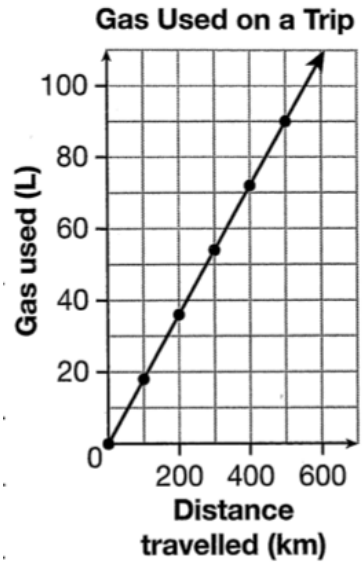
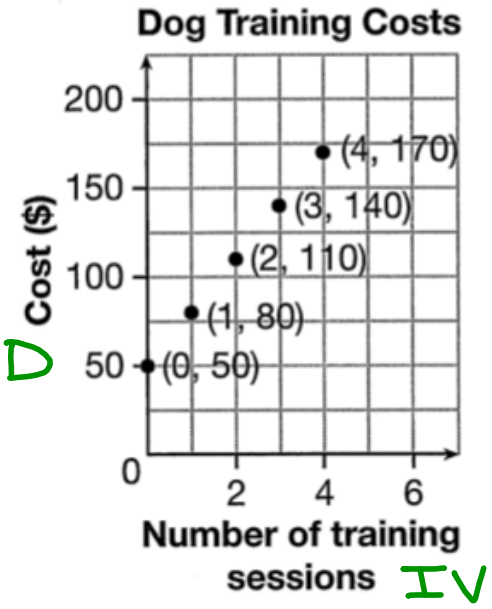
Linear Relations

Relation = A description of how two variables are connected.

Linear Relation = A relation whose points lie on a straight line.



Healy is a dog trainer in Gimli. She charges $50 for a training kit plus $30 for each session. What are some characteristics of this relation?



D

IV

1. How does the pattern change?

   When the number of lessons increase by 1, the cost increases by $30.

2. Can you have part of a session?

   No → discrete

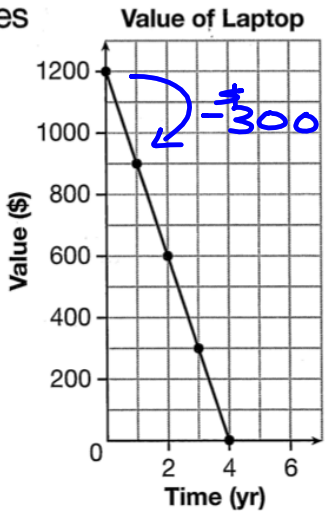
Independent Variable (x)
= Variable whose values are freely chosen.

Dependent Variable (y)
= Variable whose value depends on the independent variable

Example 1

Clint bought a computer 4 yr ago. Clint estimates that the relation between the age of the computer in years, t, and its value in dollars, v, is represented by $v = -300t + 1200$. The relation is also represented by this table of values and graph.

How does each representation show this is a linear relation?



Solution

A. How do the values in the table change?

When the year goes UP by 1, the value of the computer goes down by $300.

Time (yr), t	Value ($), v
0	1200
1	900
2	600
3	300
4	0

B. How does the graph show that this is a linear relation?

graph → straight line

table → changes by same amount

C. Circle the description of the rate of change.

constant rate of change varying rate of change

D. Can you have any part of a year? Yes

E. Is this data **discrete** or **continuous**? Explain.

Discrete = Data cannot be broken into smaller parts that have meaning.

Continuous = Data can be broken into smaller parts that have meaning.

Example 2

Bonnie installs square ceramic tiles of different sizes. The relation between a tile's side length, s, and its area, A, is represented by a table of values, an equation, and a graph. How does each representation show this is a **non-linear relation**?

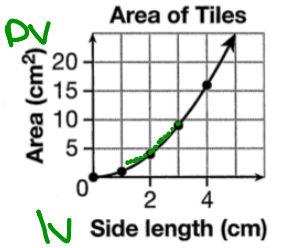
Length (cm), s	Area (cm^2), A
0	0
1	1
2	4
3	9
4	16

1, 3, 5, 7

going up by diff amount.

$A = s^2$

deg 2 or squared



It's curved

A. How do the values of the dependent variable change in the table?

Each time the length gets bigger by 1, the area gets bigger by a different amount.

B. How does the graph show that this is a non-linear relation?

not a straight line

C. Circle the description of the rate of change.

constant rate of change varying rate of change

D. Is this data **discrete** or **continuous**? Explain.

points are connected

Degree of an equation

When a linear relation is written as an equation, it will contain one or two variables and its degree will be 1.

Linear Relations:
$x^1 = 7$
$3m^1 + 2n^1 = -12$
$y = -2/3x^1 + 5$

Non-Linear Relations:
$2x + y^2 = 6$
$h = k^3$
$xy = 3$

DV
IV

IV | DV