1 A curve has the equation $y = x^2 - 6x + 17$

The turning point of the curve is at $(a, 8)$

1 (a) By completing the square, or otherwise, work out the value of a.

[2 marks]

$y = (x-3)^2 - 9 + 17$

$= (x-3)^2 + 8$

(1)

Answer 3 (1)

1 (b) The turning point of the curve $y = x^2 + 4x + b$ also has y-coordinate 8

Work out the value of b.

[2 marks]

$y = (x+2)^2 - 4 + b$ (1)

$-4 + b = 8$

$b = 12$ (1)

Answer 12

2 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]

(1)

$y = (x+7)^2 - 49 + 52$

$y = (x+7)^2 + 3$ (1)

Answer (-7 , 3 (1))

3 The equation of a curve is $y = x^2 - 18x + 70$

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

You **must** show your working.

[3 marks]

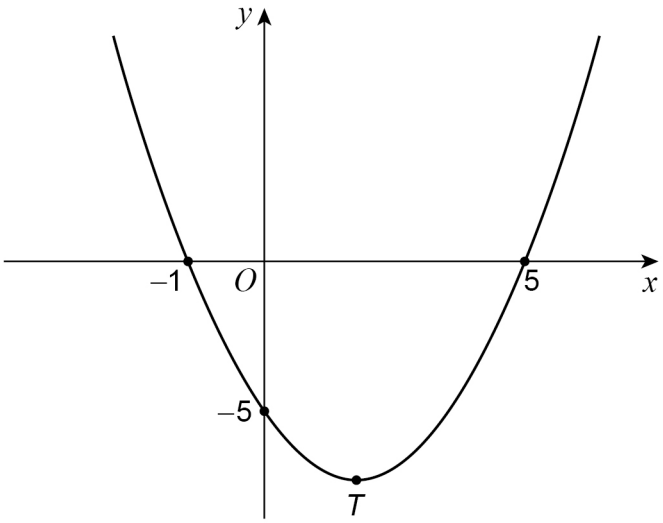
$y = (x-9)^2 - 9^2 + 70$ (1)

$= (x-9)^2 - 81 + 70$

$= (x-9)^2 - 11$ (1)

Answer (9 , -11) (1)

4 Here is a sketch of the curve $y = x^2 - 4x - 5$



4 (a) Work out the coordinates of *T*, the turning point of the curve.

[2 marks]

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

$y = (x-2) - 9$

(2)

Answer (2 , −9)

5 Express $x^2 - 6x - 15$ in the form $(x - a)^2 - b$ where a and b are integers.

[2 marks]

$(x-3)^2 - 9 - 15$

$= (x-3)^2 - 24$

Answer $(x-3)^2 - 24$ (2)

6 Write $2x^2 - 12x + 7$ in the form $d(x + e)^2 + f$ where d, e and f are integers.

[3 marks]

$2x^2 - 12x + 7$

$= 2(x^2 - 6x) + 7$ ✓ (1)

$= 2[(x-3)^2 - 3^2] + 7$ ✓ (1)

$= 2[(x-3)^2 - 9] + 7$

$= 2(x-3)^2 - 18 + 7$

$= 2(x-3)^2 - 11$ ✓ (1)

Answer $2(x-3)^2 - 11$