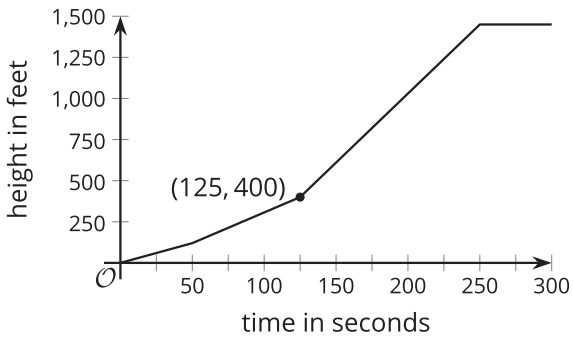
For any input, there are multiple possible outputs, so the time since takeoff is *not a function of* the height of the plane.

Functions can be represented in many ways—with a verbal description, a table of values, a graph, an expression or an equation, or a set of ordered pairs.

When a function is represented with a graph, each point on the graph is a specific pair of input and output.

Here is a graph that shows the height of a plane as a function of time since takeoff.



The point $(125, 400)$ tells us that 125 seconds after takeoff, the height of the plane is 400 feet.

Glossary

- dependent variable
- function
- independent variable

Lesson 1 Practice Problems

Problem 1

Statement

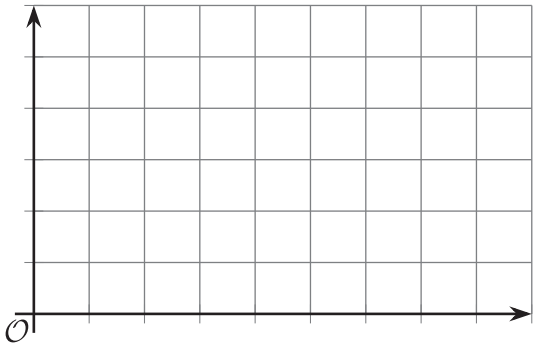
The relationship between the amount of time a car is parked, in hours, and the cost of parking, in dollars, can be described with a function.

a. Identify the independent variable and the dependent variable in this function.

b. Describe the function with a sentence of the form "_____ is a function of _____."

c. Suppose it costs \$3 per hour to park, with a maximum cost of \$12.

Sketch a possible graph of the function. Be sure to label the axes.



d. Identify one point on the graph and explain its meaning in this situation.

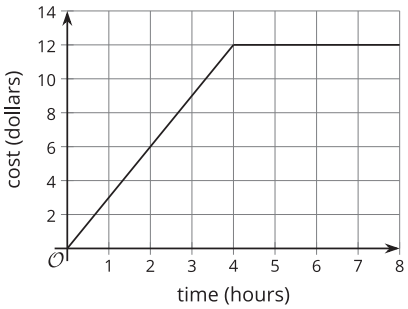
Solution

a. The amount of time that a car is parked is the independent variable. The cost of parking is the dependent variable.

b. The parking cost is a function of the amount of time a car is parked.

c. See sample graph.

d. The point $(3, 9)$ means that it costs \$9 to park for 3 hours.

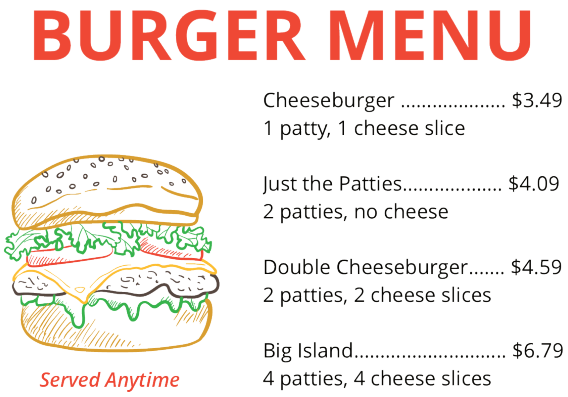


Problem 2

Statement

The prices of different burgers are shown on this sign.

Based on the information from the menu, is the price of a burger a function of the number of patties? Explain your reasoning.



Solution

No. Sample explanation: There are two possible prices for 2 patties, which means two outputs for the same input.

Problem 3

Statement

The distance a person walks, d, in kilometers, is a function of time, t, in minutes, since the walk begins.

Select **all** true statements about the input variable of this function.

A. Distance is the input.

B. Time of day is the input.

C. Time since the person starts walking is the input.

D. t represents the input.

E. d represents the input.

F. The input is not measured in any particular unit.

G. The input is measured in hours.

H. For each input, there are sometimes two outputs.

Solution

["C", "D"]

Problem 4

Statement

It costs $3 per hour to park in a parking lot, with a maximum cost of $12.

Explain why the amount of time a car is parked is *not* a function of the parking cost.

Solution

Sample response: If the amount of parking time is a function of the parking cost, then the cost is the input and the amount of parking time is the output. When the parking cost (input) is $12, the amount of parking time (output) could be 4, 6, 7.5, 11, or any length that is at least 4 hours. A relationship is not a function if for each input there are multiple possible outputs.

Problem 5

Statement

Here are clues for a puzzle involving two numbers.

- Seven times the first number plus six times the second number equals 31.