Name: SOLUTIONS

GCSE (1 - 9)

Completing the Square

Solutions by
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These questions are compiled from released Pearson Edexcel GCSE maths exam papers

They contain exam questions from up until the ***November 2023*** exam series

More recent exam papers do exist but are withheld for mock exams

As new exam papers are released these worksheets will gradually be updated

The **most current** version of these worksheets will always be available at: kennethstafford.co.uk

Past Papers:	Similar Worksheets:
Solutions:	This worksheet:

1

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

$(x+3)^2 - 7 - 3^2$

$(x+3)^2 - 7 - 9$

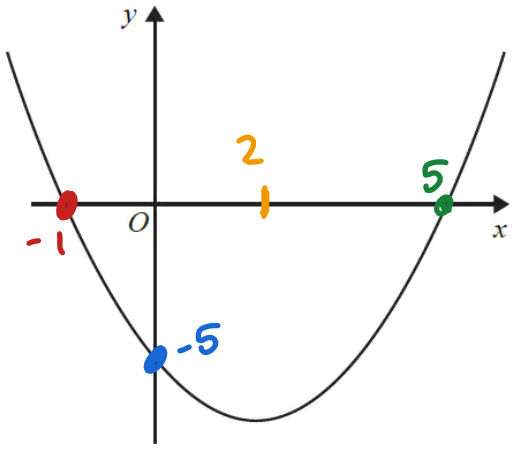
$(x+3)^2 - 16$

(Total for Question 13 is 2 marks)

[Edexcel, GCSE, Autumn 2017, Paper 3H, Q13]

2

Here is a sketch of a curve.



The equation of the curve is $y = x^2 + ax + b$ where a and b are integers.

The points $(0, -5)$ and $(5, 0)$ lie on the curve.

Find the coordinates of the turning point of the curve.

$y = x^2 + ax - 5$

$y = (x + 1)(x - 5)$

$x = -1$ $x = 5$

midpoint = 2

$y = x^2 - 4x - 5$

$y = (2)^2 - 4(2) - 5$

$y = 4 - 8 - 5$

$y = 4 - 13$

$y = -9$

(2 , -9)

(Total for Question 17 is 4 marks)

[Edexcel, GCSE, Autumn 2018, Paper 1H, Q17]

3

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.

$(x-3)^2 + 1 - 3^2$

$(x-3)^2 + 1 - 9$

$(x-3)^2 - 8$

$a =$ 3

$b =$ 8

(2)

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

(3 , -8)

(1)

(Total for Question 19 is 3 marks)

[Edexcel, GCSE, Summer 2019, Paper 1H, Q19]

4

Sketch the graph of

$$y = 2x^2 - 8x - 5$$

showing the coordinates of the turning point and the exact coordinates of any intercepts with the coordinate axes.

$2x^2 - 8x - 5 = 2(x^2 - 4x - \frac{5}{2})$

$= 2[(x-2)^2 - \frac{5}{2} - 4]$

$= 2[(x-2)^2 - 6.5]$

$= 2(x-2)^2 - 13$

turning point $(2, -13)$

$2(x-2)^2 - 13 = 0$

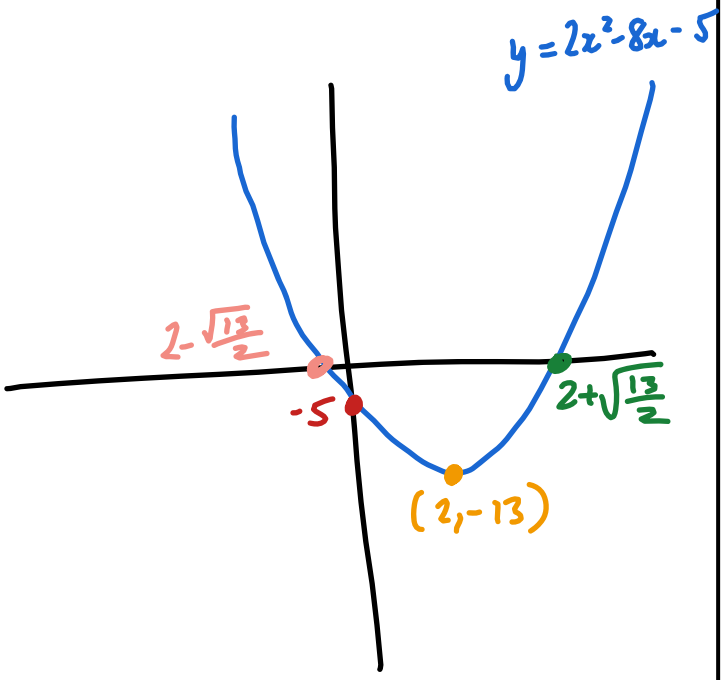
$2(x-2)^2 = 13$

$(x-2)^2 = \frac{13}{2}$

$x - 2 = \sqrt{\frac{13}{2}}$

$x = 2 \pm \sqrt{\frac{13}{2}}$

$x = 2 + \sqrt{\frac{13}{2}}$ $\quad x = 2 - \sqrt{\frac{13}{2}}$



(Total for Question 21 is 5 marks)

[Edexcel, GCSE, Autumn 2019, Paper 1H, Q21]

5

Write down the coordinates of the turning point on the graph of $y = (x + 12)^2 - 7$

(-12 , -7)

(Total for Question 17 is 1 mark)

[Edexcel, GCSE, Autumn 2020, Paper 2H, Q17]

6

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.

$y = 4(x^2 - 14)$

$y = 4[(x-7)^2 - 49]$

$y = 4(x-7)^2 - 196$

turning point = $(7, -196)$

(Total for Question 21 is 3 marks)

[Edexcel, GCSE, November 2022, Paper 3H, Q21]

7

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

$(x-4)^2 - 16 + 3$

$(x-4)^2 - 13$

(2)

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

(4 , −13)

(1)

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

$a = 7 \quad b = 8 \quad c = -5$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \qquad x = \frac{-8 \pm \sqrt{8^2 - 4 \times 7 \times -5}}{2 \times 7}$

0.449 or −1.59

(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?

$(3k-2) = 0$

$3k = 2$

$k = 2/3$

(1)

(Total for Question 17 is 7 marks)

[Edexcel, GCSE, November 2023, Paper 3H, Q17]