# Quadratic functions

*(Past Year Topical Questions 2012-2017)*

May/June 2012 (11)

3.

Find the set of values of $k$ for which the line $y = 2x + k$ cuts the curve $y = x^2 + kx + 5$ at two distinct points. [6]

Oct/Nov 2012 (11)

2.

Find the values of $k$ for which the line $y = k - 6x$ is a tangent to the curve $y = x(2x + k)$. [4]

May/June 2013 (12)

4.

Find the set of values of $k$ for which the curve $y = 2x^2 + kx + 2k - 6$ lies above the $x$-axis for all values of $x$. [4]

Oct/Nov 2013 (11)

2.

Find the set of values of $k$ for which the curve $y = (k + 1)x^2 - 3x + (k + 1)$ lies below the $x$-axis. [4]

May/June 2014 (11)

4.

Find the set of values of $k$ for which the line $y = k(4x - 3)$ does not intersect the curve $y = 4x^2 + 8x - 8$. [5]

May/June 2014 (13)

1.

**(i)** Show that $y = 3x^2 - 6x + 5$ can be written in the form $y = a(x - b)^2 + c$, where $a$, $b$ and $c$ are constants to be found. [3]

**(ii)** Hence, or otherwise, find the coordinates of the stationary point of the curve $y = 3x^2 - 6x + 5$. [1]

May/June 2015 (12)

1.

Given that the graph of $y = (2k + 5)x^2 + kx + 1$ does not meet the $x$-axis, find the possible values of $k$. [4]

Oct/Nov 2015 (11)

1.

Find the range of values of $k$ for which the equation $kx^2 + k = 8x - 2xk$ has 2 real distinct roots. [4]

May/June 2016 (11)

1.

Find the value of $k$ for which the curve $y = 2x^2 - 3x + k$

**(i)** passes through the point $(4, -7)$,

**(ii)** meets the $x$-axis at one point only.

May/June 2017 (11)

1.

The line $y = kx - 5$, where $k$ is a positive constant, is a tangent to the curve $y = x^2 + 4x$ at the point $A$.

**(i)** Find the exact value of $k$. [3]

**(ii)** Find the gradient of the normal to the curve at the point $A$, giving your answer in the form $a + b\sqrt{5}$, where $a$ and $b$ are constants. [2]

Oct/Nov 2017 (13)

3.

Find the set of values of $k$ for which the equation $kx^2 + 3x - 4 + k = 0$ has no real roots. [4]