

Turning Points by Completing the Square

For AQA GCSE Mathematics (8300) • Higher tier

Name _____

Total marks: **24**

Answer **all** questions in the spaces provided. Show your working: marks are given for correct method.

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

[2 marks]

Answer _____

(b) Hence write down the coordinates of the turning point of $y = x^2 - 6x + 11$

[1 mark]

Answer (_____ , _____)

(c) Is the turning point a maximum or a minimum? Tick a box.

[1 mark]

☐ Maximum ☐ Minimum

2 Circle the coordinates of the turning point of $y = (x + 2)^2 - 5$

[1 mark]

(2, -5)

(-2, -5)

(-2, 5)

(2, 5)

- 3** By completing the square, find the coordinates of the turning point of $y = -x^2 + 2x + 3$
State whether it is a maximum or a minimum.

[3 marks]

Answer _____

- 4** Find the coordinates of the turning point of $y = 3x^2 - 12x + 5$

[3 marks]

Answer (_____ , _____)

- 5** The turning point of $y = x^2 + bx + c$ is at $(4, -3)$
Work out the values of b and c .

[3 marks]

Answer $b =$ _____ $c =$ _____

- 6** Tom says,
“The turning point of the graph of $y = x^2 + 14x + 40$ is at $(7, -9)$.”
Tom is wrong.
Complete the square to find the correct turning point, and explain Tom’s mistake.
[3 marks]

- 7** (a) The turning point of $y = x^2 - 8x + c$ lies on the x -axis.
Work out the value of c .
[2 marks]

Answer $c =$ _____

- (b) The turning point of $y = x^2 + 2x + d$ lies on the line $y = 2x$
Work out the value of d .
[2 marks]

Answer $d =$ _____

- 8** The graph of $y = (x - p)^2 + q$ passes through the points $(-5, 21)$ and $(3, 21)$.
Work out the coordinates of the turning point of the graph.
[3 marks]

Answer (_____ , _____)