Completing the Square

Question Paper

Course	Edexcel IGCSE Maths
Section	2. Equations, Formulae & Identities
Topic	Completing the Square
Difficulty	Hard

Time allowed: 60

Score: /44

Percentage: /100

Question 1a

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

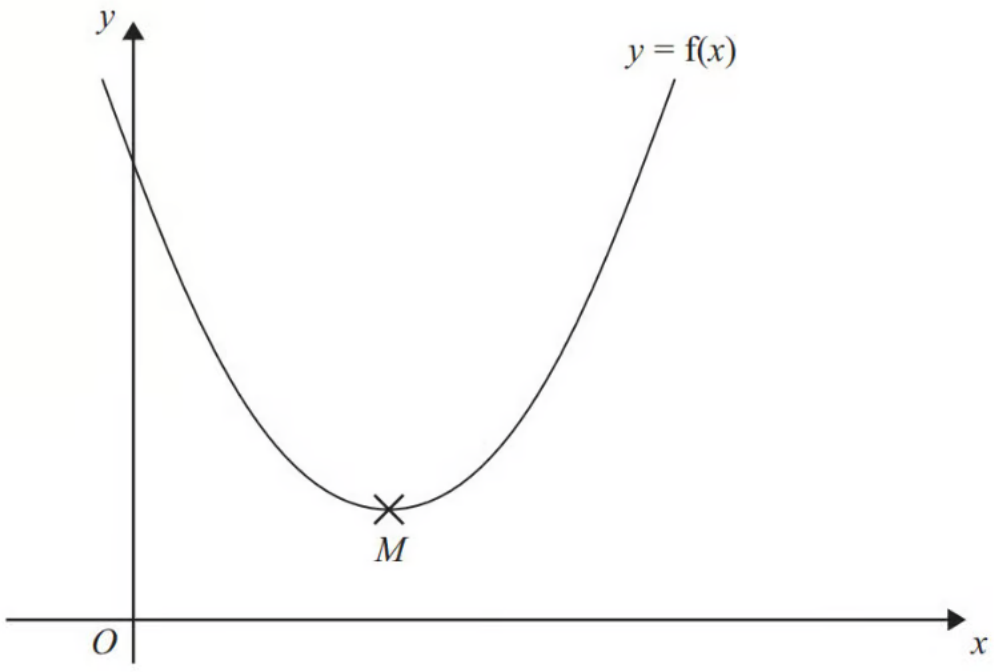
Find the value of a and the value of b.

[3 marks]

Question 1b

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]

Question 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]

Question 3

Given that a, b and c are integers,

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

[2 marks]

Question 4

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

[3 marks]

Question 5a

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

[3 marks]

Question 5b

The line $\mathbf{L}$ 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 $\mathbf{L}$.

[1 mark]

Question 6

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

Show your working clearly.

[2 marks]

Question 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]

Question 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 = ... or x = ... [4]

[7 marks]

Question 9

$x^2 - 12x + a = (x + b)^2$

Find the value of a and the value of b.

a = ...

b = ...

[3 marks]

Question 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 = ... or x = ... [2]

[4 marks]

Question 11a

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

[2 marks]

Question 11b

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

$x =$ ..... or $x =$ .....

[2 marks]

Question 12a

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

[2 marks]

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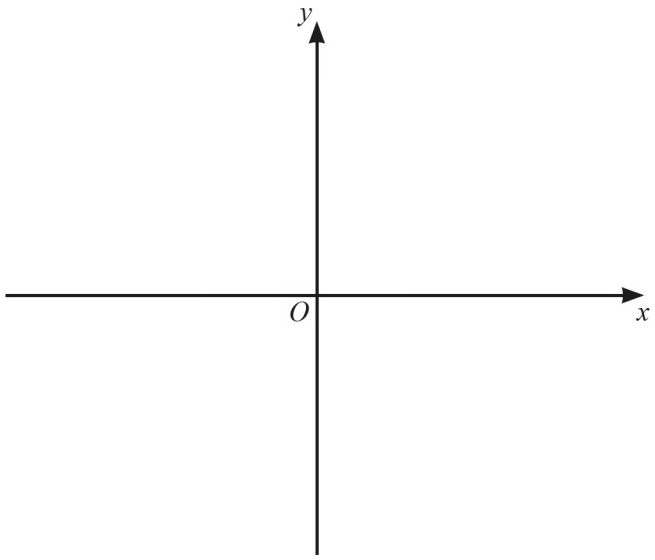
Question 12b

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



[3 marks]