

AIMING HIGH

QUADRATIC FUNCTIONS

The diagram shows the graphs of five quadratic functions or parabolas with equation $y = ax^2 + bx + c$ for different values of a, b and c.



How do the two points where the graph cuts the *x*-axis relate to the axis of symmetry of the graph and the solutions of the quadratic equation $ax^2 + bx + c = 0$?

Match the graphs in the diagram to the following descriptions and give reasons for your decisions. $1.y = ax^2 + bx + c$ if a > 0, b > 0 and c < 0 $2.y = ax^2 + bx + c$ if a < 0, b = 0 and c > 0 $3.y = ax^2 + bx + c$ if a < 0, b < 0, and $b^2 - 4ac < 0$ $4.y = a(x + p)^2 + q$ if p < 0, q < 0 and the *x*-intercepts have different signs.

 $5.y = a(x + p)^2 + q$ if a < 0, p < 0, q > 0 and one root is zero

HELP

For each case use the descriptions and choose values of a, b, c, p and q that fit the descriptions. You might try sketching the graph with your choice of these values. This should help you to match it to one of the coloured graphs A, B, C, D & E.

NEXT

Can you re-produce exactly the same diagram for the coloured graphs A, B, C, D & E and find the equations of the graphs. Perhaps use Geogebra. You can download the software for free from <u>https://www.geogebra.org/</u> and use it on your smartphone without being connected to the internet.