Assignment

Write

Describe how you can distinguish between an independent quantity and a dependent quantity. Use an example in your description.

Remember

When one quantity depends on another in a problem situation, it is said to be the dependent quantity. The quantity it depends upon is called the independent quantity. The independent quantity is represented on the *x*-axis and the dependent quantity is represented on the *y*-axis.

Practice

1. Read each scenario and identify the independent and dependent quantities. Be sure to include the appropriate units of measure. Then analyze each graph and determine which of the provided scenarios it models. For each graph, label the *x*- and *y*-axis with the appropriate quantity and unit of measure.

   a. Endangered Species
   The Elkwood Aquatic Society is working with various reptile species to increase their populations. The initial population of 450 endangered turtles tripled each year for the past five years.

   b. Video Games
   Gillian is playing video games at an arcade. Gillian starts with $40 and is playing games that cost 50 cents per game.

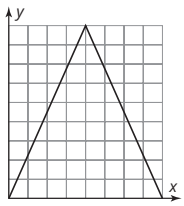
   c. Sales Commission
   Julian works as a salesman. He receives a monthly salary of $3000 as well as a 10% commission on the amount of sales.

   d. Cooling Tea
   A freshly made cup of tea is served at a temperature of about 180°F. The tea cools rapidly at first, and then slows down gradually as it approaches room temperature.

   e. Commuter Flight
   A commuter flight between two cities in Oregon takes about 40 minutes. The plane increases its altitude for the first half of the flight until it gets to 18,000 feet, and then it descends for the second half of the flight. The plane ascends and descends at a constant rate of 900 feet per minute.

   f. Cross Country
   Brady runs for his high school cross country team. His strategy for each 5-kilometer race is always to begin by increasing his speed so that by the time he reaches the first kilometer, he is running at a speed of 0.3 km/min. He maintains that speed for the next 2 km. He then gradually speeds up for the remaining 2 km so that when he crosses the finish line, he is running at a speed of 0.5 km/min.

A.



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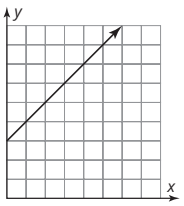

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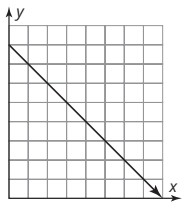


Assignment Answers

Write

Answers will vary.

Practice

1a. Endangered Species
- IQ: time (years)
- DQ: number of turtles
- Graph E

1b. Video Games
- IQ: number of games played
- DQ: money (dollars)
- Graph C

1c. Sales Commission
- IQ: monthly sales (dollars)
- DQ: monthly earnings (dollars)
- Graph B

1d. Cooling Tea
- IQ: time (minutes)
- DQ: temperature (degrees F)
- Graph F

1e. Commuter Flight
- IQ: time (minutes)
- DQ: altitude (feet)
- Graph A

1f. Cross Country
- IQ: distance (kilometers)
- DQ: speed (kilometers per minute)
- Graph D

Assignment Answers

Practice

2a. Sample answer.

Both graphs are increasing. One graph is a curve, the other is a line.

2b. Sample answer.

Both graphs are composed of more than one line segment. One graph has symmetry and the other does not.

Stretch

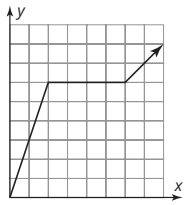
1. independent quantity: mass (grams)

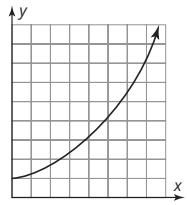
   dependent quantity: number of swings

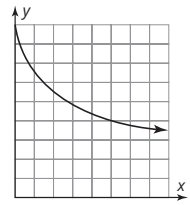
2. The time will stay the same, and he will need to use one mass so that he can test several different string lengths.

Review

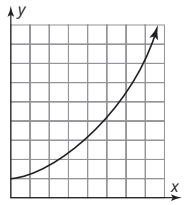
1. $x = 6$
2. 1

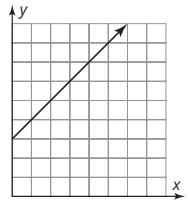
D. 

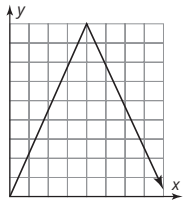
E. 

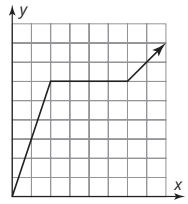
F. 

2. Compare each pair of graphs and describe any similarities and differences you notice.

a. 



b. 



Stretch

Read the scenario and identify the independent and dependent quantities. Be sure to include the appropriate units of measure.

1. A student performs several experiments in which he swings a pendulum for a 20-second duration. He uses a string that is 27 cm long, and he tests pendulum masses of different sizes, varying from 2 to 12 grams. He records the number of swings each pendulum makes in 20 seconds.
2. The student then decides to make a second graph showing the string length (in cm) as the independent quantity. What changes must the student make to his experiment?

Review

1. Solve the equation $-2x + 8 = -3x + 14$.
2. Evaluate the expression $x^2 - 3y + 12$ for $x = -2$ and $y = 5$.