6.

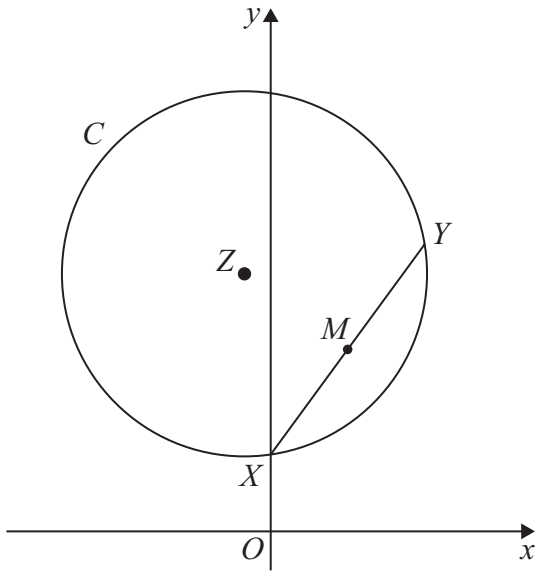

Diagram **NOT** drawn to scale

Figure 2

Figure 2 shows a circle C with centre Z

Points X and Y lie on C and have coordinates (0, 3) and (6, 11) respectively.

Given that M is the midpoint of XY

(a) Find an equation for the straight line which passes through Z and M, giving your answer in the form $ax + by + d = 0$ where a, b and d are integers.

(4)

Given that the y coordinate of Z is 10

(b) Find the x coordinate of Z

(2)

(c) Hence find an equation of C

(3)

The point W lies on C such that angle $WXY = 90°$

(d) Find the coordinates of W

(2)

(Total for Question 6 is 11 marks)

7.

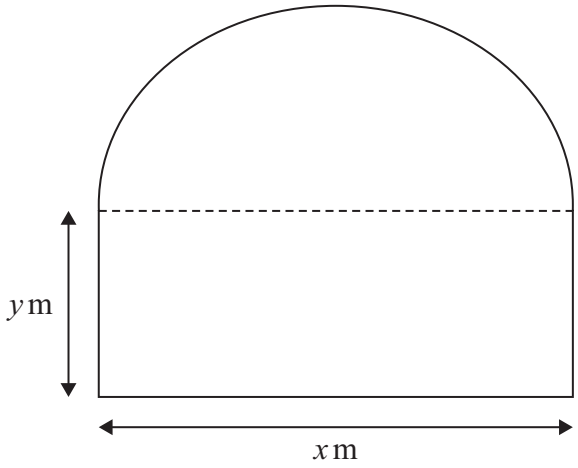

Diagram **NOT** drawn to scale

Figure 3

In this question you must show all stages of your working.
Solutions relying entirely on calculator technology are not acceptable.

Figure 3 shows the plan view of a garden. The shape of this garden consists of a rectangle joined to a semicircle.

The rectangle has length x metres and width y metres.

The area of the garden is $100\,\text{m}^2$.

(a) Show that the perimeter, P metres, of the garden is given by

$$P = \frac{1}{4}x(4 + \pi) + \frac{200}{x}$$

(4)

(b) Use calculus to find the exact value of x for which the perimeter of the garden is a minimum.

(3)

(c) Justify, by further use of calculus, that the value of x found in part (b) gives a minimum value for P.

(2)

(d) Find the minimum perimeter of the garden, giving your answer in metres to one decimal place.

(2)

(Total for Question 7 is 11 marks)