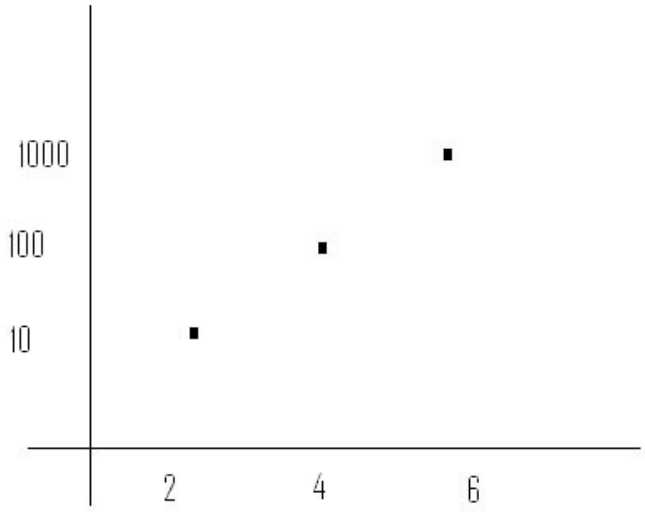
1

True or False: The graph below represents a linear relationship.



a. True

b. False

Vertical scale has irregular spacing.

2

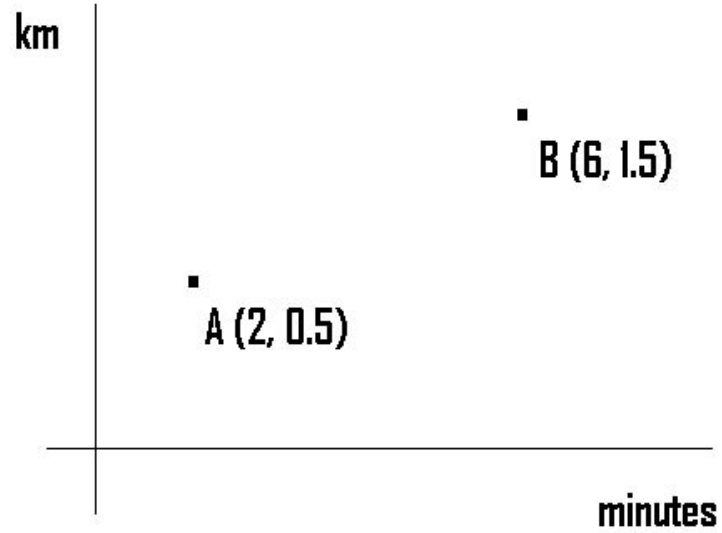
The equation $\text{temperature} = 1.39 \cdot \text{pressure} + 0.41$ defines

a. pressure as a function of temperature.

b. temperature as a function of pressure.

c. a relationship, but not a function.

3 In the figure, a line passing through points A and B would have a slope with units of



a. minutes.
b. kilometers.
c. minutes / kilometer.
d. kilometers / minute.

4

Based on the equation $y = 3x - 10$ as x increases, y

a. increases.

b. decreases.

c. remains constant.

5

True or False: We can see from the equation

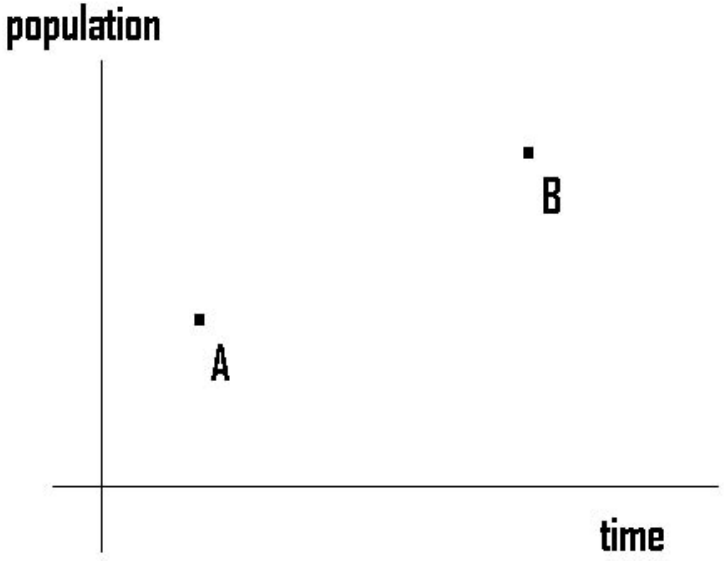
$$\text{temperature} = 1.39 \cdot \text{pressure} + 0.41$$

that if the pressure increases by one unit then the temperature will increase by 1.39 units.

a. True

b. False

6 The graph shows two data points from a population study. If the population at B is 1,000 more than at A and if they are 8 years apart, then the slope of the line connecting the points is



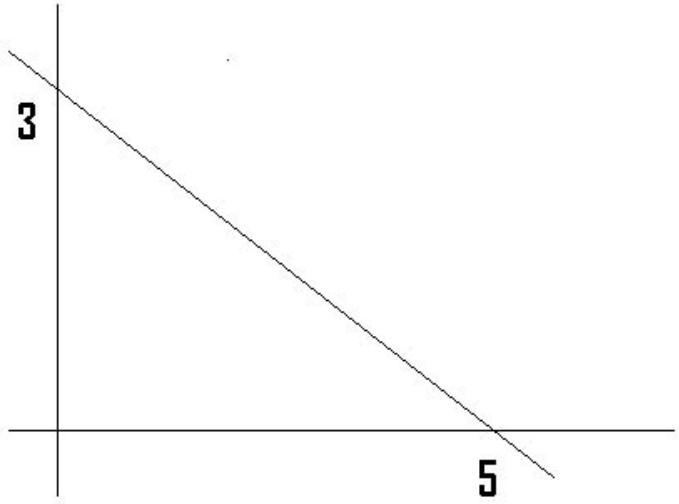
a. $\frac{1{,}000}{8}$.

b. $\frac{8}{1{,}000}$.

c. $8 + 1{,}000$.

d. impossible to find without the coordinates of the points.

7 Choose the form you should use to find the equation for the line shown below with the least calculation.



a. $y = mx + b$

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

c. $\frac{x}{a} + \frac{y}{b} = 1$

8

A scientist examines a set of data, realizes that the data are roughly linear and computes the line of best fit. She uses her model to make a prediction. As it happens, the prediction is not accurate enough to be useful to her. What should she do next?

a. Go over her calculations carefully; there must be a miscalculation.

b. Gather more data and find a new linear equation.

c. Revisit the graph and find a non-linear equation to fit the data.

9

Mark spent a great deal of time with the wild parrots of Telegraph Hill and carefully recorded his observations. If he kept track of the population size for 3 years, this would be a (fill in the blank) basis for a population prediction 10 years into the future.

a. very reliable
b. somewhat reliable
c. useless

10

A marine biologist has studied enough physics to know that water pressure increases linearly as a function of depth below the surface of the water in feet (ft.). She takes pressure measurements at depths of 100 ft. and 200 ft. then finds a linear equation connecting the points. The equation would be a (fill in the blank) basis for a pressure prediction at 1,000 ft.

a. very reliable
b. somewhat reliable
c. useless

11

A sales survey for movie tickets shows 300 tickets can be sold for \$5 each, and for each \$1 increase in price the number sold goes down by 43. If p stands for price and s for number of tickets sold, an equation for this situation is

a. $\frac{s}{p} = \frac{300}{5}$.

b. $p + 1 = s - 43$.

c. $s - 300 = -43(p - 5)$.

d. $5 + n = 300 - 47n$.

12

A phone company is studying the growth of demand for service in one town. At the start of the study, there were ten million calls placed per year. That went up by 1 million the first year, 3 million the second year, 5 million the third year, 7 million the fourth year, and so on. According to this pattern, the **total** number of calls placed each year experienced

a. arithmetic growth.

b. quadratic growth.

c. neither arithmetic nor quadratic growth.

10 million calls placed in year 1, then 11 million in year 2, 14 million in year 3, 19 million in year 4, etc. So the sequence of total calls each year would be 10, 11, 14, 19, etc.

13

The phrase “constant second differences” means

a. a constant difference between terms two positions apart, such as a_2 and a_4, or a_3 and a_5.

b. the terms are in units of seconds and increase at a constant rate.

c. the differences of the differences are all the same.

d. the terms follow an arithmetic growth pattern.

14

Which of the following would you **not** expect to see in a quadratic growth model?

a. Graphing a_n versus n produces a straight line.

b. A functional equation that involves both n and n^2.

c. Differences between successive terms that grow arithmetically.

15

An alternative energy company builds wind powered electric generators. The first year they build 50, the second year they build 60, the third they build 70, and so on. Let G_n stand for the **total** number of generators in operation after n years.

True or False: G_n follows a quadratic growth model.

a. True
b. False

G_n arises as the *sum* of an arithmetic growth sequence.

16

An investigation of AIDS cases in the US results in a model in which c_n is the number of people infected with the disease at the end of year n. The investigator wants to predict when there will be 25 million infected people. To answer this question, the investigator must

a. find c_n for a given value of n.

b. find n for a given value of c_n.

c. use a quadratic growth model.

d. use proportional reasoning.

17

In a quadratic growth model $p_1,\ p_2,\ p_3,$ ... represent successive measurements of the population of a bacteria colony, taken every 6 hours. The second differences are all equal to 100. In one 24 hour period, the population grows by 10,000. In the next 24 hour period, the population can be expected to grow by

a. more than 10,000.
b. 10,000.
c. less than 10,000.
d. Can't tell.

Constant second diffs > 0 imply an upward curving graph when traced from left to right.