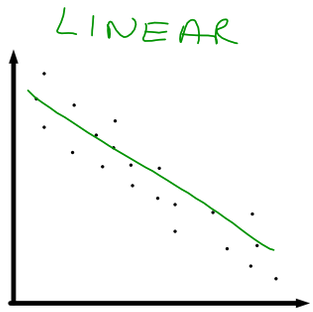
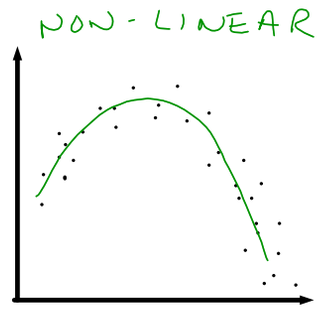
3.1 Investigating Non-Linear Relationships

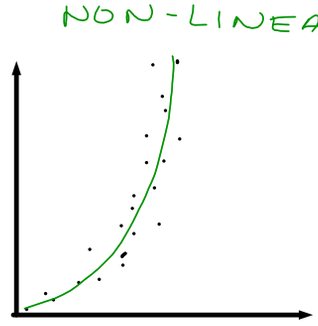
Line of Best Fit: a line drawn through a scatter plot when the data appears to follow a linear relation.

Curve of Best Fit: a smooth curve that represents the "shape" of the data. Non-linear data will have a non-linear curve of best fit.

Ex 1: Determine whether the data represents a linear or non-linear relation, then draw the line or curve of best fit.



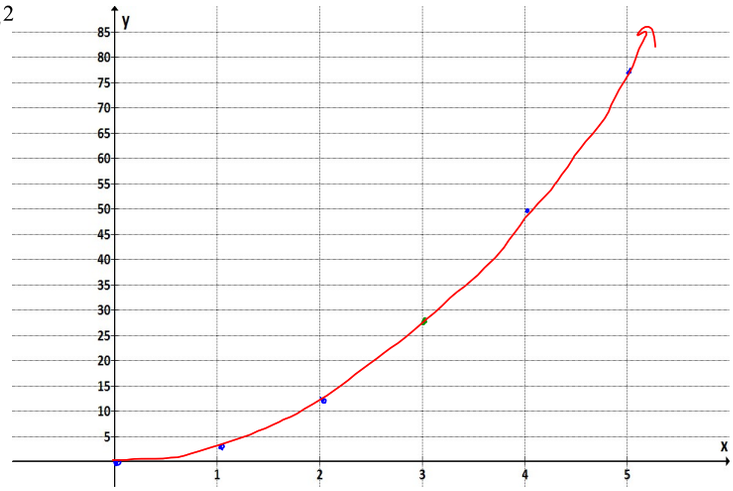




Ex 2: What is the relationship between the radius of a circle and its area?

$A = \pi r^2$

radius	area
0	0
1	3.1
2	12.6
3	28.3
4	50.3
5	78.5



$r = 3$

$A = \pi(3)^2$

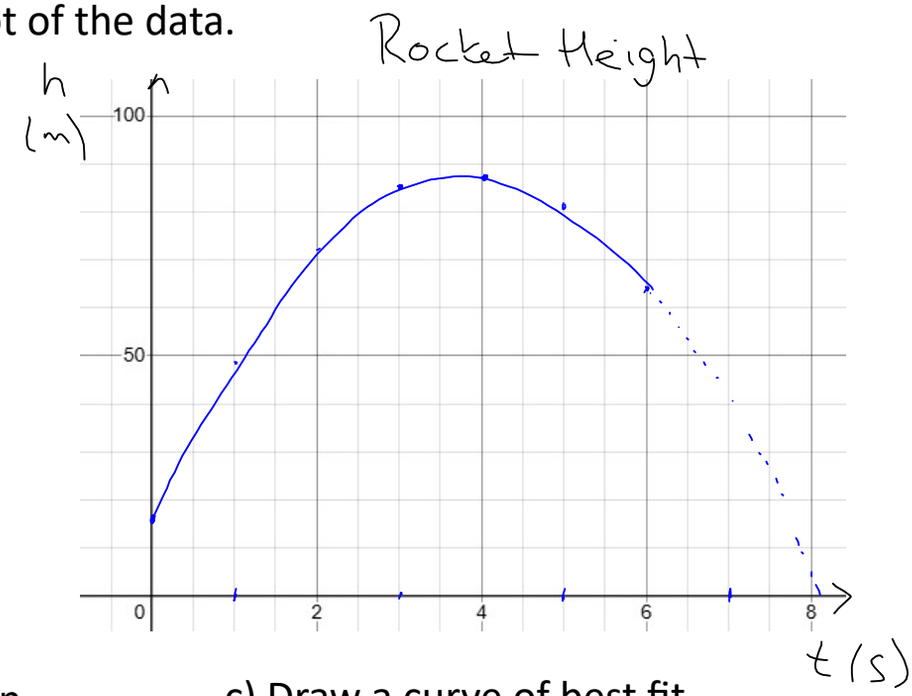
$= 28.3$

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Ex 3: A toy rocket is launched straight up. The table shows its height, h, in metres above the ground after t seconds.

a) Create a scatter plot of the data.

Time	Height
0	16
1	49
2	72
3	85
4	88
5	81
6	64



b) Describe the relation.

Non-linear

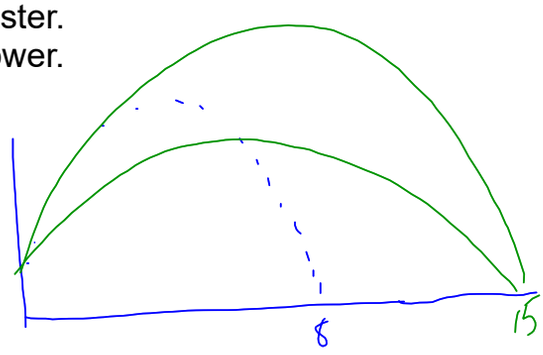
c) Draw a curve of best fit.

d) Use your model to predict the height of the rocket at 8 seconds.

Approx. 0m (Sitting on the ground)

e) Describe how the graph would change if the rocket stayed in the air for 15 seconds.

- it would reach a higher maximum if it increased faster.
- it would reach a lower maximum if it increased slower.
- both maximums would happen at later times.



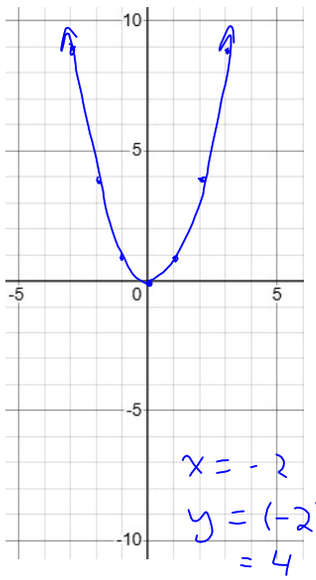
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Graphs of Quadratic Relations

Ex 4: Complete the table of values and graph each relation.

a) $y = x^2$

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

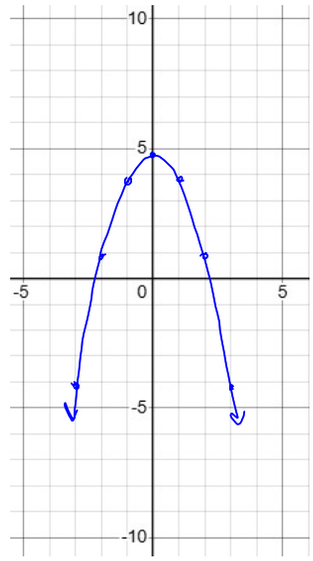


$x = 3$
$y = (3)^2$
$= 9$

$x = -2$
$y = (-2)^2$
$= 4$

b) $y = 5 - x^2$

x	y
-3	-4
-2	1
-1	4
0	5
1	4
2	1
3	-4

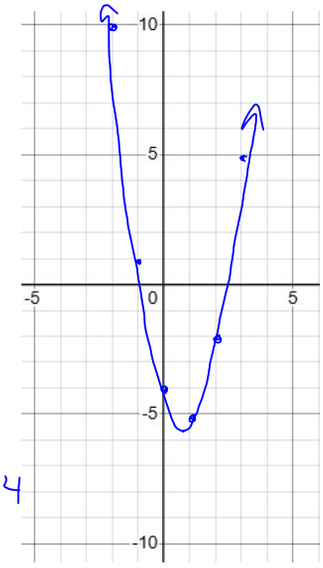


Describe what these graphs have in common.

Parabolic in Shape

c) $y = 2x^2 - 3x - 4$

x	y
-3	23
-2	10
-1	1
0	-4
1	-5
2	-2
3	5



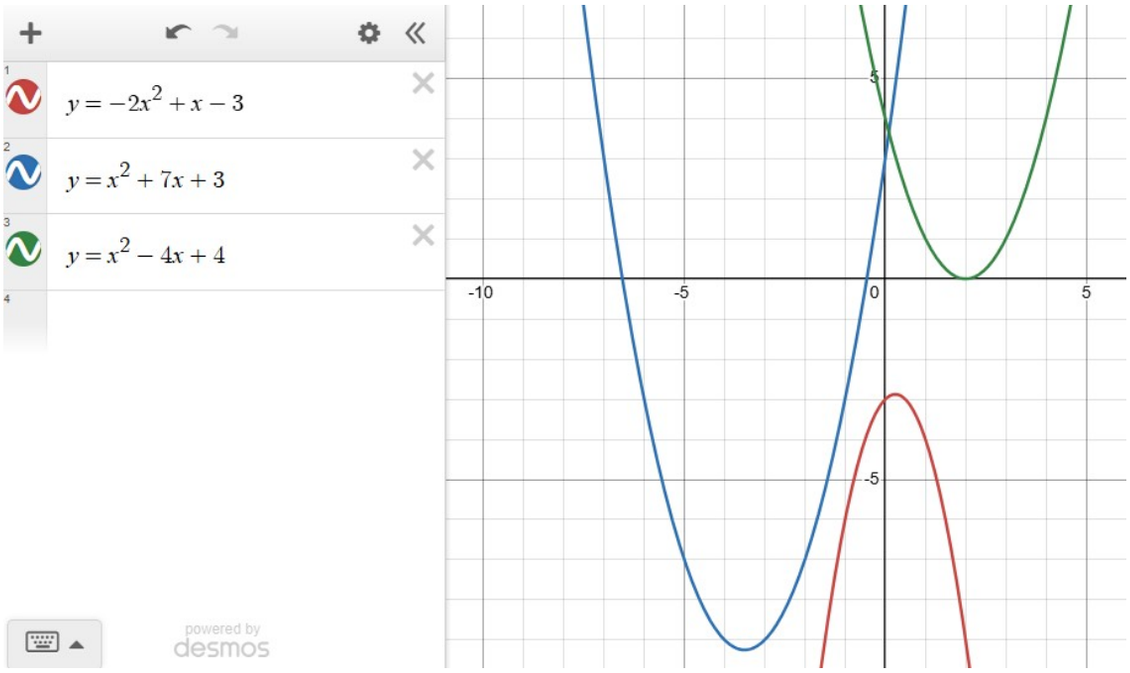
$y = 2x^2 - 3x - 4$

$x = -3$
$y = 2(-3)^2 - 3(-3) - 4$
$= 2(9) + 9 - 4$
$= 23$

These are the graphs of Quadratic relations.
The graph is called a

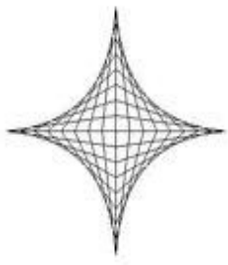
Parabola

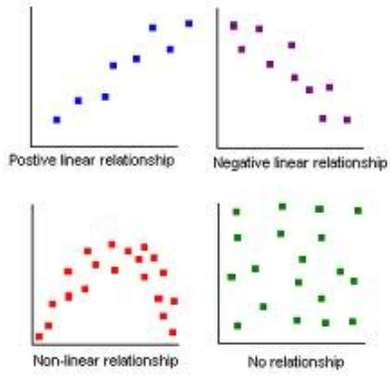
Ex. 6 Use graphing technology to graph each of the following.



Homework

p. 166 #C1,2,3,5 p. 172 #3





Jan 23-9:29 PM