FMP10 Name: _____
Date: _____

4.2 Linear Relations

Relation:
- an association between two quantities
- a rule that turns input values into output values

A relation can be presented in a variety of ways. For example,

Words

Three times the length of your ear, e, is equal to the length of your face, f, (from chin to hairline).

Equation

$f = 3e$

f: output, e: input

Ordered Pairs (points)

(e, f) (x, y)

ex. (2.5 cm, 7.5 cm) input, output

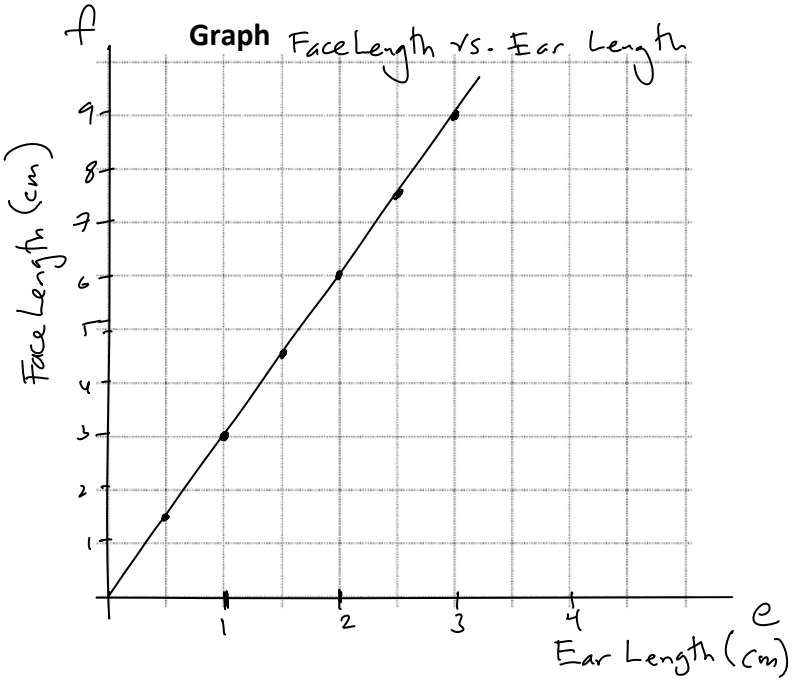
(4 cm, 12 cm) (1 cm, 3 cm)

Table of Values

Ear Length, e (cm)	Face Length, f (cm)
0.5	1.5
1	3
1.5	4.5
2	6
2.5	7.5
3	9

independent dependent

Graph Face Length vs. Ear Length



Independent Variable:
- The input variable
- Graphed on x-axis

ex. ear length

Dependent Variable:
- The output variable
- Graphed on y-axis

ex. face length

Linear Relation:

- forms straight line when graphed
- values of y are inc/dec by a constant as x inc/dec by some constant
- 1 or 2 variable equation of degree 1

Non-linear Relation:

* does not form a straight line

Ex. Table of Values

Linear

x	y
2	17
3	14
4	11
	8

+1 ↓ ; −3 ↓

Non-Linear

x	y
0	1
2	3
4	6
6	10

+2 ↓ ; +2, +3, +4 →

Ex. Equations

Linear

$x = 7$

$3m + 2n = -12$

$y = -\frac{2}{3}x + 5$

$y = -3$

} degree 1

Non-Linear

$2x + y^2 = 6$

$h = k^3$

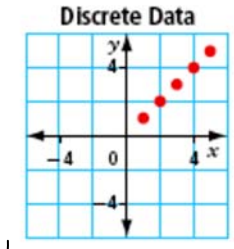
$xy = 3$

$y = \frac{1}{x}$

Discrete Data:

Values are not connected

For data that cannot have values between

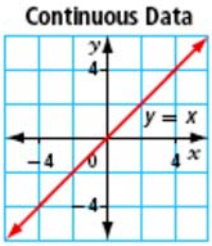


ex. selling muffins for $1 each

Continuous Data:

Values are connected

Has infinite divisions between whole value points.



Ex. In a frog jumping championship there is a frog named George who jumps a distance of 2m in a single leap. George maintains a distance of 2m every jump; the total distance travelled is measured after every jump. Consider the relationship between the number of jumps and the total distance travelled.

a) Create a variable to represent each quantity in the relation. Which is the dependent variable? Which is the independent variable?

Let j = # of jumps ← independent

d = total distance ← dependent

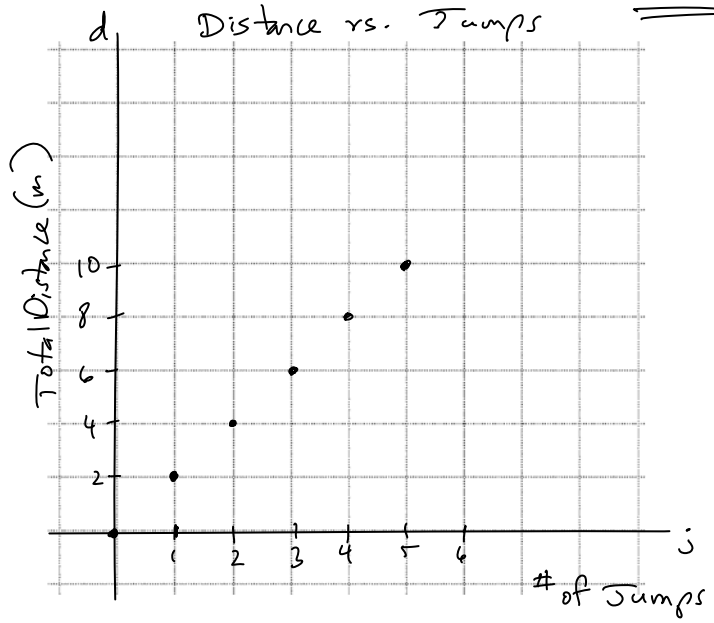
b) Create a table of values for this relation. What are appropriate values for the independent variable?

j (#)	d (m)
0	0
1	2
2	4
3	6
4	8
5	10

c) Identify the relationship as linear or non-linear. Explain how you know.

Linear, distance increases by a constant +2m as the # of jumps increases by a constant +1.

d) Create a graph for the relation. Are the data discrete or continuous?



Discrete – no partial jumps

Practice: pg. 287/ # 1 – 6, 8, 11, 12