A188 Completing the square

Q1.

By completing the square, find the coordinates of the turning point of the curve with equation
$y = x^2 + 10x + 18$
You must show all your working.

(..... , ...)

(Total for question = 3 marks)

Q2.

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.

a = ...

b = ...

(2)

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

(..... , ...)

(1)

(Total for question = 3 marks)

Q3.

(a) Write $2x^2 + 16x + 35$ in the form $a(x + b)^2 + c$ where a, b, and c are integers.

.....

(3)

(b) Hence, or otherwise, write down the coordinates of the turning point of the graph of $y = 2x^2 + 16x + 35$

.....

(1)

(Total for question = 4 marks)

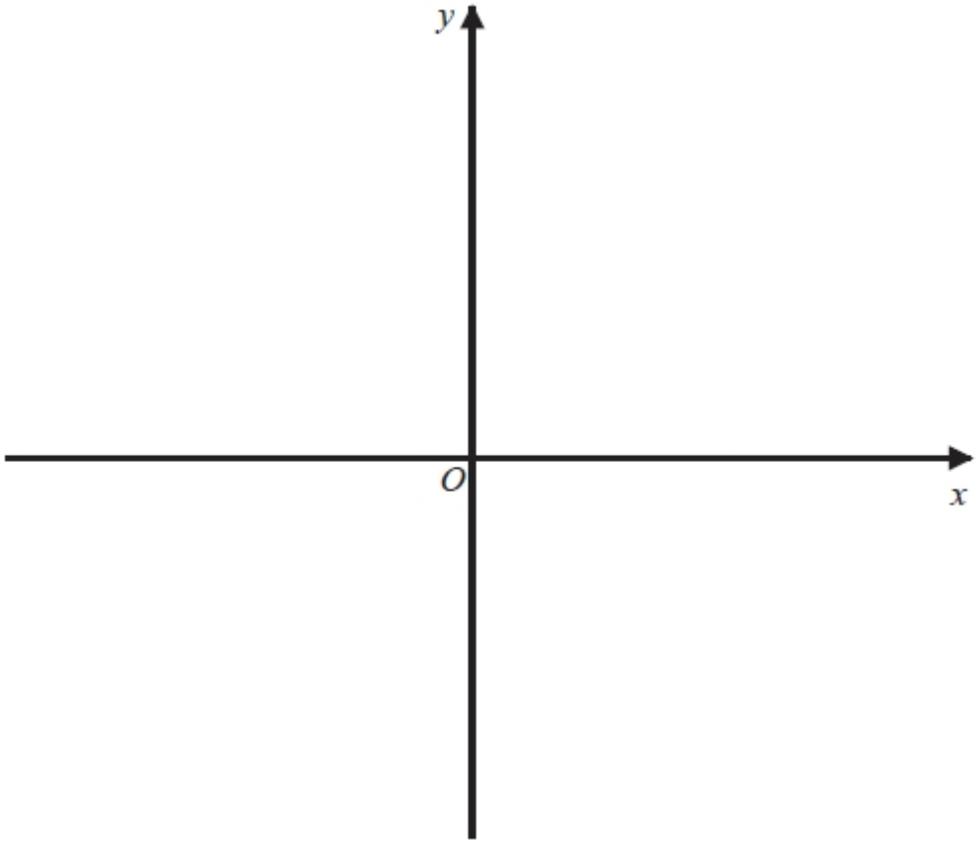
Q4.

The curve **C** has equation $y = 4(x - 1)^2 - a$ where $a > 4$

Using the axes below, sketch the curve **C**.
On your sketch show clearly, in terms of a,

(i) the coordinates of any points of intersection of **C** with the coordinate axes,

(ii) the coordinates of the turning point.



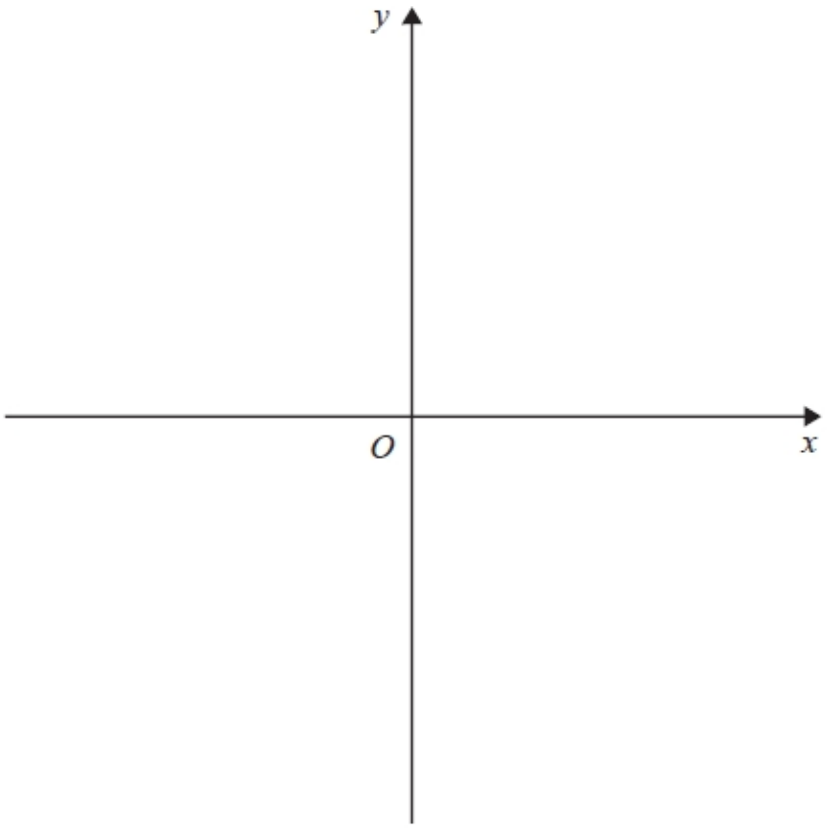
(Total for question = 4 marks)

Q5.

The curve C has equation $y = x^2 - 6x + 4$

Using the axes below, sketch the curve C.
On your sketch show clearly

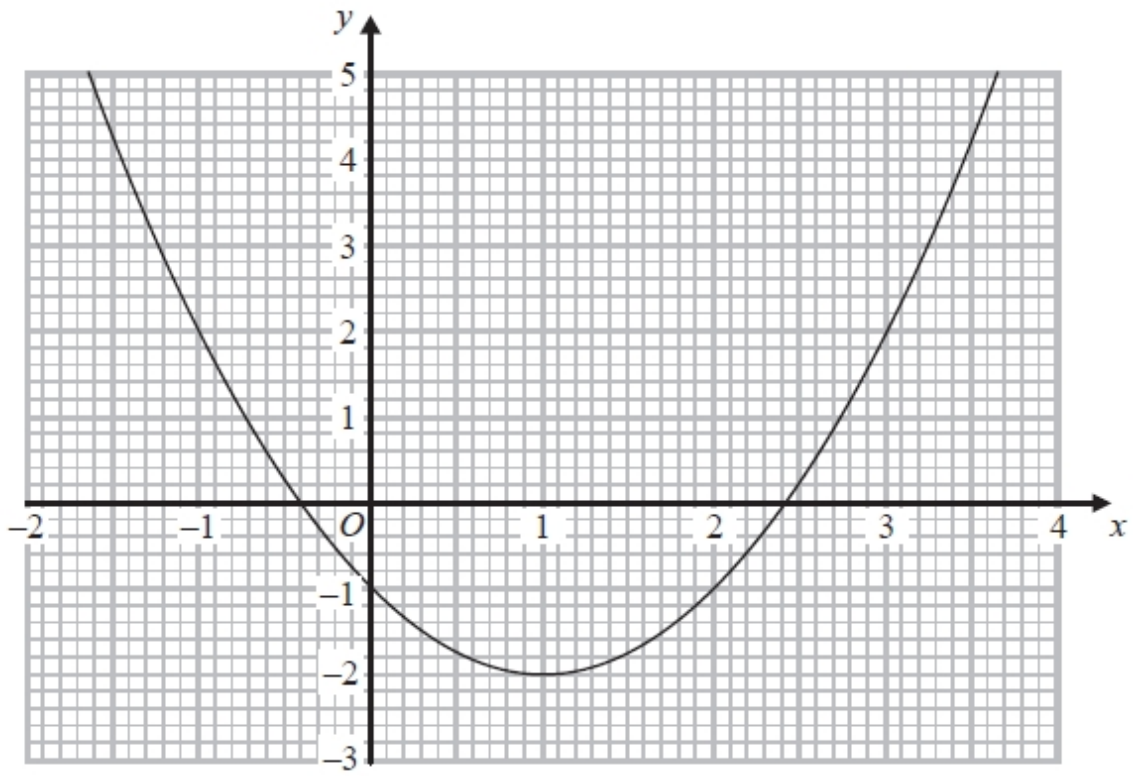
(i) the exact coordinates of any points of intersection of C with the coordinate axes,
(ii) the coordinates of the turning point.



(Total for question = 6 marks)

Q6.

Here is the graph of $y = x^2 - 2x - 1$



(a) Use the graph to solve the equation $x^2 - 2x - 1 = 2$

.....

(2)

The equation $x^2 + 5x - 7 = 0$ can be solved by finding the points of intersection of the line $y = ax + b$ with the graph of $y = x^2 - 2x - 1$

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

a = ...

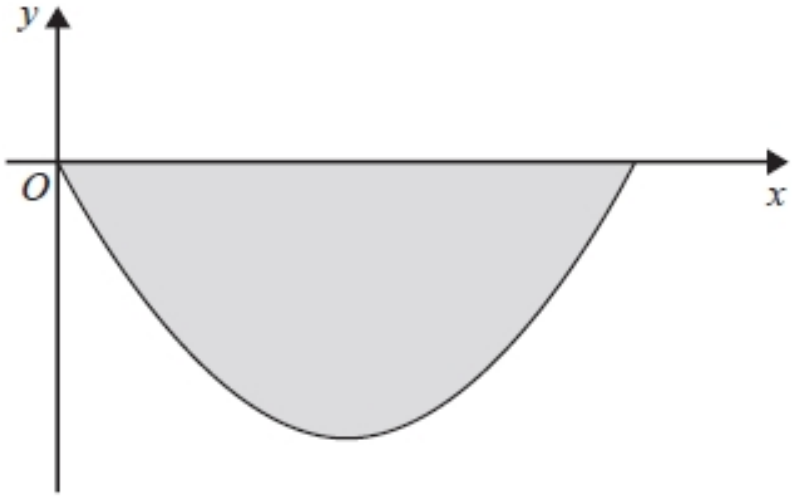
b = ...

(2)

(Total for question = 4 marks)

Q7.

Here is a sketch of a vertical cross section through the centre of a bowl.



The cross section is the shaded region between the curve and the *x*-axis.

The curve has equation $y = \frac{x^2}{10} - 3x$ where *x* and *y* are both measured in centimetres.

Find the depth of the bowl.

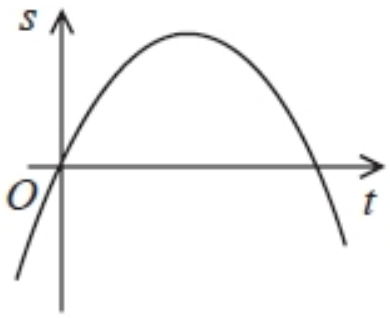
..... cm

(Total for question = 4 marks)

Q8.

A particle *P* is moving in a straight line.
O is a fixed point on the straight line.
The distance, *s* metres, of *P* from *O* at time *t* seconds is given by

$$s = 80t - 5t^2$$



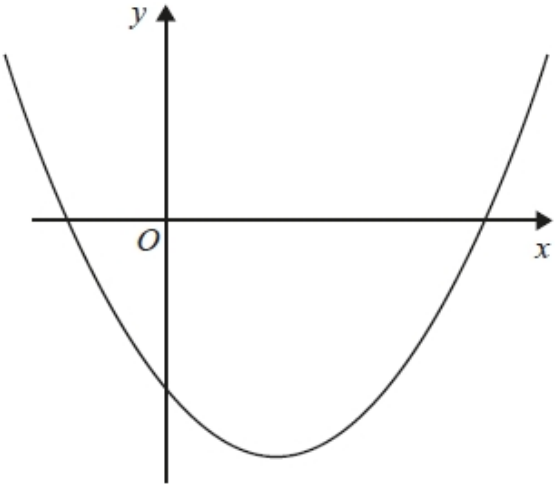
Use algebra to find the greatest distance of *P* from *O* when $0 \leq t \leq 16$

..... metres

(Total for question = 4 marks)

Q9.

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.

(..... , ...)

(Total for question = 4 marks)