

Higher Mathematics

Quadratics - Questions - 2013-2017

Marks are indicated in brackets after each question number

2013 Paper 1 Question 3, (2)

Calculate the discriminant of the quadratic equation $2x^2 + 4x + 5 = 0$.

2013 Paper 1 Question 19, (2)

Solve $1 - 2x - 3x^2 > 0$, where x is a real number.

2013 Paper 1 Question 21, (3)

Express $2x^2 + 12x + 1$ in the form $a(x + b)^2 + c$.

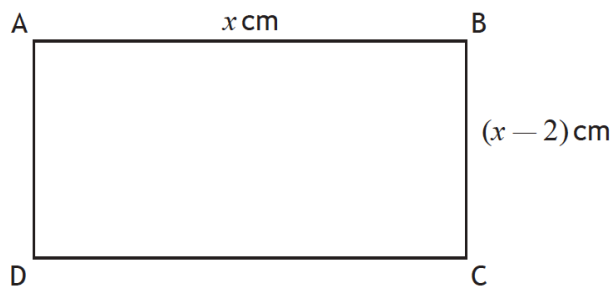
2014 Paper 1 Question 17, (2)

$3x^2 + 12x + 17$ is expressed in the form $3(x + p)^2 + q$.

What is the value of q ?

2015 Paper 1 Question 8, (4)

ABCD is a rectangle with sides of lengths x centimetres and $(x - 2)$ centimetres, as shown.



If the area of ABCD is less than 15 cm^2 , determine the range of possible values of x .

2015 Paper 1 Question 11, (4) (6)

$T(-2, -5)$ lies on the circumference of the circle with equation

$$(x + 8)^2 + (y + 2)^2 = 45.$$

- (a) Find the equation of the tangent to the circle passing through T .
- (b) This tangent is also a tangent to a parabola with equation $y = -2x^2 + px + 1 - p$, where $p > 3$.
Determine the value of p .

2016 Paper 1 Question 12, (2) (3)

The functions f and g are defined on \mathbb{R} , the set of real numbers by

$$f(x) = 2x^2 - 4x + 5 \text{ and } g(x) = 3 - x.$$

- (a) Given $h(x) = f(g(x))$, show that $h(x) = 2x^2 - 8x + 11$.
- (b) Express $h(x)$ in the form $p(x + q)^2 + r$.

2016 Paper 2 Question 2, (3)

Find the range of values for p such that $x^2 - 2x + 3 - p = 0$ has no real roots.

2017 Paper 1 Question 4, (3)

Find the value of k for which the equation $x^2 + 4x + (k - 5) = 0$ has equal roots.

2017 Paper 2 Question 4, (3) (2) (2)

- (a) Express $3x^2 + 24x + 50$ in the form $a(x + b)^2 + c$.
- (b) Given that $f(x) = x^3 + 12x^2 + 50x - 11$, find $f'(x)$.
- (c) Hence, or otherwise, explain why the curve with equation $y = f(x)$ is strictly increasing for all values of x .