

# Practice: Linear vs. Non-Linear | MFM 1P

1) Determine whether the following relations are linear, or non-linear.

a)

x	y	First Differences
-2	1	
-1	3	
0	5	
1	7	
2	9	
3	11	

Linear  Non-Linear

b)

x	y	First Differences
-2	4	
-1	1	
0	0	
1	1	
2	4	
3	9	

Linear  Non-Linear

c)

x	y	First Differences
-2	5	
-1	5	
0	5	
1	5	
2	5	
3	5	

Linear  Non-Linear

d)

x	y	First Differences
-2	0.25	
-1	0.5	
0	1	
1	2	
2	4	
3	8	

Linear  Non-Linear

e)

x	y	First Differences
-4	4	
-2	2	
0	0	
2	-2	
4	-4	
6	-6	

Linear  Non-Linear

f)

x	y	First Differences
-5	75	
-3	27	
-1	3	
1	3	
3	27	
5	75	

Linear  Non-Linear

g)

x	y	First Differences
-6	-8	
-3	1	
0	10	
3	1	
6	-8	
9	-17	

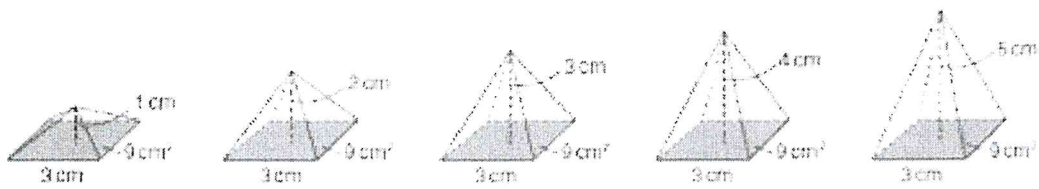
Linear  Non-Linear

h)

x	y	First Differences
0	0	
0.25	1	
0.5	2	
0.75	3	
1	4	
1.25	5	

Linear  Non-Linear

2) Consider the pyramids given below. Each pyramid has a square base that has an area of  $9\text{cm}^2$ .



Complete the given table comparing the area of the pyramid, to its height. Recall that, for a pyramid...  $V = A_{\text{base}} \times h \div 3$ . Is the relationship linear or non-linear?


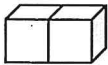

Height (cm)	Volume ( $\text{cm}^3$ )	First Differences
1		
2		
3		
4		
5		

# Practice: Linear vs. Non-Linear | MFM1P

**Question#1.**

Consider the pattern started below, by placing 1 cm cubes side by side. For one cube, there are 6 sides showing, and so the surface area would be  $6\text{cm}^2$ . With two cubes side by side, there are 10 sides showing, and so the surface area would be  $10\text{cm}^2$ .

1. Complete the following table.

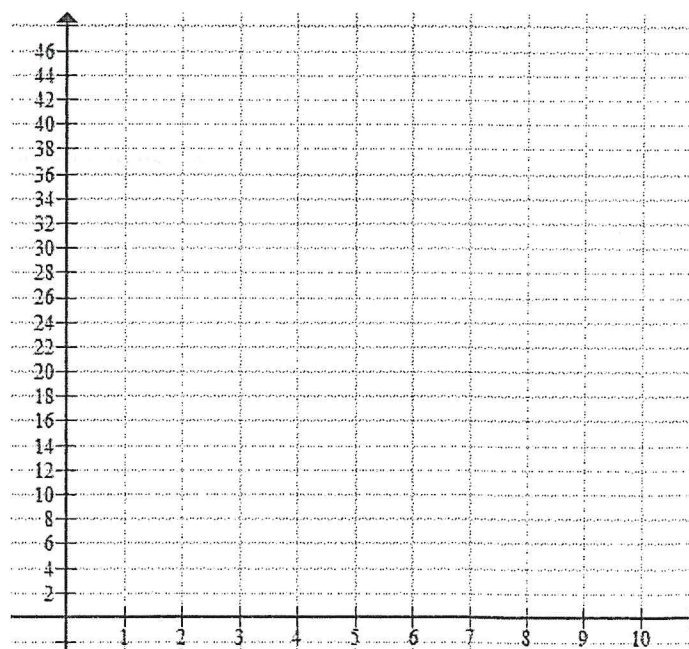
Shape	Number of Cubes	Surface Area( $\text{cm}^2$ )	
	1	6	<b>First Difference</b>
	2	10	
	3		
	4		
	5		
	6		

2. Is this relationship linear or non-linear?  
Use the first differences to explain your reasoning.

3. Make a graph of the relationship between the number of cubes and the surface area.  
Construct a line of best fit.

4. a) Use your line of best fit to determine the surface area of the shape made from 10 cubes.  
\*draw your lines!

b) Did you use interpolation or extrapolation to answer 4. above? Explain how you know.



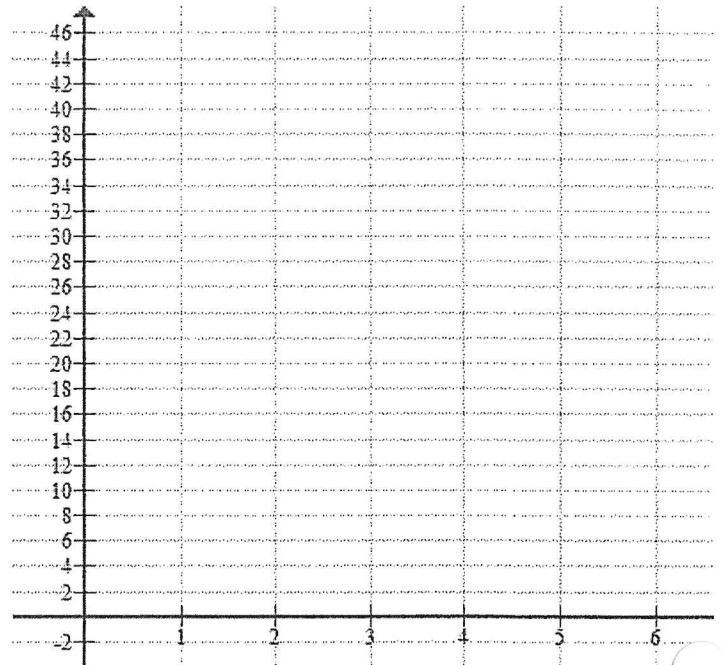
**Challenge:** Can you predict the surface area of the shape made from 100 cubes? \_\_\_\_\_

# Practice: Linear vs. Non-Linear | MFM1P

**Question#2.**

Every 1 year, the population of a cluster of rabbits doubles. Complete the table of values started for you, and create a graph of this relationship.

Years	Population (x 100)	1 <sup>st</sup> Diff
0	1	
1	2	
2		
3		
4		
5		



1. Would you describe this trend as positive or negative? Why?
  
2. Would you describe this trend as linear or non-linear? How do you know? Use first differences to explain your reasoning.
  
3. Draw a **curve of best fit** through the points.
  
4. What would the population be after 6 years?
  
5. a) Use your curve to predict the population of rabbits after 3.5 years. \*draw your lines!
  
- b) Did you use interpolation or extrapolation? Explain how you know.