10

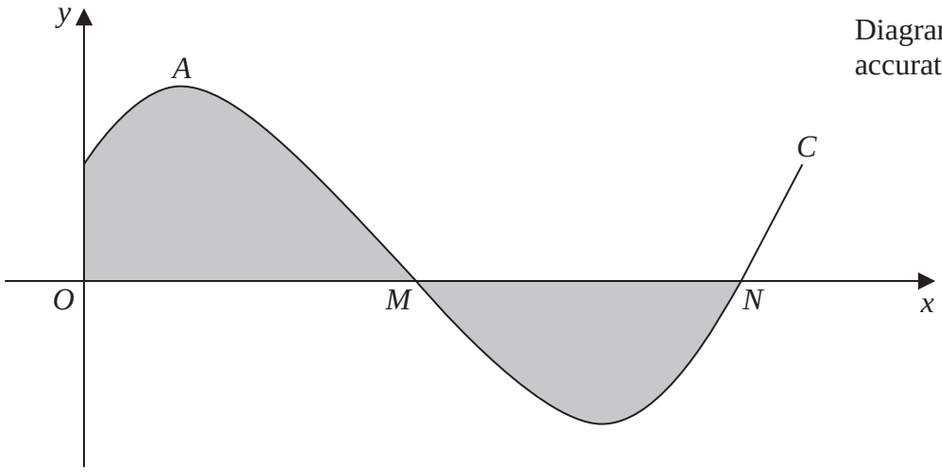

Diagram **NOT** accurately drawn

Figure 4

Figure 4 shows the curve C with equation $y = \frac{1}{2} + \sin 3x$ where $0 \leqslant x < \frac{2\pi}{3}$

The curve C crosses the x-axis at the points M and N

(a) Show that the coordinates of M are $\left(\frac{7\pi}{18}, 0\right)$ and find the coordinates of N

(3)

The curve C has a maximum at the point A

(b) Find the coordinates of A

(4)

(c) Find an equation of the tangent to C at M

Give your answer in the form $ay + b\sqrt{3}x - c\sqrt{3}\pi = 0$ where a, b and c are integers to be found.

(4)

The finite region, shown shaded in Figure 4, is bounded by the curve C, the y-axis and the part of the x-axis from O to N

(d) Use algebraic integration to find, to 3 significant figures, the total area of the shaded region.

(4)

Question 10 continued

Question 10 continued

Question 10 continued

(Total for Question 10 is 15 marks)

11 $f'(x) = ax^2 - 14x - 10$ where $a \in \mathbb{Z}$

Given that $(x - 4)$ is a factor of $f(x)$ and that when $f(x)$ is divided by $(x + 1)$ the remainder is 25

(a) show that $a = 6$

(6)

(b) Hence use algebra to solve the equation $f(x) = 0$

(6)

Question 11 continued

Question 11 continued

(Total for Question 11 is 12 marks)

TOTAL FOR PAPER IS 100 MARKS