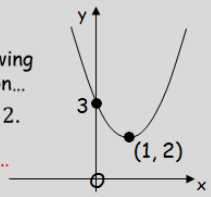
Outcome 2 – Sketching a Quadratic Function

Bronze example

Examples…

Sketch the following quadratic function…

$y = (x-1)^2 + 2.$



You need to know…

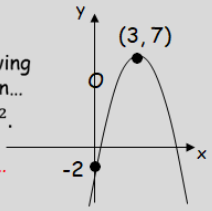
1. Maximum or minimum turning point?
   Minimum (the coefficient of x^2 is positive)
2. Coordinates of turning point.
   (1, 2)
3. Y-intercept.
   $y = (0-1)^2 + 2 = 1 + 2 = 3$ (0, 3)

Silver example

Examples…

Sketch the following quadratic function…

$y = 7 - (x-3)^2.$



You need to know…

1. Maximum or minimum turning point?
   Maximum (the coefficient of x^2 is negative)
2. Coordinates of turning point.
   (3, 7)
3. Y-intercept.
   $y = 7 - (0-3)^2 = 7 - 9 = -2$ (0, -2)

Gold example

Examples…

Sketch the graph…

$y = (x+1)(x-7).$

Mark clearly where the graph crosses the axes and state the coordinates of the turning point.

1. Find where graph crosses the y-axis

   $y = (0+1)(0-7) = (1)(-7) = -7$ **sub in x = 0**

2. Find where graph crosses the x-axis

   $(x+1)(x-7) = 0$ **set = 0**

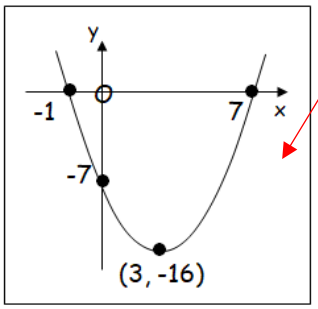
   $x = -1 \quad x = 7$ **x is halfway between the roots!**

3. Calculate the turning point

   $x = (-1+7) \div 2 = 3$ **Sub in to get y!**

   $y = (3+1)(3-7) = (4)(-4) = -16$

4. Show this all in a sketch (3, -16)



Bronze Questions

Sketch the following quadratic functions…

1. $y = (x-2)^2 + 5$
2. $y = (x-3)^2 - 1$
3. $y = (x-4)^2 - 8$
4. $y = (x+1)^2 + 3$
5. $y = (x-1)^2 + 2$
6. $y = (x+2)^2 + 1$
7. $y = (x-5)^2 - 11$
8. $y = (x-1)^2 + 9$
9. $y = (x-1)^2 + 6$
10. $y = (x+2)^2 + 3$

Gold Questions

Sketch the following graphs, marking clearly where the graph crosses the axes and state the coordinates of the turning point…

1. $y = (x+1)(x-5)$
2. $y = (x+2)(x-8)$
3. $y = (x-4)(x-6)$
4. $y = (x+3)(x+9)$

Silver Questions

Sketch the following quadratic functions…

1. $y = 4 - (x-1)^2$
2. $y = 2 - (x-4)^2$
3. $y = 7 - (x-1)^2$
4. $y = 3 - (x+2)^2$
5. $y = 8 - (x-3)^2$
6. $y = 1 - (x+5)^2$
7. $y = 11 - (x-2)^2$
8. $y = 9 - (x-4)^2$
9. $y = 6 - (x-2)^2$
10. $y = 5 - (x+3)^2$

Bronze Answers

1. Min, (2, 5), (0, 9)
2. Min, (3, -1), (0, 8)
3. Min, (4, -8), (0, 8)
4. Min, (-1, 3), (0, 4)
5. Min, (1, 2), (0, 3)
6. Min, (-2, 1), (0, 5)
7. Min, (5, -11), (0, 14)
8. Min, (1, 9), (0, 10)
9. Min, (1, 6), (0, 7)
10. Min, (-2, 3), (0, 7)

Silver Answers

1. Max, (1, 4), (0, 3)
2. Max, (4, 2), (0, -14)
3. Max, (1, 7), (0, 6)
4. Max, (-2, 3), (0, -1)
5. Max, (3, 8), (0, 1)
6. Max, (-5, 1), (0, -24)
7. Max, (2, 11), (0, 7)
8. Max, (4, 9), (0, -7)
9. Max, (2, 6), (0, 2)
10. Max, (-3, 5), (0, -4)

Gold Answers

(0, -5)
x = -1, 5
(2, -9)

(0, -16)
x = -2, 8
(3, -25)

(0, 24)
x = 4, 6
(5, -1)

(0, 27)
x = -3, -9
(-6, -9)