

Lesson 5 Properties of Linear Relations

To identify a Linear Relation, we can use the following:

- a table of values
- a set of ordered pairs
- a graph

A community centre rents out its banquet hall for a charge of \$50 plus an additional fee of \$4 per person.

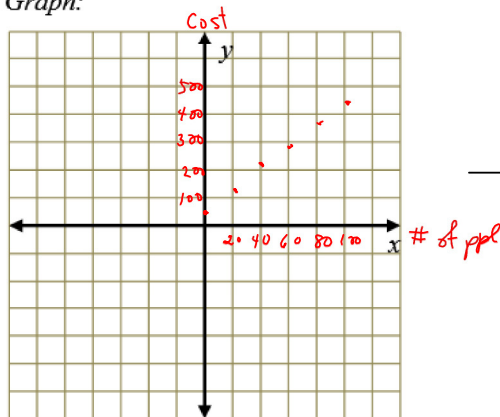
# of people (Independent)	Total cost (Dependent)
0	50
20	130
40	210
60	290
80	370
100	450

Handwritten notes: Brackets on the left indicate a constant change of +20 in the independent variable between rows. Brackets on the right indicate a constant change of +80 in the dependent variable between rows.

A constant change in the independent variable results in a constant change in the dependent variable. → linear

Ordered Pairs: Look for a constant change in x to result in a constant change in y → linear

Graph:



→ forms linear relation

** Note: points are not connected as graph is not continuous*

RF L5 Properties of Linear Relations.notebook

Intro Applied & Pre-Calculus 10 Relations & Functions

Example 1 – Determine Linear Relations

1) Given a table of values

Rate of pay is:

Cost of monthly cell bill: 1st 100 \$0.10/min after \$0.50

Hours	Pay
0	0
2	10
4	20
6	30

+2 (rows) *+10* (columns)
 constant change
 \therefore linear

Min. Used	Cost
0	20
100	30
200	120
300	170

+10 (rows) *+90* (columns)
 not constant
 \therefore not linear

2) Given an equation

(Graph with a table of values OR use the graphing calculator ^{desmos} then see if it is a line)

$y = 2x - 5$

linear

$y = 3$

horizontal line

constant function
(always same y-value)

$x = 1$

vertical line
not linear

$y = 2x^2 + 4$

non-linear

(forms a curve, not a line)

Example 2 - Description given (Make a table of values)

- a) Company A charges \$2400 per year. The value is related to time and decreases by 10% each year.

Year
1
2
3
4

Cost Charged Per Year	10% Decrease Per Year
2400	$2400 \times 0.1 = \$240$
<i>2160</i>	<i>$2160 \times 0.1 = \\$216$</i>
<i>$2160 - 216 = 1944$</i>	<i>$1944 \times 0.1 = \\$194.40$</i>

not a constant change
 \therefore non-linear

- b) A plumber charges a \$80 flat rate and \$50 for each hour he works. The total cost of service is related to time.

Hours Worked	Charge
1	$(1 \times \$50) + \$80 = \$130$
2	$(2 \times \$50) + \$80 = \$180$
3	$(3 \times \$50) + \$80 = \$230$
4	$\$280$

+50 (rows) *+50* (columns)
 constant change
 \therefore linear

Assignment: Pg. 308; 4a, 4, 6i, 7, 10, 12a, 16