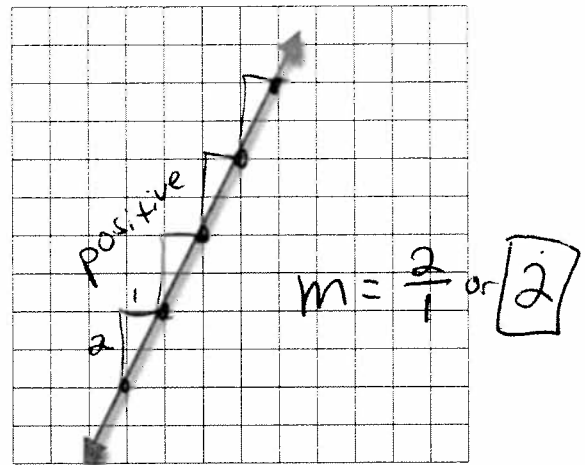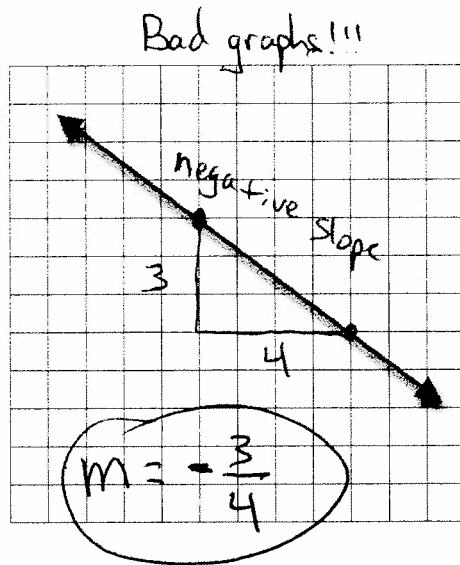
   **a.** Write a function rule describing the situation.    $f(p) = 1.15p$

   **b.** How much would it cost you if the bag of jelly beans weighed 5 lbs?

   $= 1.15(5)$
   $= \$5.75$

Page 2

**Rate of Change – Equations – Graphing**

1. Find the rate of change from the graphs.

Bad graphs!!!

negative Slope

3

4

$$m = -\frac{3}{4}$$

positive

1

2

$$m = \frac{2}{1} \text{ or } \boxed{2}$$

2. Find the slope of the lines with the following ordered pairs:

    a. (2, 5) and (7, 9)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{9-5}{7-2} = \boxed{\frac{4}{5}}$$

    b. (-2, 4) and (1, -5)

$$m = \frac{-5-4}{1--2} = \frac{-9}{3} = \boxed{-3}$$

3. Find the rate of change. The minimum wage in 1994 was $5.25. In 2010, the minimum wage is $7.15.

Cost per year!

$$\frac{7.15 - 5.25}{2010 - 1994} \rightarrow \frac{\$1.90}{16 \text{ years}}$$

Increase at $1.90 in 16 years

or $.12/year

4. Would the graphs of the following situations be discrete or continuous?
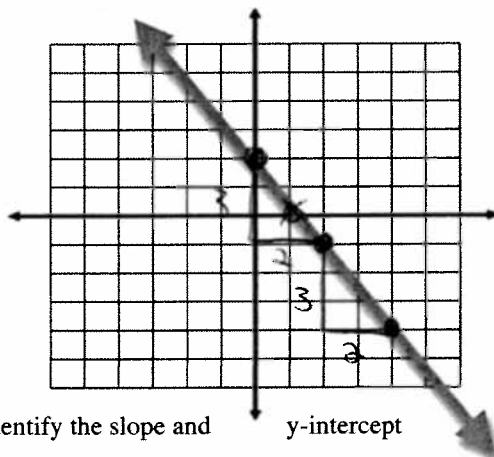
    b) the number of ice cream cones bought at the snack shop

    Discrete ... cannot have half a cone.

    c) the length of a snake

    Continuous ... can have decimals with length.
    ex. 13.24 in. long.

5. Identify the y-intercept and slope of the following graph. Then write an equation in slope-intercept form.

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

$$\boxed{y = -\frac{3}{2}x + 2}$$

6. Identify the slope and y-intercept of the following equations.

    a) $y = 3x + 5$
    $m = 3$
    $b = 5$

    b) $y = \frac{1}{2}x - 3$
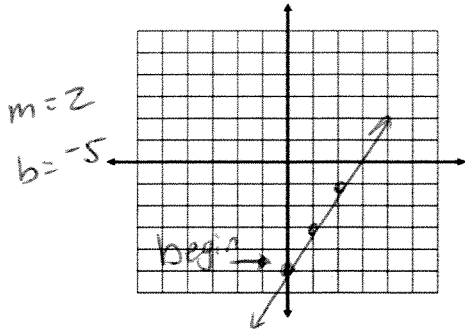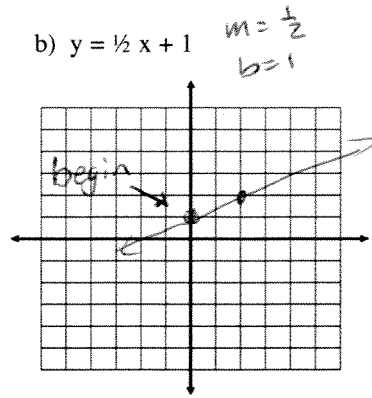    $m = \frac{1}{2}$
    $b = -3$

    c) $y = 8$    $y = 0x + 8$
    $m = 0$
    $b = 8$
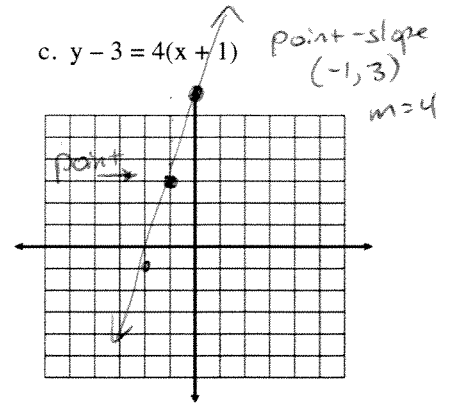
Page 3

7. Graph the following equations.

a) $y = 2x - 5$

$m = 2$
$b = -5$

b) $y = \frac{1}{2}x + 1$

$m = \frac{1}{2}$
$b = 1$

begin

c. $y - 3 = 4(x + 1)$

point-slope
$(-1, 3)$
$m = 4$

point

8. Graph the following equation by finding the x and y intercepts.

$6x - 3y = 12$

x-intercept $(2, 0)$

$6x = 12$
$x = 2$

y-intercept $(0, -4)$

$-3y = 12$

$y = -4$

$x_1 y_1 \quad x_2 y_2$
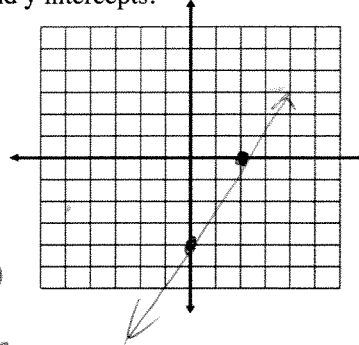
9. A line passes through the points (4, 1) and (2, -5). Write the equation of the line in point-slope form. Then rewrite into slope-intercept form.

pick a point : $(4, 1)$

$\frac{-5 - 1}{2 - 4} = \frac{-6}{-2} = 3$

$y - 1 = 3(x - 4)$ point-slope

$y - 1 = 3x - 12$
$\quad +1 \qquad +1$

$y = 3x - 11$ slope-intercept

**Write an equation that represents the problem below.**

10. You have 310 saved texts on your phone. You delete 3 per minute. Write a linear function that models the number of texts after x minutes.

a.) equation $f(m) = -3m + 310$

b.) How many texts will you have left after 20 minutes?

$= -3(20) + 310$
$= -60 + 310 = 250$ texts

11. Adult movie tickets are \$10 and student movie tickets are \$8. Write a standard equation relating the number of adults and students that can go to the movie for \$40.

a.) equation $10A + 8S = 40$

b.) Do you have enough money to take 3 adults and 2 students? Why or why not _____

$10(3) + 8(2)$
$30 + 16$
$46$

No, we only have \$40.
\$46 is too expensive.

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