10 (a) Solve the equation

$$\sin\left(x + \frac{\pi}{3}\right) = \frac{\sqrt{3}}{2} \qquad \text{for } 0 \leqslant x \leqslant 2\pi$$

Give your solutions in terms of π, where appropriate.

(3)

(b) Solve the equation

$$3\sin\theta + 5\cos\theta = 0 \qquad \text{for } -360° \leqslant \theta \leqslant 360°$$

Give your solutions to the nearest degree.

(3)

(c) Solve the equation

$$1 + \sin 2y = 2\cos^2 2y \qquad \text{for } -180° \leqslant y \leqslant 0°$$

(5)

Question 10 continued

Question 10 continued

Question 10 continued

(Total for Question 10 is 11 marks)

11

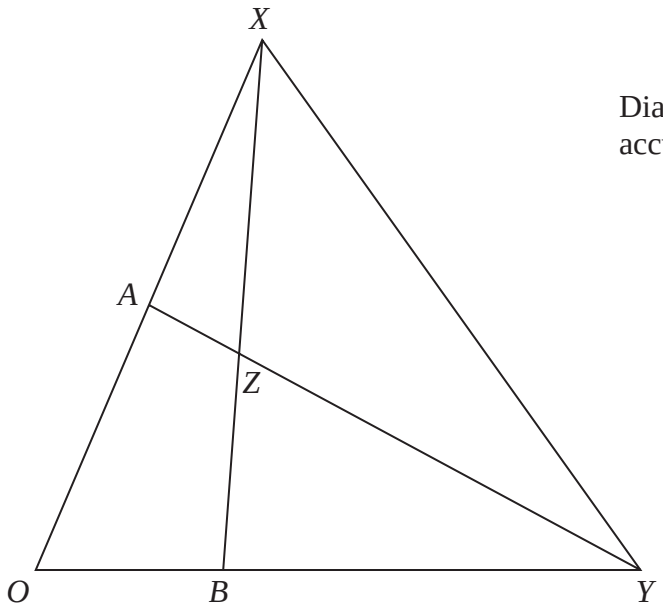

Diagram **NOT** accurately drawn

Figure 1

Figure 1 shows a triangle OXY

$$\overrightarrow{OX} = 2\mathbf{a} \text{ and } \overrightarrow{OY} = 3\mathbf{b}$$

A is the midpoint of OX and B is the point on OY such that $OB : BY = 1 : 2$
The lines XB and AY intersect at Z.

(a) Find $\overrightarrow{AB}$ as a simplified expression in terms of **a** and **b**

(1)

(b) Using a vector method, find $\overrightarrow{OZ}$ as a simplified expression in terms of **a** and **b**

(9)

The point M on XY is such that O, Z and M are collinear.

(c) Find $\overrightarrow{OM}$ as a simplified expression in terms of **a** and **b**

(3)

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Question 11 continued

Question 11 continued

Question 11 continued

(Total for Question 11 is 13 marks)

12

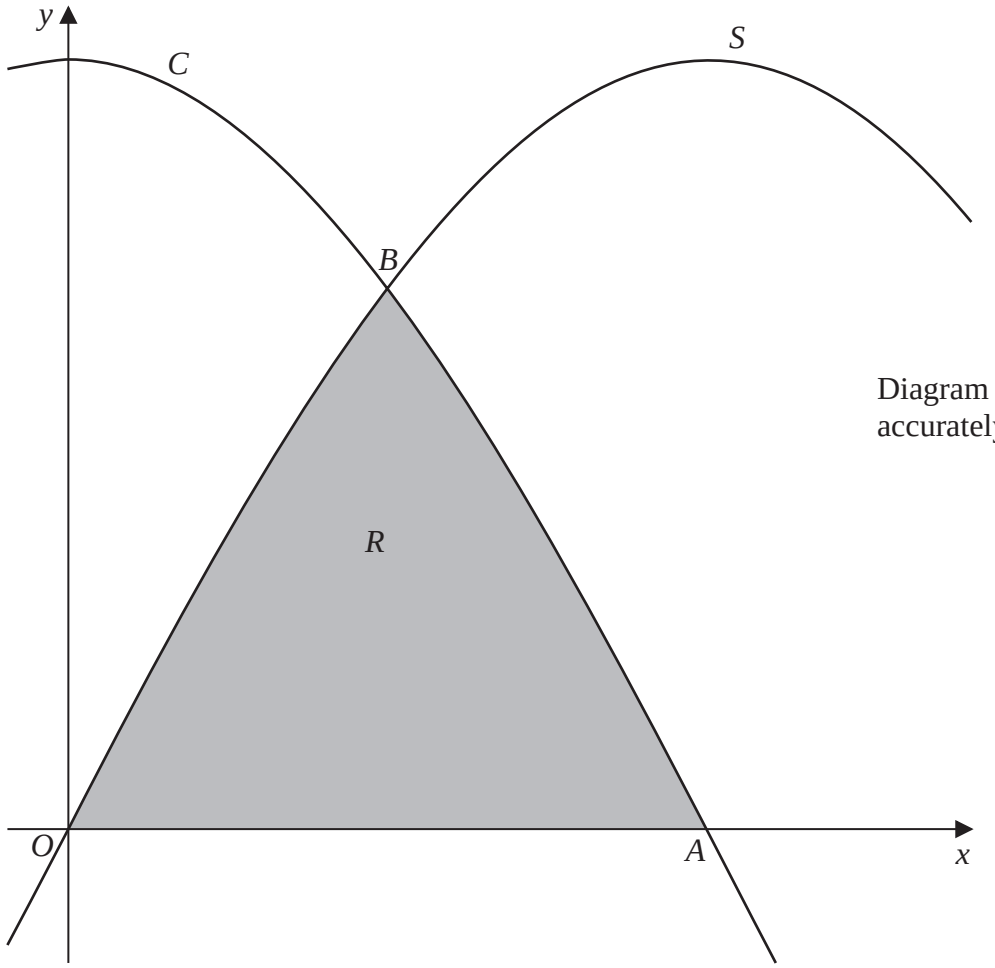

Diagram **NOT** accurately drawn

Figure 2

The region R, shown shaded in Figure 2, is bounded by the x-axis, the curve S with equation $y = 2\sin x$ and the curve C with equation $y = 2\cos x$.
As shown in Figure 2, C crosses the x-axis at the point A.

(a) Write down the x coordinate of A.

(1)

As shown in Figure 2, C and S intersect at the point B.

(b) Find the x coordinate of B.

(2)

(c) Using calculus, find the area of the shaded region R.
Give your answer in the form $a - \sqrt{b}$ where a and b are integers.

(4)

Question 12 continued

Question 12 continued

(Total for Question 12 is 7 marks)

TOTAL FOR PAPER IS 100 MARKS