

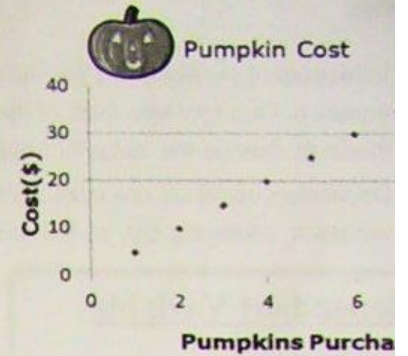
Discrete vs. Continuous Data

Whenever we collect data, there's a collection of possible values from which we record our observations. If we're flipping a coin, the possible values we can observe are H (heads) or T (tails). Or, occasionally, the very rare E (edge). If we're measuring someone's height in centimeters, the possible values are any positive number of centimeters and fractions thereof. There are two different ways to classify data based on the possible values we can observe.

Data is **discrete** if there is clear separation between the different possible values. Either there will be a finite number of possible values, or we're counting something.

If we flip a coin and record the result there are only two possible values (ignoring that pesky "edge" thing), H and T, so our observations are discrete.

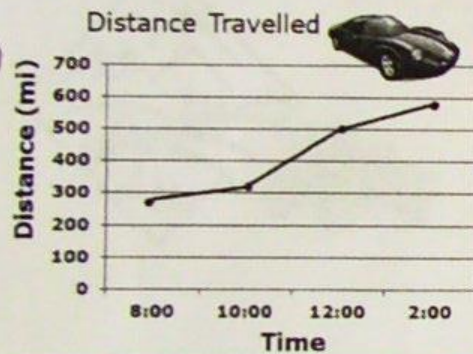
Recording the numbers of coins in different piggy banks would also give us discrete data, since there's a separation of one whole coin between any two numbers we might get. Even a half-dollar is still a whole-coin.



Discrete Data

- **Counted**
- Does **NOT** make sense to evaluate in between data
- Do **NOT** connect points when graphing

Sets of data that record counts of things are discrete.



Continuous Data

- **Measured**
- Does make sense to evaluate in between data
- Do connect points when graphing

However, data is **continuous** if there's no clear separation between possible values. Like if two values are still kinda-sorta seeing each other but haven't really discussed if they're an "item."

If we measure someone's height in centimeters we could get 160 cm, 160.01 cm, or 160.001 cm (assuming we had a very accurate measuring tool). For any two possible values (say, 160 cm and 161 cm) there's another possible value between them (160.5 cm). Those infuriating numbers can always be broken down into smaller and smaller numbers. It's part of the reason we love them so much. Can't count them, can't count without them.

Sets of data involving measurements that can have fractions or decimals are generally continuous.

Practice

Write **discrete** or **continuous** next to each situation. If you made the graph, would the points be **connected**?

1. A person's height over the school year continuous ; connect
2. The number of students in a classroom discrete ; do not connect
3. A dog's weight during the first year continuous ; connect
4. The temperature of dinner as it cooks continuous ; connect
5. How many magazine subscriptions were sold discrete ; do not connect

Independent vs. Dependent Variables

Generally speaking, in any given model or equation, variables can be divided into two categories:

- Independent variables are the variables that are changed in a given model or equation. One can also think of them as the 'input' which is then modified by the model to change the 'output' or dependent variable.
- Dependent variables are considered to be functions of the independent variables, changing only as the independent variable does.

Independent Variable

- Input
- Controlled or manipulated
- X-axis

Dependent Variable

- Output
- Affected by the independent variable
- Y-axis

Practice

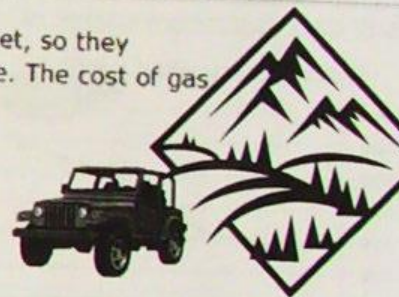
Write the appropriate variable to indicate if it is **independent** or **dependent** in the given situation.

1. Callie and Hajari are going on a road trip together. They have a limited budget, so they consider several different routes and calculate the cost of gas for each route. The cost of gas for each route depends on the length of the route.

g = the cost of gas
 r = the length of the route

Independent Variable: r

Dependent Variable: g



2. Tyler is training to run a marathon at the end of the month. The more time he has spent training, the longer the distance he is able to cover during one run.

t = the amount of time Tyler has spent training
 d = the distance Tyler is able to cover during one run

Independent Variable: t

Dependent Variable: d



3. At a deli counter, the price of a customer's order is calculated based on its weight.

p = the price
 w = the weight

Independent Variable: w

Dependent Variable: p



The Four Views of a Relationship, Introduction

Campgrounds

You and your friends are going camping. The campground charges \$10.00 for each campsite. This can be described with the equation $C = 10n$ where C is the cost and n is the number of campsites rented.

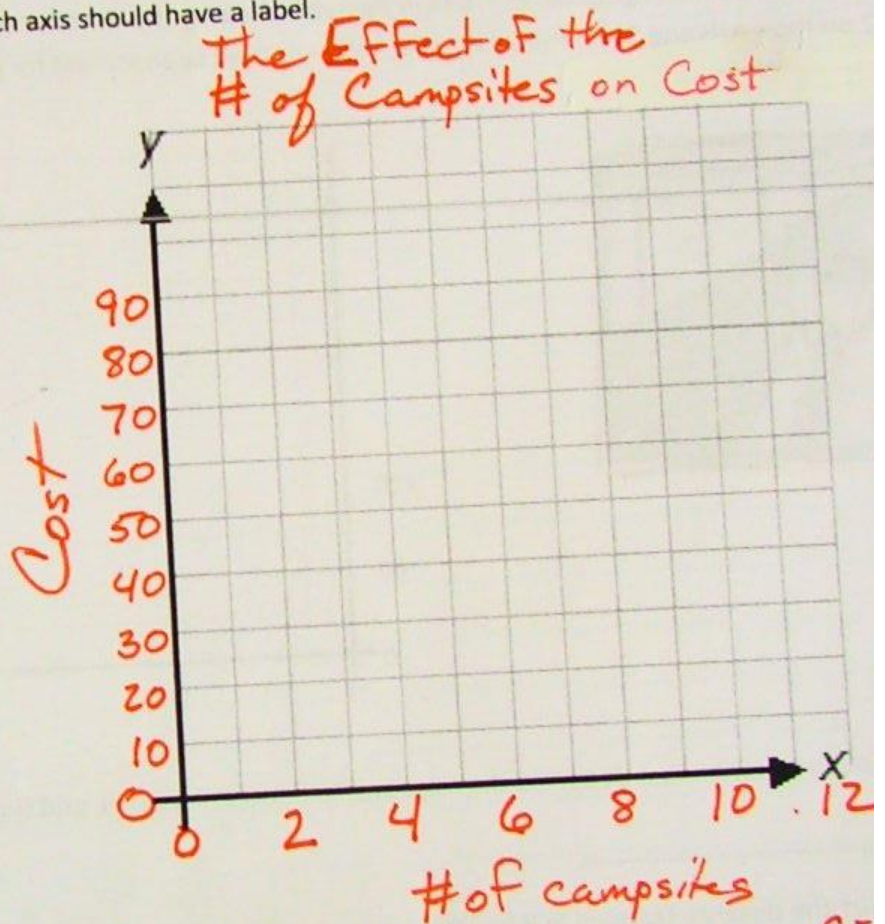
1) Write **independent** or **dependent** next to each variable.

C = the cost dependent (y) n = the number of campsites independent (x)

2) Describe the data as continuous or discrete. Explain your answer. discrete; you can't get part of a campsite

3) Make a table and a graph showing the cost for up to 10 campsites. Use an interval of 1 on the x-axis and 10 on the y-axis.) The graph should have a title and each axis should have a label.

x # of Campsites	y Cost
0	0
1	10
2	20



4) If 8 campsites are rented, what is the cost? _____ You should be able to get your answer from the equation, graph or the table.

5) Use your equation to calculate the number of campsites if the cost is \$120. 12 campsites (Show work)

Equation: $C = 10n$

Substitute: $120 = 10n$

Solve: $n = 12$

A Van's Speed

Suppose a van averaged a steady 60 miles per hour on the interstate highway.



The table below shows the relationship between the time traveled and the distance.

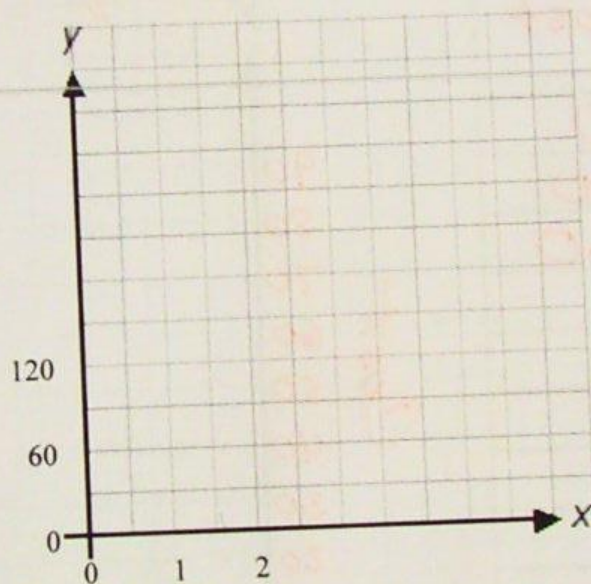
Time(hours)	0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
Distance (miles)	0	30	60	90					

1) Complete the table.

2) Identify the independent variable: _____ Identify the dependent variable: _____

3) Describe the data as continuous or discrete. Explain your answer. _____

4) Make a coordinate graph of the data in the table showing the distance travelled after each hour. Use an interval of $\frac{1}{2}$ on the x-axis and 30 on the y-axis. (The intervals have been started for you.) The graph should have a title and each axis should have a label.



5) Write an equation that describes the relationship between distance and time. (Use d for distance and t for time)

6) Predict the distance traveled in 8 hours. Justify your reasoning. _____

7) Predict the time needed to travel 300 miles. Justify your reasoning. _____
