N5 Maths: Quadratic Graphs

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For each of the following quadratic functions, identify:

- its roots (by solving $y=0$)
- the coordinates of its turning point (average the roots and then substitute to find the y-coordinate)
- the nature of its turning point (minimum if the coefficient of x^2 is positive, or maximum if negative)
- the coordinates of the point of intersection with the y-axis (by substituting $x=0$).

Q1 These are the easiest type. Each function is in the form $y = (x - r_1)(x - r_2)$.

a) $y = (x - 1)(x - 5)$ **b)** $y = (x - 2)(x - 8)$ **c)** $y = (x - 3)(x - 7)$

Q2 The only difference here is that some of the roots will be negative numbers.

a) $y = (x + 1)(x - 3)$ **b)** $y = (x + 5)(x + 3)$ **c)** $y = (x - 2)(x + 4)$

Q3 For these functions, the x-coordinate of each turning point will work out to be a fraction.

a) $y = (x - 1)(x - 4)$ **b)** $y = (x - 3)(x + 2)$ **c)** $y = (x + 7)(x + 4)$

Q4 Some of these roots are fractions, which complicates the averaging process.

a) $y = (2x - 1)(2x - 3)$ **b)** $y = (2x + 1)(x - 3)$ **c)** $y = (4x + 3)(2x - 5)$

Q5 So far, all of the graphs have been 'happy' parabolas, with minimum turning points. These aren't.

a) $y = (-x + 4)(x - 2)$ **b)** $y = (2x + 1)(5 - x)$ **c)** $y = (-2x + 3)(3x - 2)$

Q6 These functions are in completed square form, so you can read off the turning point from the equation, but you will have to expand and then factorise it in order to identify the roots.

a) $y = (x - 6)^2 - 9$ **b)** $y = (x - 3)^2 - 1$ **c)** $y = (x + 4)^2 - 1$

Q7 These functions are in a completed square form that requires more work to expand.

a) $y = 4(x - 2)^2 - 9$ **b)** $y = -(x - 3)^2 + 4$ **c)** $y = -4(x + 1)^2 + 25$

Q8 Mixed question types.

a) $y = (x + 3)(x - 7)$ **b)** $y = (3x - 1)(2x + 1)$ **c)** $y = (-x + 3)(x + 1)$

d) $y = (x + 1)^2 - 1$ **e)** $y = -2(x - 3)^2 + 8$ **f)** $y = 8x^2 - 10x + 3$
Hint: factorise first.

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