

Show all work for partial credit. Please write on the test and number your scratch work accordingly. Good luck!

1. In each of the following, list **two numbers** that are:

- 6
- a) Natural numbers 1, 2, 3, ...
 - b) Whole numbers 0, 1, 2, 3, ...
 - c) Integers ..., -2, -1, 0, 1, 2, ...
 - d) Rational numbers 4/5, -13/8, 5, -32
 - e) Irrational numbers $\sqrt{2}$, π , 1.414414441...
 - f) Real numbers 8, 7/2, -3, $\sqrt{10}$

2. Simplify the following. Write solutions with positive exponents.

9

$$\left(\frac{3x^2}{4y^{-2}z}\right)^3 = \frac{3^3 x^{2 \cdot 3}}{4^3 y^{-2 \cdot 3} z^{1 \cdot 3}} = \frac{27x^6}{64y^{-6}z^3} = \frac{27x^6 y^6}{64z^3}$$

3. Find the equation of a line that passes through the points (1, 3) and (2, -4).

4

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-4 - 3}{2 - 1} = \frac{-7}{1} = -7$$

$$y - y_1 = m(x - x_1)$$

$$y - 3 = -7(x - 1)$$

$$y - 3 = -7x + 7$$

$$y = -7x + 10$$

4

4. Rainforests are defined as forests that grow in regions receiving more than 70 inches of rain per year. The world is losing an estimated 49 million acres of rain forest each year.

$$m = -49$$

a) Find a linear function, $R(t)$, that calculates the acres of rain forest (in millions) lost in t years.

4

$$R(t) = -49t$$

b) Evaluate $R(7)$ and state its meaning in the context of the problem.

4

$$R(7) = -49(7) = -343$$

In 7 years, 343 million acres of rain forests will be depleted.

5. Match the slopes with the appropriate lines shown below. Place your answer in the boxes provided.

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

$$m = -5$$

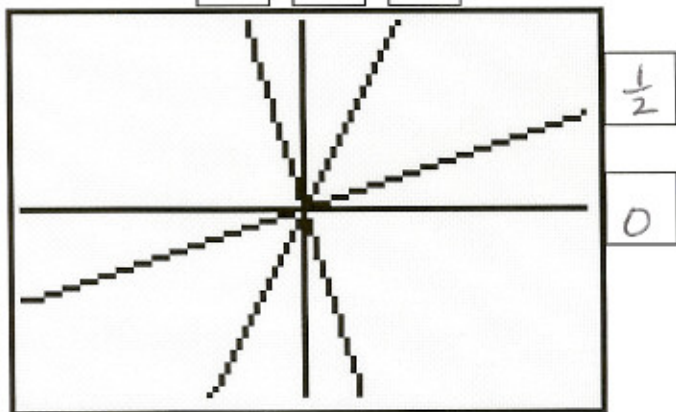
$$m = 3$$

$$m = 0$$

$$m = \phi$$

2 each

-5 ϕ 3



6. The table below shows Fahrenheit and Celsius temperatures.

F	C
-40	-40
0	-160/9
32	0
100	340/9

$$m = \frac{-160 - -40}{0 - -40} = \frac{5}{9}$$

$$m = \frac{340 - 0}{100 - 32} = \frac{5}{9}$$

$$m = \frac{0 - -160}{32 - 0} = \frac{5}{9}$$

a) Does this table describe a **function**? Why or why not?

3

Yes, passes the VLT

b) Does this table describe a **linear function**? Why or why not?

3

Yes, has constant slope of $\frac{5}{9}$

c) Find a linear function that models this data.

3

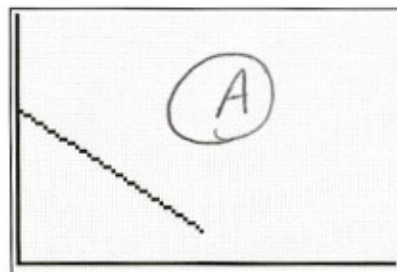
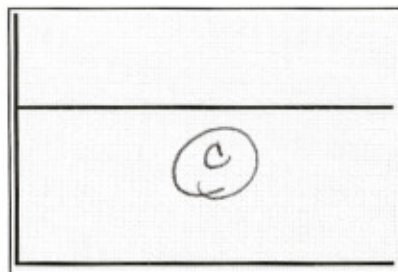
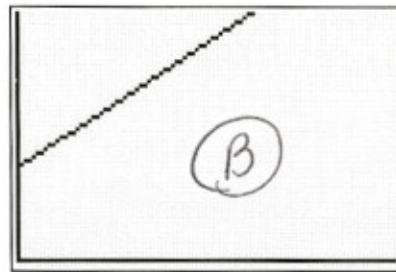
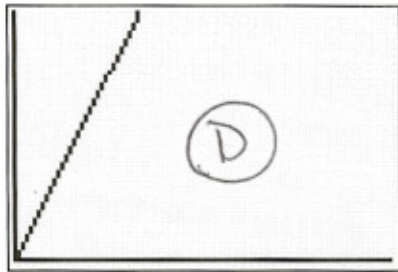
$$Y = \frac{5}{9}x - \frac{160}{9}$$

$$C = \frac{5}{9}F - \frac{160}{9}$$

7. Match the situation with the graph that models it best.

- A. The number of sales per year of lava lamps from 1960 to present. *decreasing*
 B. The total federal debt from 1985 to 1995. *increasing*
 C. The distance between Chicago and Denver from 1985 to 1995. *constant*
 D. The height of a rocket launched at sea level during the first minute of the rocket's flight. *increasing from 0.*

2 each



8. The number of radio stations on the air from 1950 to 1995 may be modeled by $N(t) = 214.2t - 415,368$ where t is the year.

a) State what the independent variable (input) represents.

② t : The year ranging from 1950 to 1995

b) State what the dependent variable (output) represents.

② $N(t)$: The number of radio stations on air in a particular year between 1950 to 1995.

c) Find the slope and state its meaning in the context of the problem.

② $m = \frac{214.2 \text{ radiostations}}{1 \text{ year}}$

② Increase of 214.2 radio stations per year since 1950

9. Find an equation of a line that is **perpendicular** to the line $y = \frac{-4}{3}x - 2$ and passes through the point (2, 3).

$$y - y_1 = m(x - x_1)$$

$$y - 3 = \frac{3}{4}(x - 2)$$

$$y - 3 = \frac{3}{4}x - \frac{3}{2}$$

(4)

$$y = \frac{3}{4}x + \frac{3}{2}$$

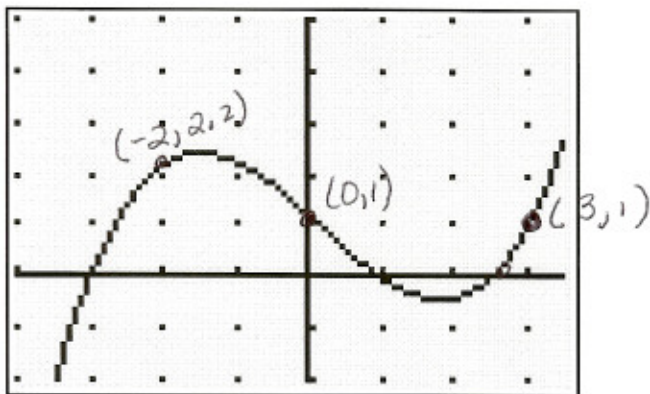
$$m = \frac{-4}{3}$$

(2)

$$\perp m = 3/4$$

(2)

Use the graph to answer questions 10-12. Each tick mark represents 1 unit.



10. Determine if the graph above represents a function or not. State why or why not.

Yes, passes the VLT

(4)

(4)

11. a. State the domain of the above graph.

(6)

$(-\infty, \infty)$

- b. State the range of the above graph.

(5)

$(-\infty, \infty)$

(3)

$$f(0) = 1$$

(3)

$$f(3) = 1$$

(3)

$$f(-2) = 2.2$$