## **Quantitative Skills & Reasoning – Math 1001**

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## Functions

A **function** is a rule or correspondence that assigns to each element of a set (called the domain) exactly one element of a second set (called the range).

A function may be defined by a set of ordered pairs, a diagram, a table, a graph, an equation, or a verbal description.

The set of all first elements of the function, or the inputs, is called the **domain**. The variable representing elements in the domain is called the **independent variable**.

The **range** is the set of all second elements of the function, or the outputs. The **dependent variable** is the variable representing elements in the range.



## **Must Pass Vertical Line Test**



If a nonvertical line passes through the points  $P(x_1, y_1)$  and  $Q(x_2, y_2)$ , Its slope is found using the formula  $m = \frac{y_2 - y_1}{w_1 - w_2}$ 

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

The equation of the line with slope *m* and passing through a known point  $(x_1, y_1)$  is  $y - y_1 = m(x - x_1)$ 

Find the equation for the linear function that passes through the points (-4, -6) and (8, 3). Answers must use whole numbers and/or fractions, not decimals.

If a nonvertical line passes through the points  $P(x_1, y_1)$  and  $Q(x_2, y_2)$ , Its slope is found using the formula  $m = \frac{y_2 - y_1}{m}$ 

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

In Exercises 11 - 20, find the slope-intercept form of the line which passes through the given points.



17. 
$$y = -\frac{5}{4}x + \frac{11}{8}$$
 18.  $y = 2x + \frac{13}{6}$ 

A sale sperson is paid \$200 per week plus 5% commission on her weekly sales of x dollars. Find a linear function that represents her total weekly pay, W (in dollars) in terms of x. What must her weekly sales be in order for her to earn \$475.00 for the week? A salesperson is paid \$200 per week plus 5% commission on her weekly sales of x dollars. Find a linear function that represents her total weekly pay, W (in dollars) in terms of x. What must her weekly sales be in order for her to earn \$475.00 for the week?

32.  $W(x) = 200 + .05x, x \ge 0$  She must make \$5500 in weekly sales.

An on-demand publisher charges \$22.50 to print a 600 page book and \$15.50 to print a 400 page book. Find a linear function which models the cost of a book C as a function of the number of pages p. Interpret the slope of the linear function and find and interpret C(0).

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33. C(p) = 0.035p + 1.5 The slope 0.035 means it costs 3.5¢ per page. C(0) = 1.5 means there is a fixed, or start-up, cost of \$1.50 to make each book.

The amount of radiation in a 1 kg sample of Plutonium loses 33% of its radioactivity every 500 years.

The function is a) linear b) Exponential decay (decrease) c)neither

The population of a town (10,000 in 2018) is decreasing by 100 people per year.

The function is a) linear b) Exponential decay (decrease) c)neither Write an equation for P(t) where t is the years past 2018 A rock is thrown upward from the top of a 112-foot high cliff overlooking the ocean at a speed of 96 feet per second. The rock's height above ocean can be modeled by the equation  $H(t) = -16t^2 + 96t + 112.$ 

- **a**. When does the rock reach the maximum height?
- **b.** What is the maximum height of the rock?
- **c.** When does the rock hit the ocean?

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T=3 sec, 256 ft. 7 sec

Find the vertex, y intercept and

$$f(x) = -x^2 + 4x + 3$$

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$$2 + \sqrt{7}$$
,  $2 - \sqrt{7}$ 

Flu in a very bad year increased at the rate of 50% per month. In the first month, there were 100 cases. How many cases after 6 months?

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17) In California home values increased rapidly at about 15% per year. In 20 years, how much would a \$100,000 home be worth? Round to nearest dollar.

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\$1,636,654