

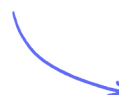
Exam Questions

Completing the Square

Completing the Square

Medium (10 questions)	/25
Hard (12 questions)	/44
Very Hard (8 questions)	/26
Total Marks	/95

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Medium Questions

1 Write $x^2 + 6x - 7$ in the form $(x + a)^2 + b$ where a and b are integers.

(2 marks)

2 Write $x^2 + 2x - 8$ in the form $(x + m)^2 + n$

where m and n are integers.

(2 marks)

3 Express $x^2 - 10x + 40$ in the form $(x + a)^2 + b$, where a and b are integers.

(2 marks)

4 The equation of a curve is $y = (x + 3)^2 + 5$

Choose the coordinates of the turning point.

- A. (5, 3)
- B. (5, -3)
- C. (3, 5)
- D. (-3, 5)

(1 mark)

5 Write $x^2 - 10x + 22$ in the form $(x - a)^2 - b$

(3 marks)

6 Write $x^2 - 6x + 11$ in the form $(x - a)^2 + b$

(3 marks)

7 Write $x^2 + 8x + 3$ in the form $(x + a)^2 - b$.

(4 marks)

8 Write $x^2 - 10x + 16$ in the form $(x + a)^2 + b$

(3 marks)

9 Write $x^2 + 10x + 14$ in the form $(x + a)^2 + b$.

(2 marks)

10

$$x^2 + 4x - 9 \equiv (x + a)^2 + b$$

Find the value of a and the value of b .

$a =$

$b =$

(3 marks)

Hard Questions

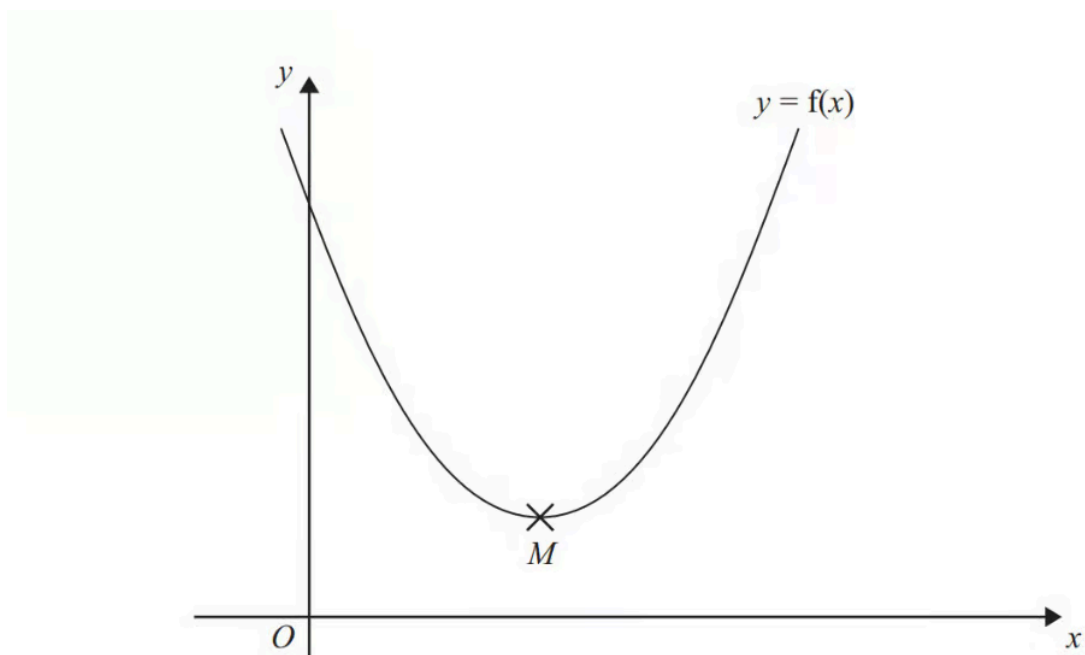
- 1 (a) The expression $x^2 - 8x + 21$ can be written in the form $(x - a)^2 + b$ for all values of x .

Find the value of a and the value of b .

(3 marks)

- (b) The equation of a curve is $y = f(x)$ where $f(x) = x^2 - 8x + 21$

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



The minimum point of the curve is M .

Write down the coordinates of M .

(1 mark)

2 Given that $x^2 - 6x + 1 = (x - a)^2 - b$ for all values of x .

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

[2]

ii) Hence write down the coordinates of the turning point of the graph of $y = x^2 - 6x + 1$.

[1]

(3 marks)

3 Given that a , b and c are integers,

express $3x^2 + 12x + 19$ in the form $a(x + b)^2 + c$

(2 marks)

4 Express $4x^2 - 8x + 7$ in the form $a(x + b)^2 + c$ where a , b and c are integers.

(3 marks)

5 (a) Write $3x^2 - 12x + 7$ in the form $a(x + b)^2 + c$

(3 marks)

- (b) The line **L** is the line of symmetry of the curve with equation $y = 3x^2 - 12x + 7$

Using your answer to part (a) or otherwise, write down an equation of **L**.

(1 mark)

- 6 Express $x^2 + 6\sqrt{2}x - 1$ in the form $(x + a)^2 + b$

Show your working clearly.

(2 marks)

- 7 The equation of a curve is $y = x^2 + 14x + 52$

By completing the square, work out the coordinates of the turning point.

You **must** show your working.

(3 marks)

- 8 i) Write $x^2 + 4x - 16$ in the form $(x + a)^2 - b$.

[3]

- ii) Solve the equation $x^2 + 4x - 16 = 0$.

Give your answers in surd form as simply as possible.

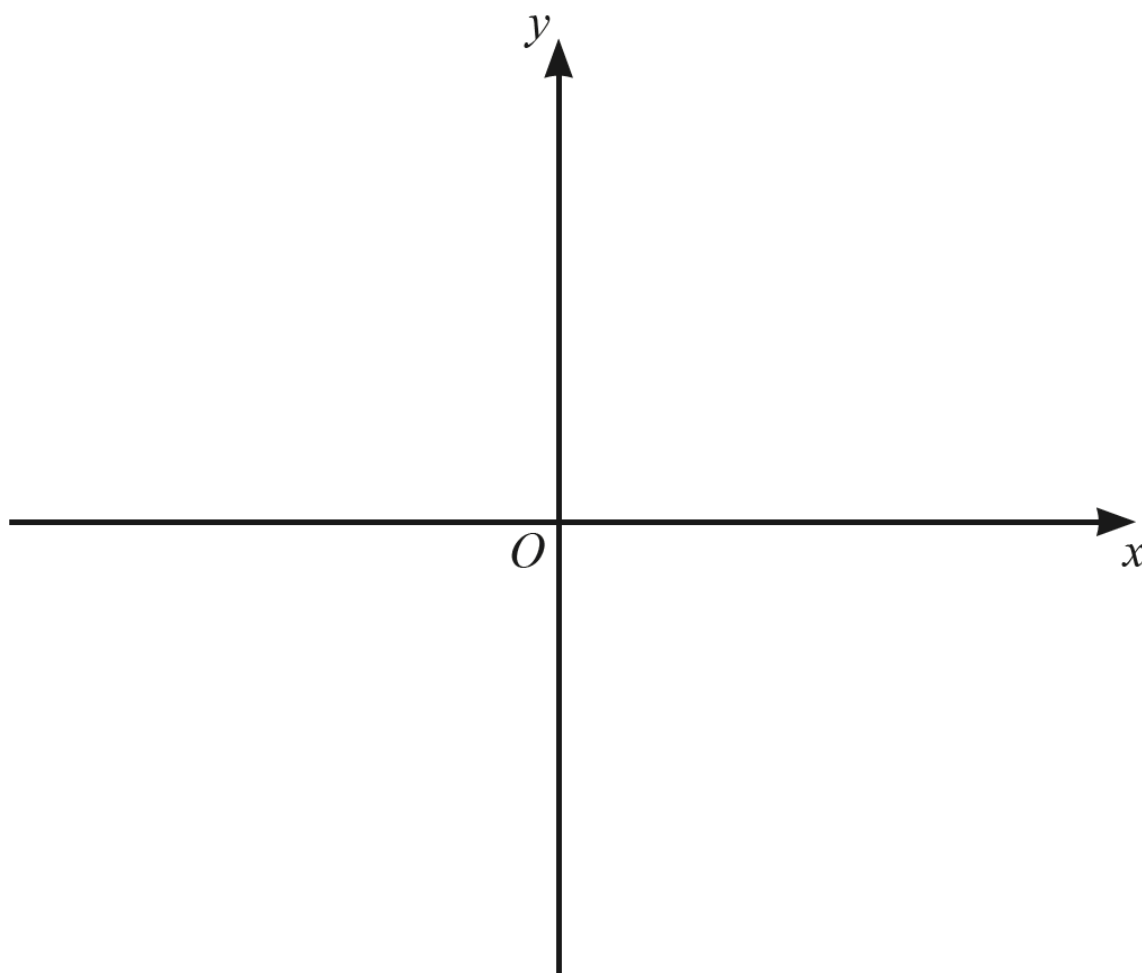
$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [4]

(7 marks)

9 (a) Write $x^2 + 10x + 14$ in the form $(x + a)^2 + b$.

(2 marks)

(b) Sketch the graph of $y = x^2 + 10x + 14$, indicating the coordinates of the turning point.



(3 marks)

10 i) Write $x^2 + 8x - 9$ in the form $(x + k)^2 + h$.

[2]

ii) Use your answer to **part (i)** to solve the equation $x^2 + 8x - 9 = 0$.

$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [2]

(4 marks)

11 (a) Write $x^2 - 18x - 27$ in the form $(x + k)^2 + h$.

(2 marks)

(b) Use your answer to **part (a)** to solve the equation $x^2 - 18x - 27 = 0$.

$x = \dots\dots\dots$ or $x = \dots\dots\dots$

(2 marks)

12 $x^2 - 12x + a \equiv (x + b)^2$

Find the value of a and the value of b .

$a = \dots\dots\dots$

$b = \dots\dots\dots$

(3 marks)

Very Hard Questions

1 (a) Write $2x^2 + 16x + 35$ in the form $a(x + b)^2 + c$ where a , b , and c are integers.

(3 marks)

(b) Hence, or otherwise, write down the coordinates of the turning point of the graph of $y = 2x^2 + 16x + 35$

(1 mark)

2 (a) Express $7 + 12x - 3x^2$ in the form $a + b(x + c)^2$ where a , b and c are integers.

(3 marks)

(b) **C** is the curve with equation $y = 7 + 12x - 3x^2$

The point **A** is the maximum point on **C**

Use your answer to part (a) to write down the coordinates of **A**

(1 mark)

3 Express $7 - 12x - 2x^2$ in the form $a + b(x + c)^2$ where a , b and c are integers.

(3 marks)

4 Express $5 + 6x - x^2$ in the form $p - (x - q)^2$ where p and q are constants.

(2 marks)

5 Write $5 + 12x - 2x^2$ in the form $a + b(x + c)^2$ where a , b and c are integers.

(4 marks)

6 Express $7 - 4x - x^2$ in the form $p - (x + q)^2$ where p and q are constants.

(2 marks)

7 $2x^2 - 6x + 5$ can be written in the form $a(x - b)^2 + c$ where a , b and c are positive numbers.

Work out the values of a , b and c .

$a = \dots\dots\dots$

$b = \dots\dots\dots$

$c = \dots\dots\dots$

(3 marks)

8 Find the turning point of $y = x^2 + 4x - 3$ by completing the square.

(..... ,)

(4 marks)