

Level 3 Algebra - Completing The Square

Jan 2015 - Question 11

Jan 2016 - Question 11

June 2018 - Question 19

Jan 2019 - Question 17

June 2019 - Question 11

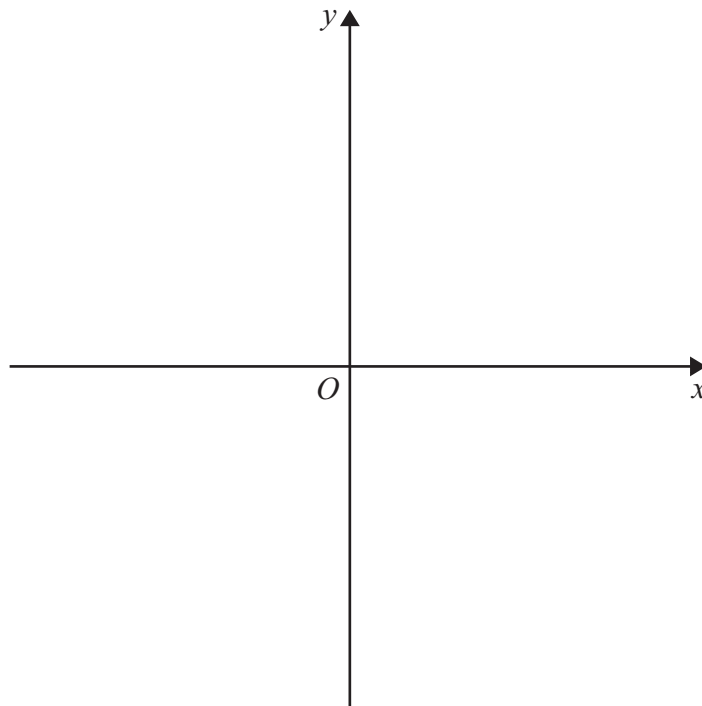
Jan 2020 - Question 10

June 2022 - Question 10

Jan 2023 - Question 13

Jan 2024 - Question 10

(c) Sketch the graph of $x^2 + y^2 = 1$



(1)

(Total for Question 10 is 5 marks)

11 (a) Write the quadratic expression $x^2 + 4x + 7$ in the form $(x + m)^2 + n$ where m and n are integers.

.....
(2)

(b) Write down the coordinates of the turning point of the graph of $y = x^2 + 4x + 7$

.....
(1)

(Total for Question 11 is 3 marks)

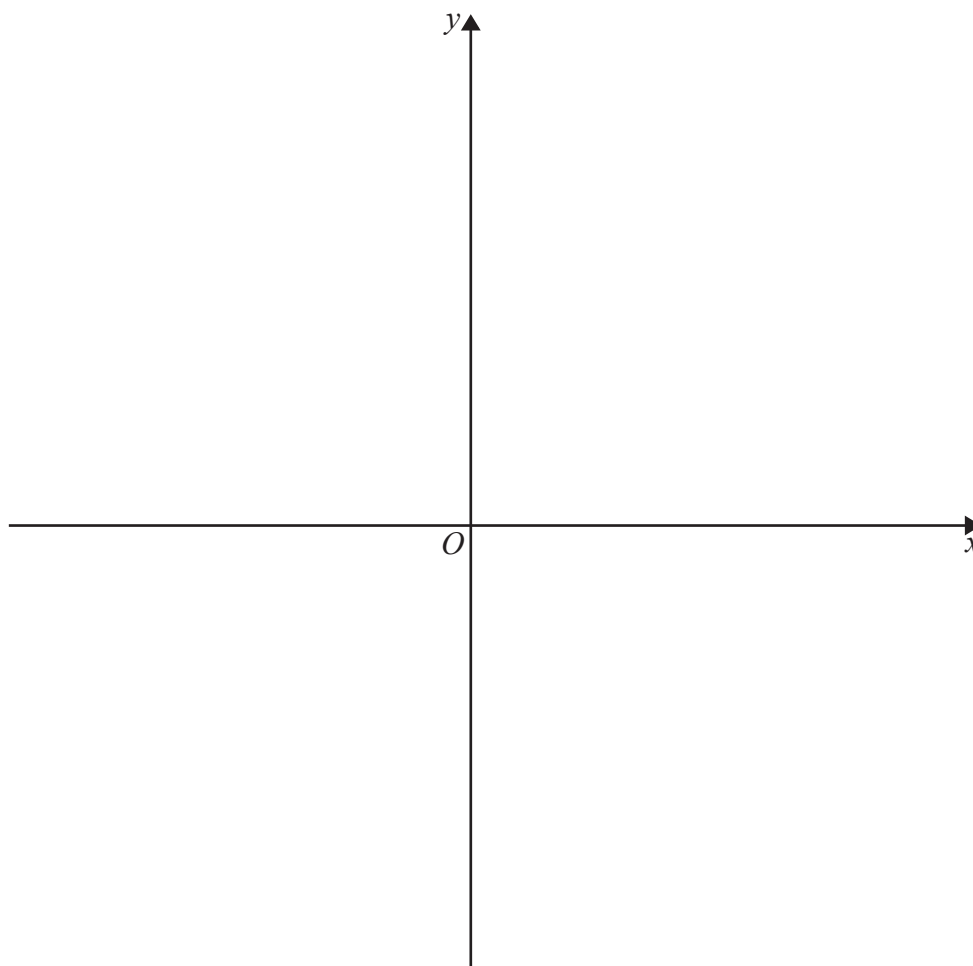


- 11 (a) Write the quadratic expression $x^2 - 10x + 29$ in the form $(x + p)^2 + q$ where p and q are constants.

.....
(2)

- (b) Sketch the graph of $y = x^2 - 10x + 29$

Mark, on your sketch, the coordinates of the turning point of the graph and the coordinates of the point where the graph intersects the y -axis.



(3)

(Total for Question 11 is 5 marks)



- 19 (a) Write the quadratic expression $5 - x^2 - 4x$ in the form $a - (x + b)^2$ where a and b are integers.

.....
(2)

The graph of $y = 5 - x^2 - 4x$ has a turning point at the point P .

- (b) Write down the coordinates of P .

.....
(1)

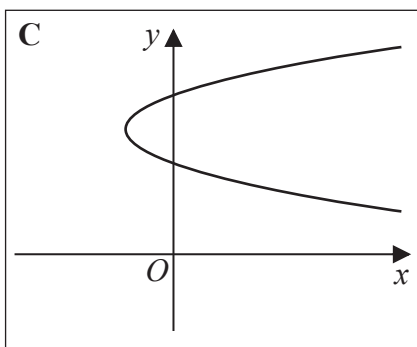
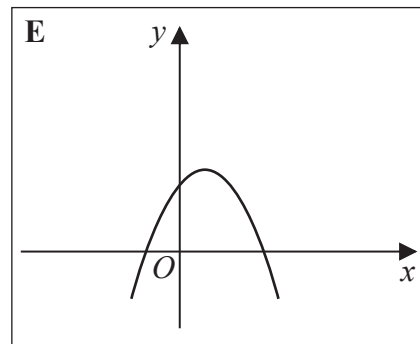
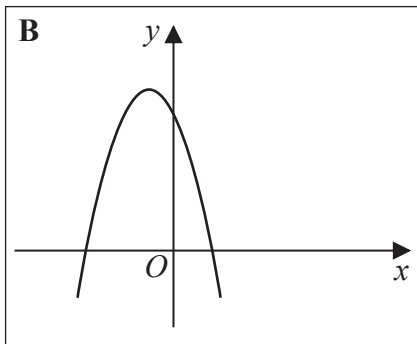
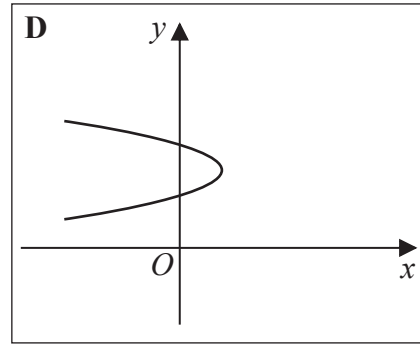
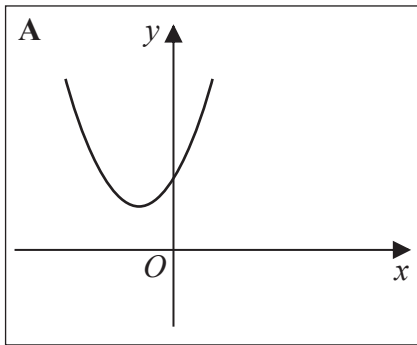


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Here are some sketch graphs.



The equation for one of these sketch graphs is $y = 5 - x^2 - 4x$

(c) Write down the letter of this sketch.

.....
(1)

(Total for Question 19 is 4 marks)



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17 (a) Write $4x^2 - 28x$ in the form $(2x - a)^2 - b$ where a and b are integers.

.....
(2)

The curve with equation $y = 4x^2 - 28x$ has a turning point at the point M .

(b) Write down the coordinates of M .

.....
(1)

(Total for Question 17 is 3 marks)



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11 Here is a quadratic equation.

$$5x^2 + 6x - 8 = 0$$

(a) (i) Write down the sum of the roots of this equation.

.....
(1)

(ii) Write down the product of the roots of this equation.

.....
(1)

(b) Write $x^2 - 8x + 7$ in the form $(x + p)^2 + q$ where p and q are constants.

.....
(2)

(Total for Question 11 is 4 marks)



10 (a) (i) Write the equation $\frac{x^2}{2} = \frac{x}{3} + \frac{1}{4}$ in the form $ax^2 + bx + c = 0$ where a , b , and c are integers.

.....
(1)

(ii) Hence use the quadratic formula to solve the equation $\frac{x^2}{2} = \frac{x}{3} + \frac{1}{4}$
Give your answer in the form $\frac{p \pm \sqrt{q}}{6}$ where p and q are integers.

.....
(3)

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(b) Solve the equation $(x + 3)^2 = (x + 3)$

.....
(3)

(c) Write the quadratic expression $x^2 - 8x + 3$ in the form $(x + m)^2 + n$ where m and n are integers.

.....
(2)

(Total for Question 10 is 9 marks)

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9 (a) Factorise $6x^2y^2 - 9x^3y$

.....
(2)

(b) Factorise $p^4 - p^2q^2$

.....
(2)

(Total for Question 9 is 4 marks)

10 $x^2 + 6x + 13$ can be written in the form $(x + a)^2 + b$

(a) Find the value of a and the value of b .

$a =$

$b =$

(2)

The curve with equation $y = x^2 + 6x + 13$ has a turning point at the point A .

(b) Write down the coordinates of A .

.....
(1)

(Total for Question 10 is 3 marks)



13 (a) Use the quadratic formula to solve the equation $3x^2 - 4x - 2 = 0$

Give your answer in the form $\frac{p \pm \sqrt{q}}{3}$ where p and q are integers.

.....
(3)

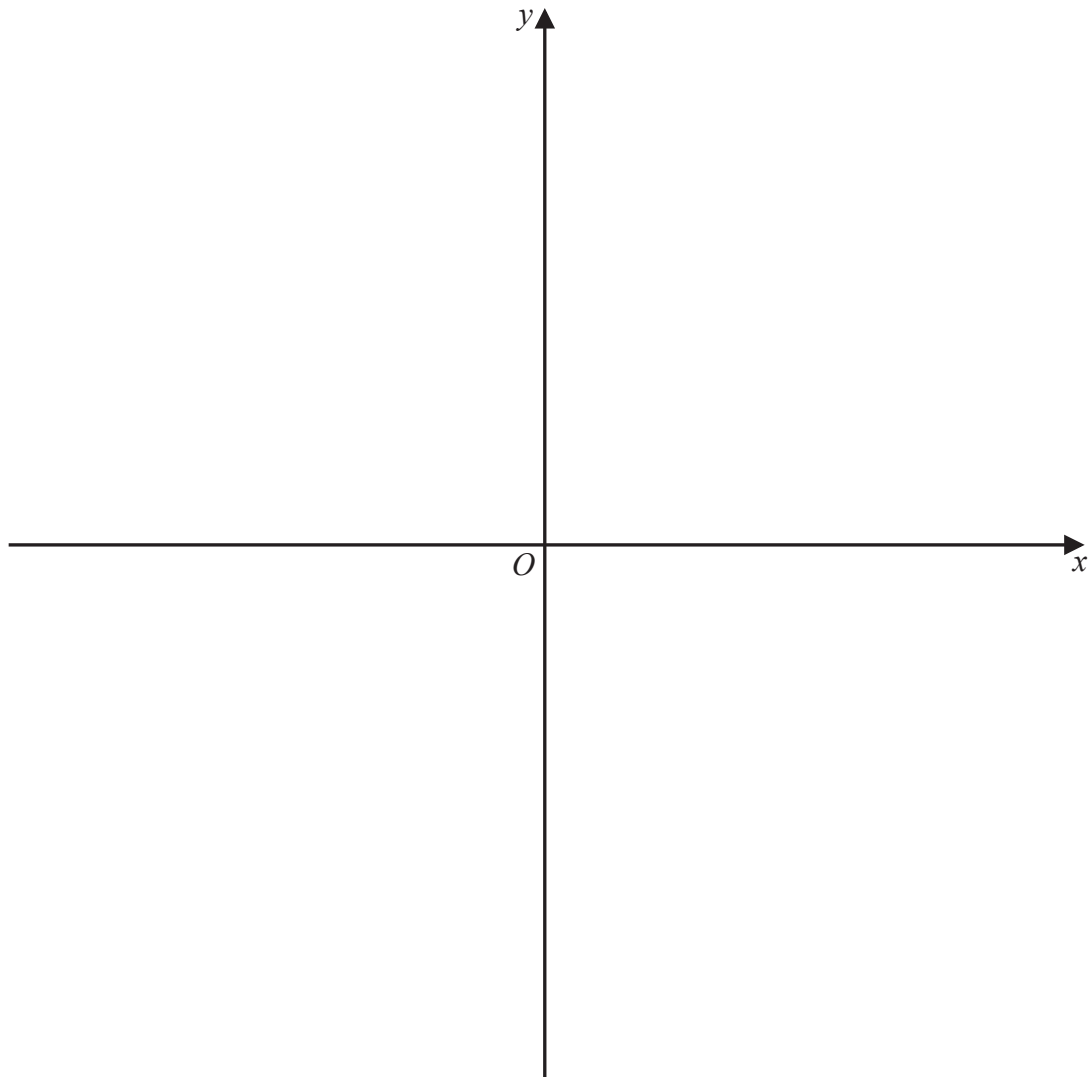
(b) (i) Write the quadratic expression $4x^2 - 12x + 10$ in the form $(ax + m)^2 + n$
where a , m and n are integers.

.....
(3)



(ii) Hence sketch the graph of $y = 4x^2 - 12x + 10$

Mark on your sketch the coordinates of the turning point of the graph and the coordinates of the point where the graph intersects the y -axis.



(3)

(Total for Question 13 is 9 marks)

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P 6 8 7 8 7 A 0 1 5 2 4

9 (a) Factorise $10xy^3 + 15x^2y^2$

.....
(2)

(b) Factorise $p^2q^2 - q^2$

.....
(2)

(Total for Question 9 is 4 marks)

10 $x^2 + 8x + 11$ can be written in the form $(x + a)^2 + b$

(a) Find the value of a and the value of b .

$a =$

$b =$

(2)

The graph of $y = x^2 + 8x + 11$ has a turning point at the point T .

(b) Write down the coordinates of T .

.....
(1)

(Total for Question 10 is 3 marks)

