Quadratics

Go to the appropriate Past Paper for the answers

2019 Paper 1

2. The equation $x^2+(k-5)x+1=0$ has equal roots.

Determine the possible values of k. **3**

2018 Paper 2

4. Express $-3x^2-6x+7$ in the form $a(x+b)^2+c$. **3**

2018 Paper 2

10. The equation $x^2+(m-3)x+m=0$ has two real and distinct roots.

Determine the range of values for m. **4**

Specimen 5 Paper 1

6. Determine the range of values of p such that the equation $x^2+(p+1)x+9=0$ has no real roots. **4**

2017 Paper 1

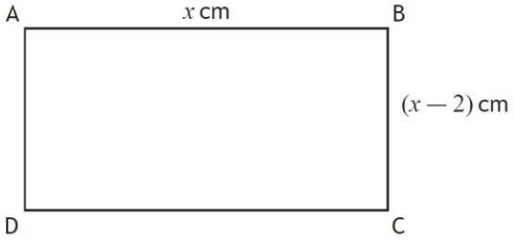
4. Find the value of k for which the equation $x^2+4x+(k-5)=0$ has equal roots. **3**

2016 Paper 2

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

New 2015 Paper 1

8. 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. **4**

Specimen 4 Paper 1

8. $f(x)$ and $g(x)$ are functions, defined on the set of real numbers, such that

$f(x) = 1 - \frac{1}{2}x$ and $g(x) = 8x^2 - 3$.

(a) Given that $h(x) = g(f(x))$, show that $h(x) = 2x^2 - 8x + 5$. **3**

(b) Express $h(x)$ in the form $a(x+p)^2 + q$. **3**

(c) Hence, or otherwise, state the coordinates of the turning point on the graph of $y = h(x)$. **1**

(d) Sketch the graph of $y = h(x) + 3$, showing clearly the coordinates of the turning point and the y-axis intercept. **2**

Exemplar Paper 2

3. Find the value of p such that the equation $x^2 + (p+1)x + 9 = 0$ has no real roots. **4**

2014 Paper 1

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

What is the value of q?

2013 Paper 1

3. If $x^2 - 6x + 14$ is written in the form $(x - p)^2 + q$, what is the value of q? **2**

2013 Paper 1

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

2012 Paper 1

3. If $x^2 - 6x + 14$ is written in the form $(x - p)^2 + q$, what is the value of q? **2**

2012 Paper 1

19. Solve $6 - x - x^2 < 0$. **2**

2011 Paper 1

5. If $x^2 - 8x + 7$ is written in the form $(x - p)^2 + q$, what is the value of q? **2**

2011 Paper 1

9. The discriminant of a quadratic equation is 23.

Here are two statements about this quadratic equation:

(1) the roots are real;

(2) the roots are rational.

Which of the following is true? **2**

A Neither statement is correct.

B Only statement (1) is correct.

C Only statement (2) is correct.

D Both statements are correct.

2010 Paper 1

6. The roots of the equation $kx^2 - 3x + 2 = 0$ are equal.

What is the value of k? **2**

2010 Paper 1

18. What is the solution of $x^2 + 4x > 0$, where x is a real number? **2**

2009 Paper 1

12. A function f is given by $f(x) = 2x^2 - x - 9$.

Which of the following describes the nature of the roots of $f(x) = 0$?

A No real roots

B Equal roots **2**

C Real distinct roots

D Rational distinct roots

2009 Paper 1

19. For what values of x is $6 + x - x^2 < 0$?

A $x > 3$ only

B $x < -2$ only

C $x < -2, x > 3$ **2**

D $-3 < x < 2$

2008 Paper 1

10. Here are two statements about the roots of the equation $x^2 + x + 1 = 0$:

(1) the roots are equal;

(2) the roots are real.

Which of the following is true?

A Neither statement is correct.

B Only statement (1) is correct.

C Only statement (2) is correct.

D Both statements are correct.

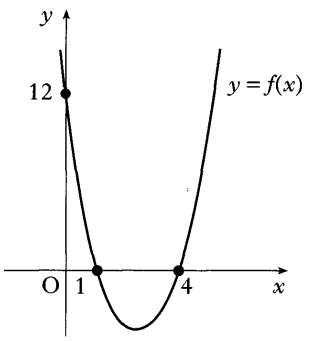
2

2008 Paper 1

13. The diagram shows part of the graph of a quadratic function $y = f(x)$.

The graph has an equation of the form $y = k(x - a)(x - b)$.

What is the equation of the graph?



2

2008 Paper 1

16. $2x^2 + 4x + 7$ is expressed in the form $2(x + p)^2 + q$.

What is the value of q?

2

2007 Paper 1

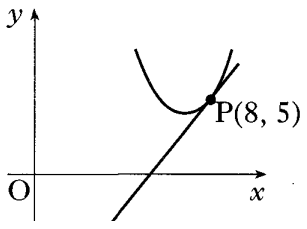
4. Find the range of values of k such that the equation $kx^2 - x - 1 = 0$ has no real roots.

4

2006 Paper 2

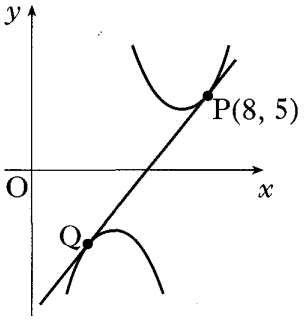
3. The parabola with equation $y = x^2 - 14x + 53$ has a tangent at the point P(8, 5).

(*a*) Find the equation of this tangent.



4

(*b*) Show that the tangent found in (*a*) is also a tangent to the parabola with equation $y = -x^2 + 10x - 27$ and find the coordinates of the point of contact Q.



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2004 Paper 1

8. (*a*) Write $x^2 - 10x + 27$ in the form $(x + b)^2 + c$. **2**

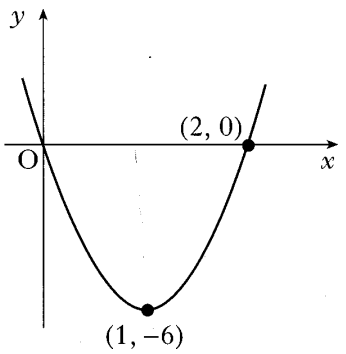
(*b*) Hence show that the function $g(x) = \frac{1}{3}x^3 - 5x^2 + 27x - 2$ is always increasing. **4**

2004 Paper 1

11. The diagram shows a parabola passing through the points (0, 0), (1, −6) and (2, 0).

(*a*) The equation of the parabola is of the form $y = ax(x - b)$. **3**

Find the values of a and b.



2004 Paper 2

3. Prove that the roots of the equation $2x^2 + px - 3 = 0$ are real for all values of p. **4**