Lesson October 18

Today, we are looking at parabolas which have been shifted BOTH horizontally and vertically:

$y = (x - h)^2 + k$ or $y = -a(x - h)^2 + k$

Horizontal translation

Vertical translation

Reflection

Question 1

a) How has the perfect parabola $y = x^2$ been moved to create the parabola: $y = (x - 2)^2 - 9$?

b) Write down the co-ordinates of the turning point of this parabola.

c) Has it got a maximum or a minimum turning point?

d) Find the co-ordinates of the y-intercept.

e) Find the co-ordinates of the x-intercept.

f) Sketch the graph of this parabola, labelling all the **key points**:

Question 2

Consider the parabola with equation: $y = -(x+3)^2 - 2$

a. Where has happened to the perfect parabola $y = x^2$ to create this parabola?

b. What are the co-ordinates of its turning point?

c. Does it have a minimum or a maximum turning point?

d. Find the co-ordinates of its y-intercept.

e. Explain why this parabola will have no x-intercepts.

f. Sketch the graph of this parabola, marking in all the key points.

g. Fill in the gaps: A parabola will always have a _____

_____ and a _____ .

However, it may have no, 1 or 2 _____ .

Question 3

a. What has happened to the perfect parabola to create the graph of the parabola with equation: $y = (x - 1)^2 - 4$?

b. Write down the co-ordinates of the turning point of this graph.

c. Is it a maximum or a minimum turning point?

d. Find the co-ordinates of the y-intercept.

e. Find the co-ordinates of the *x*-intercepts.

f. Sketch the graph of this parabola.

Question 4

Consider the parabola with equation: $y = -(x + 4)^2 + 1$

a) What has happened to the perfect parabola to create this parabola?

b) What are the co-ordinates of its turning point, and is it a maximum or a minimum?

c) Find the co-ordinates of the y-intercept.

d) Find the co-ordinates of the *x*-intercept.

e) Sketch the graph of this parabola, labelling all the key points with their co-ordinates.

Question 5

a) Write down the co-ordinates of the parabola with equation: $y = (x - 2)^2 + 3$.

b) Has it got a maximum or a minimum turning point?

c) Explain why this parabola would not have any x-intercepts.

d) Find the co-ordinates of its y-intercept.

e) Sketch its graph.

Question 6

Write down the co-ordinates of the turning point of the graph: $y = -(x + 3)^2$.

a. Does it have a maximum or a minimum turning point?

b. Find the co-ordinates of its x-intercept.

c. Find the co-ordinates of its y-intercept and sketch its graph.