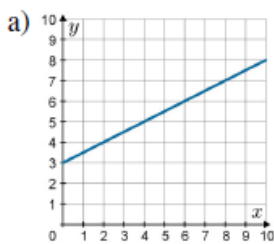


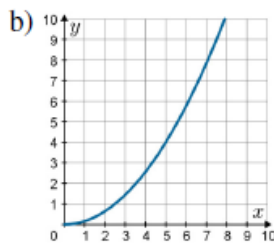
Solutions

Page 108 #s 1, 3ace, 4, 6, 8, 9, 12

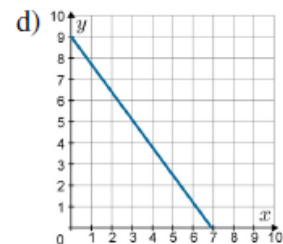
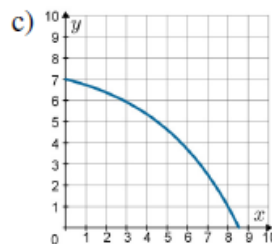
1. Classify each of the following relations as either linear or non-linear.



Linear



Non-linear



Linear

Linear graphs have a straight line

Linear

3. Use the first differences to classify each of the following relations as either linear or non-linear.

a)

Time (s)	Height (m)
0	2
1	8
2	14
3	20
4	26

6
6
6
6
6
⇒ Linear

c)

Distance (m)	Speed (m/s)
0	20
5	17
10	14
15	11
20	8

-3
-3
-3
-3
-3
⇒ Linear

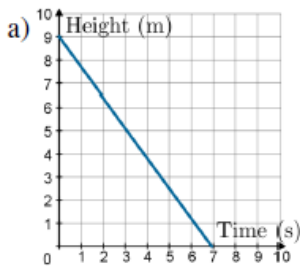
e)

x	y
0	-5
2	-7
4	-1
6	13
8	35

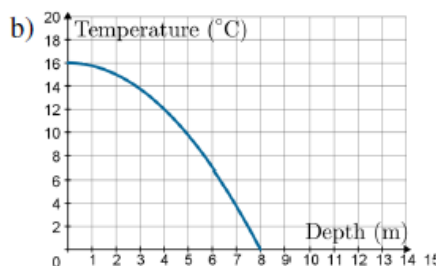
-2
-6
14
22
⇒ Non-linear

To be linear the first differences must be constant (the same)

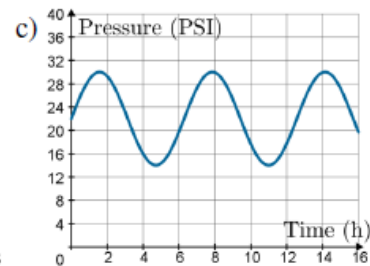
4. Determine the start value (initial value) for each of the following relations.



= 9m



= 16°C

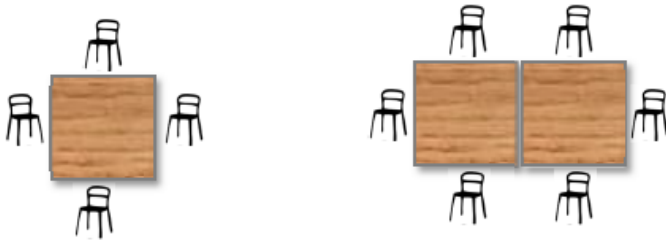


= 22 PSI

Initial value is the value of the dependent variable (y) when the independent variable (x) is zero.

OR It's the value where the graph crosses the y-axis

6. At a square table, four people can be seated (one on each side). When two tables are joined together, as shown below, six people can be seated.



a) Complete the table of values above.

b) Does this example display linear growth? Explain.

Yes, increases by 2 for each extra table.

c) If twelve tables were joined, how many people could be seated?

Number of Tables	Number of Seats
1	4
2	6
3	8
4	10
5	12

2
2
2
2

c) $n = 0$ would give 2 seats
 $\Rightarrow 12 \times 2 + 2 = 26$ seats
 1st difference initial value

8. A remote control helicopter starts on the ground and rises at a rate of 2 m/s.

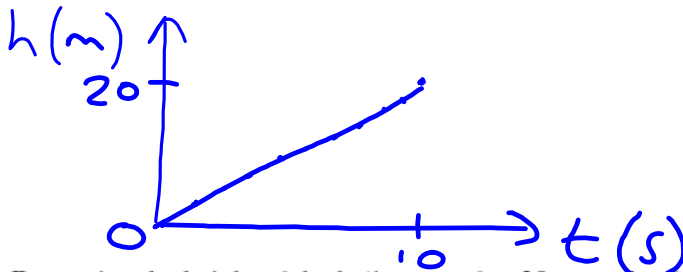
a) Is the relationship between the number of seconds passed and the altitude linear or non-linear? Explain.

Linear, because it is rising at a constant rate

b) Create a table of values showing the helicopter's altitude for time values of 0, 1, 2, 3, 4, and 5 seconds.

Time (s)	Height (m)
0	0
1	2
2	4
3	6
4	8
5	10

c) Create a graph to model the height of the helicopter over the first 10 seconds of its climb.



d) Determine the height of the helicopter after 20 seconds of climbing.

e) To determine the height after 20 seconds, can we simply double the height after 10 seconds? Explain.

d) 40 m above the ground after 20 seconds
 e) In this case yes, because the initial value = 0

9. The cost of hosting an event at Rachel's Banquet Centre is made up of a one-time initial fee of \$280, plus \$45 per guest.

- a) Is the relationship between the number of guests and the total cost linear or non-linear? Explain. *Linear, because cost of each guest is the same.*
- b) Complete the table of values on the right.
- c) Determine the total cost of hosting an event with 100 guests.
- d) To determine the total cost for 100 guests, can we simply double the total cost for 50 guests? Explain.
- e) Determine the number of guests if the total cost is \$3565.

Number of Guests	Total Cost (\$)
0	280
10	730
20	1180
30	1630
40	2080
50	2530

c) $100 \times 45 + 280 = \$4780$
 cost per guest \rightarrow initial value \leftarrow

d) No, because the initial value is not zero.

e) $n \times 45 + 280 = 3565$
 $45n + 280 - 280 = 3565 - 280$
 $45n = 3285$
 $\frac{45n}{45} = \frac{3285}{45}$
 $n = 73$ guests