

**LEARNING TARGET:**



"I can identify a relation as linear, quadratic or exponential, if I am given a table, equation or graph.  
I can complete any table of values."

**Recall:** relation, first difference, second difference, y-ratio,  
linear relation, non-linear relation

**Recall:** BEDMAS

Complete the tables, then graph each relation.

$= 2(x) + 3$

x	$y = 2x + 3$	FD	SD
0	3	5-3=2	
1	5	7-5=2	2-2=0
2	7	9-7=2	2-2=0
3	9	11-9=2	2-2=0
4	11	13-11=2	2-2=0
5	13	15-13=2	2-2=0
6	15		

∴ FD are constant  
∴ the table represents a linear relation

$= 2(x)^2 + 3$

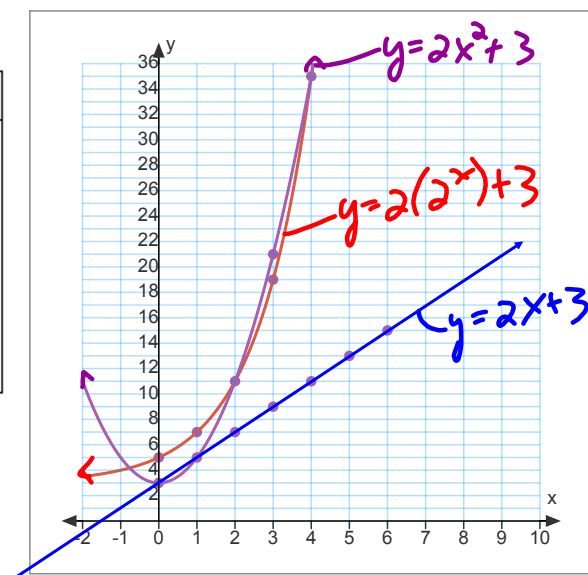
x	$y = 2x^2 + 3$	FD	SD
0	3	5-3=2	6-2=4
1	5	11-5=6	10-6=4
2	11	21-11=10	14-10=4
3	21	35-21=14	18-14=4
4	35	53-35=18	22-18=4
5	53	75-53=22	
6	75		

∴ SD are constant  
∴ the table represents a quadratic relation

$= 2(2^x) + 3$


x	$y = 2(2^x) + 3$	FD	SD	y-ratio
0	5	7-5=2	2	$\frac{4}{2} = 2$
1	7	11-7=4	4	$\frac{8}{4} = 2$
2	11	19-11=8	8	$\frac{16}{8} = 2$
3	19	37-19=18	16	$\frac{32}{16} = 2$
4	37	75-37=38	32	$\frac{64}{32} = 2$
5	75	151-75=76	64	$\frac{128}{64} = 2$
6	151			

∴ y-ratios are constant  
∴ the table represents an exponential relation



$y = 2x + 3$   
 $y = 2x^2 + 3$   
 $y = 2(2^x) + 3$

As a class, summarize the properties:

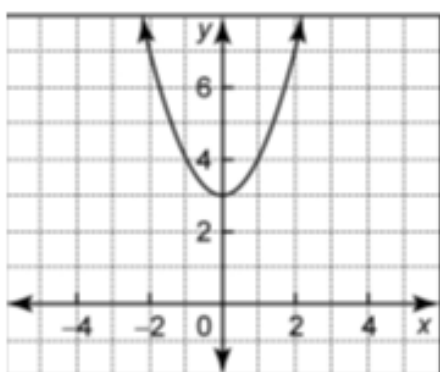
Linear	Quadratic Relation (Non-Linear Relation #1)	Exponential Relation (Non-Linear Relation #2)
Straight line	parabola (U shaped) ↳ has a vertex	growth or decay
FD are constant	SD are constant	
Variable is exponent 1	Variable is squared ↳ exponent 2	y-ratios are constant variable is in the exponent

Cycle 1 Day 2 **MBF 3CI CHAPTERS 4, 5, 7: RELATIONS**

**PRACTICE**

1. Classify as linear, quadratic, exponential, or “unknown”. EXPLAIN.

a)



b)

$x$	$y$
1	3
2	9
3	27
4	81
5	243
6	729

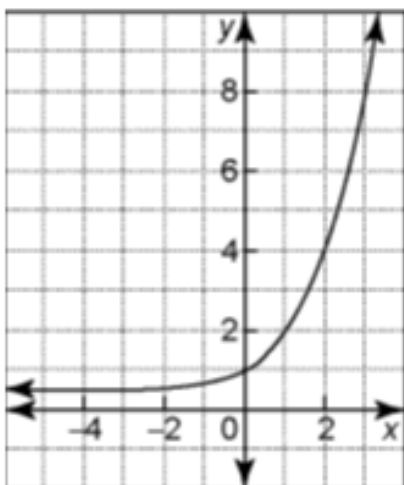
c)  $y = -5x + 4$

d)  $y = x^2 - 11$

e)  $y = 4^x$

f)  $A = 100(1 + 0.06)^n$

g)



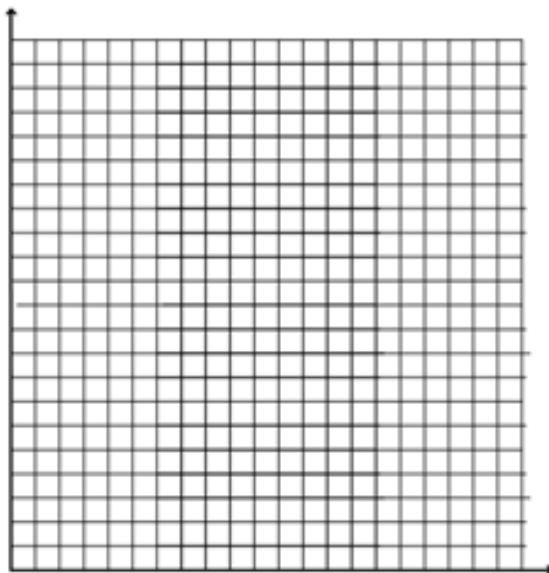
h)

$x$	$y$
-3	19
-2	9
-1	3
0	1
1	3
2	9
3	19

2. A cannonball is shot horizontally from the top of a cliff. Its vertical height above ground versus time elapsed is  $h = 150 - 4.9t^2$  where  $h$  is the cannonball's vertical height above ground (metres) and  $t$  is the time (seconds).
- Classify the relationship between height of the cannonball and time.
  - Complete the table of values:

Time	Height
0	
1	
2	
3	

- Graph this relation:



**SHORT ANSWERS:**

- Are you explaining your choice?*

a) quadratic	b) exponential	c) linear
d) quadratic	e) exponential	f) exponential
g) exponential	h) quadratic	
- Quadratic
  - The respective height values are: 150 m, 145.1 m, 130.4 m, 105.9 m.

Go back to the Learning Target .

Can you confidently say that you have met today's goal?