5.

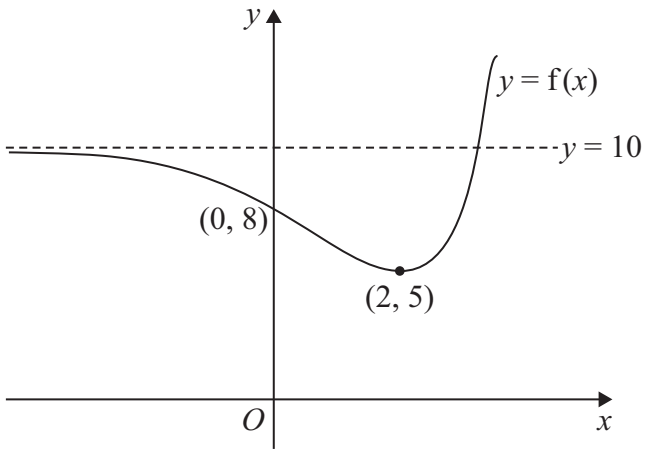

Figure 2

Figure 2 shows a sketch of part of the curve with equation $y = f(x)$.

The curve crosses the y-axis at the point (0, 8).

The line with equation $y = 10$ is the only asymptote to the curve.

The curve has a single turning point, a minimum point at (2, 5), as shown in Figure 2.

(a) State the coordinates of the minimum point of the curve with equation $y = f\left(\frac{1}{4}x\right)$

(1)

(b) State the equation of the asymptote to the curve with equation $y = f(x) - 3$

(1)

The curve with equation $y = f(x)$ meets the line with equation $y = k$, where k is a constant, at two distinct points.

(c) State the set of possible values for k.

(2)

(d) Sketch the curve with equation $y = -f(x)$. On your sketch, show clearly the coordinates of the turning point, the coordinates of the intersection with the y-axis and the equation of the asymptote.

(3)

(Total for Question 5 is 7 marks)

6.

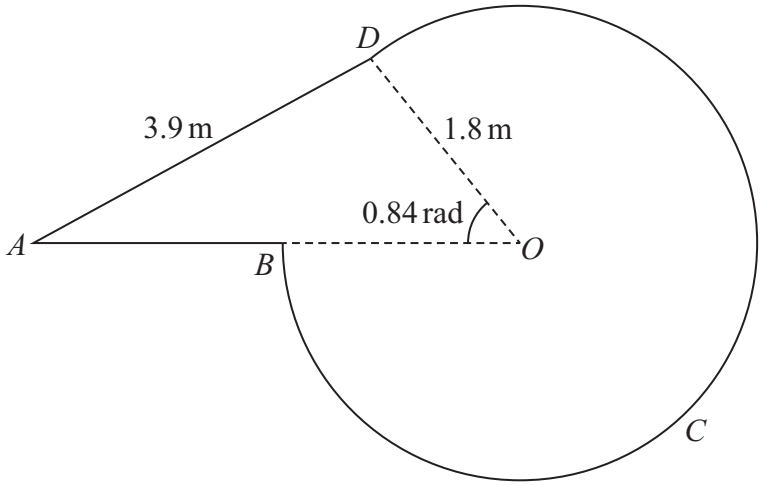

Diagram not drawn to scale

Figure 3

In this question you must show all stages of your working.

Figure 3 shows the design for a shop sign *ABCDA*.

The sign consists of a triangle *AOD* joined to a sector of a circle *DOBCD* with radius 1.8 m and centre *O*.

The points *A*, *B* and *O* lie on a straight line.

Given that *AD* = 3.9 m and angle *BOD* is 0.84 radians,

(a) calculate the size of angle *DAO*, giving the answer in radians to 3 decimal places.

(2)

(b) Find, in m, the length of *AO* giving the answer to 2 decimal places.

(3)

(c) Find, in m^2, the area of the shop sign, giving the answer to one decimal place.

(3)

(d) Find, in m, the perimeter of the shop sign, giving the answer to one decimal place.

(3)

(Total for Question 6 is 11 marks)