Chhetri Academy

chhetriacademy.com

GCSE MATHS

Algebra

Edexcel 1MA1 | Subtopic collection Topic 19

Completing the square

Higher tier

Past paper question booklet

9	2003-2023	Higher
question groups	available papers	tier

Before you begin

1. Show working and use units where appropriate.
2. Use extra paper if you need more space.
3. Print at actual size (100%) for measurement questions.

Name _____ **Date** _____

Whole questions are retained for context; some parts cover other points. Legacy sources are labelled.

18. For all values of x and m, $x^2 - 2mx = (x-m)^2 - k$

Leave blank

(a) Express k in terms of m.

.....

(2)

The expression $x^2 - 2mx$ has a minimum value as x varies.

(b) (i) Find the minimum value of $x^2 - 2mx$.
Give your answer in terms of m.

.....

(ii) State the value of x for which this minimum value occurs.
Give your answer in terms of m.

.....

(3)

20. The expression $x^2 - 6x + 14$ can be written in the form $(x - p)^2 + q$, for all values of x.

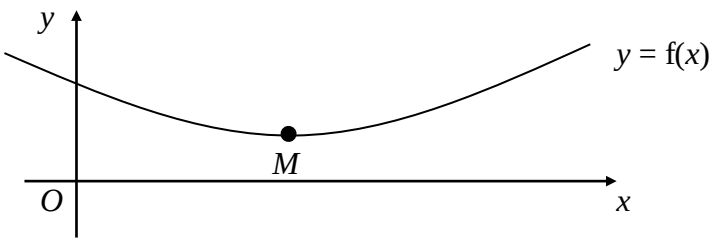
(a) Find the value of (i) p, (ii) q.

(i) $p =$ .....

(ii) $q =$ .....

(3)

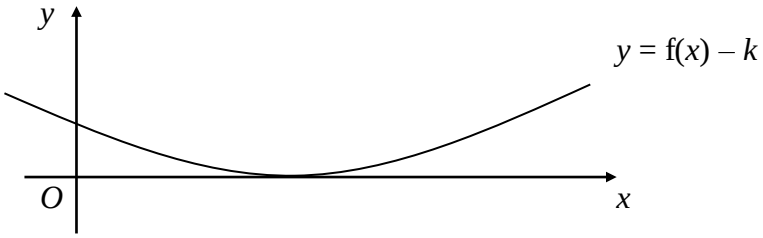
The equation of a curve is $y = f(x)$, where $f(x) = x^2 - 6x + 14$.
Here is a sketch of the graph of $y = f(x)$.



(b) Write down the coordinates of the minimum point, M, of the curve.

.....
(1)

Here is a sketch of the graph of $y = f(x) - k$, where k is a positive constant.
The graph touches the x-axis.



(c) Find the value of k.

$k =$ .....
(1)

(d) For the graph of $y = f(x - 1)$,

(i) write down the coordinates of the minimum point,

.....

(ii) find the coordinates of the point where the curve crosses the y-axis.

.....
(3)

blank

20. (a) Expand and simplify $(2x + 5)(3x – 2)$

.....

(3)

(b) Given that $x^2 + 6x – 5 = (x + p)^2 + q$ for all values of x,

find the value of

(i) p,

(ii) q.

p = ...

q = ...

(3)

Q20

(Total 6 marks)

25. (a) Expand and simplify $(2x + 4y)(4x - 5y)$

.....

(2)

(b) Simplify fully $\dfrac{(x+10)^5}{(x+10)^4}$

.....

(1)

(c) Simplify fully $\dfrac{x^2-25}{x^2+7x+10}$

.....

(3)

For all values of x, $x^2 + 6x - 2 = (x + p)^2 + q$

(d) Find the value of p and the value of q.

$p =$ ..... $q =$ .....

(2)

Q25

(Total 8 marks)

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

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

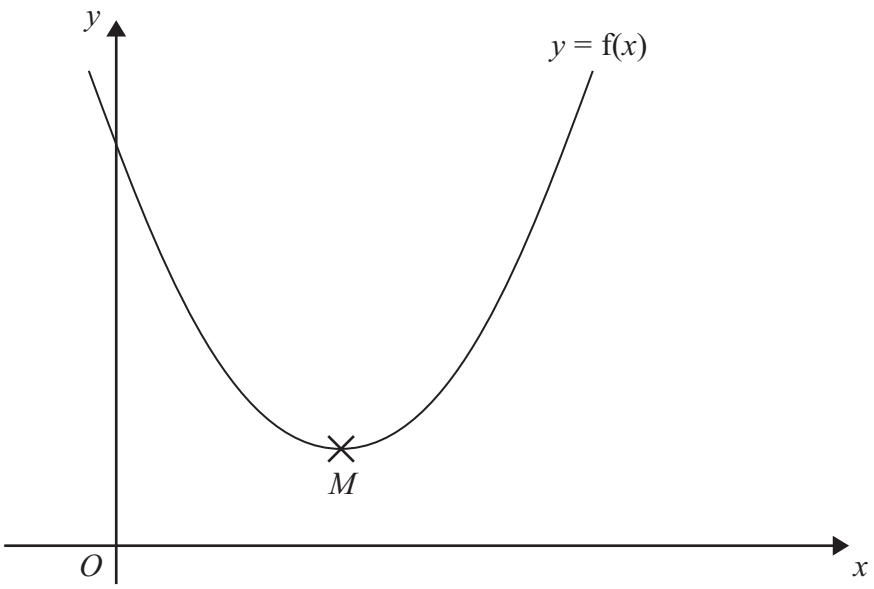
$a =$ .....

$b =$ .....

(3)

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.

(b) Write down the coordinates of M.

(..... , ...)

(1)

(Total for Question 25 is 4 marks)

20 The expression $x^2 - 8x + 6$ can be written in the form $(x - p)^2 + q$ for all values of x.

(a) Find the value of p and the value of q.

$p =$ .....

$q =$ .....

(3)

The graph of $y = x^2 - 8x + 6$ has a minimum point.

(b) Write down the coordinates of this point.

(..... , ...)

(1)

(Total for Question 20 is 4 marks)

Question 07

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

.....

(Total for Question 13 is 2 marks)

21 The equation of a curve is $y = 4x^2 - 56x$
The curve has one turning point.

By completing the square, show that the coordinates of the turning point are $(7, -196)$
You must show all your working.

(Total for Question 21 is 3 marks)

17 (a) (i) Write $x^2 - 8x + 3$ in the form $(x - a)^2 - b$ where a and b are integers.

.....

(2)

(ii) Hence, write down the coordinates of the turning point on the graph of $y = x^2 - 8x + 3$

(..... , ...)

(1)

(b) Solve $7x^2 + 8x - 5 = 0$
Give your solutions correct to 3 significant figures.

.....

(3)

Alex has to find the solutions of the quadratic equation $3k^2 + 10k - 8 = 0$
Here is his working and answer.

$(3k - 2)(k + 4) = 0$

$k = 2$ or $k = -4$

(c) What mistake has Alex made?

.....

.....

.....

(1)

(Total for Question 17 is 7 marks)