10

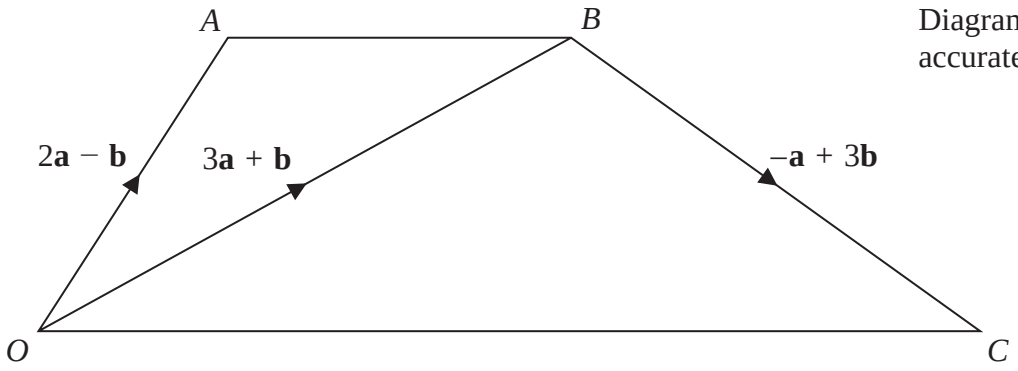

Diagram **NOT** accurately drawn

Figure 1

Figure 1 shows quadrilateral $OABC$ with

$$\overrightarrow{OA} = 2\mathbf{a} - \mathbf{b} \qquad \overrightarrow{OB} = 3\mathbf{a} + \mathbf{b} \qquad \overrightarrow{BC} = -\mathbf{a} + 3\mathbf{b}$$

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

(2)

(b) Prove that $\overrightarrow{OC}$ is parallel to $\overrightarrow{AB}$

(2)

The diagonals, OB and AC, intersect at the point X.

(c) Using a vector method find the ratio $AX : XC$

(7)

Question 10 continued

Question 10 continued

Question 10 continued

(Total for Question 10 is 11 marks)

11

Diagram **NOT** accurately drawn

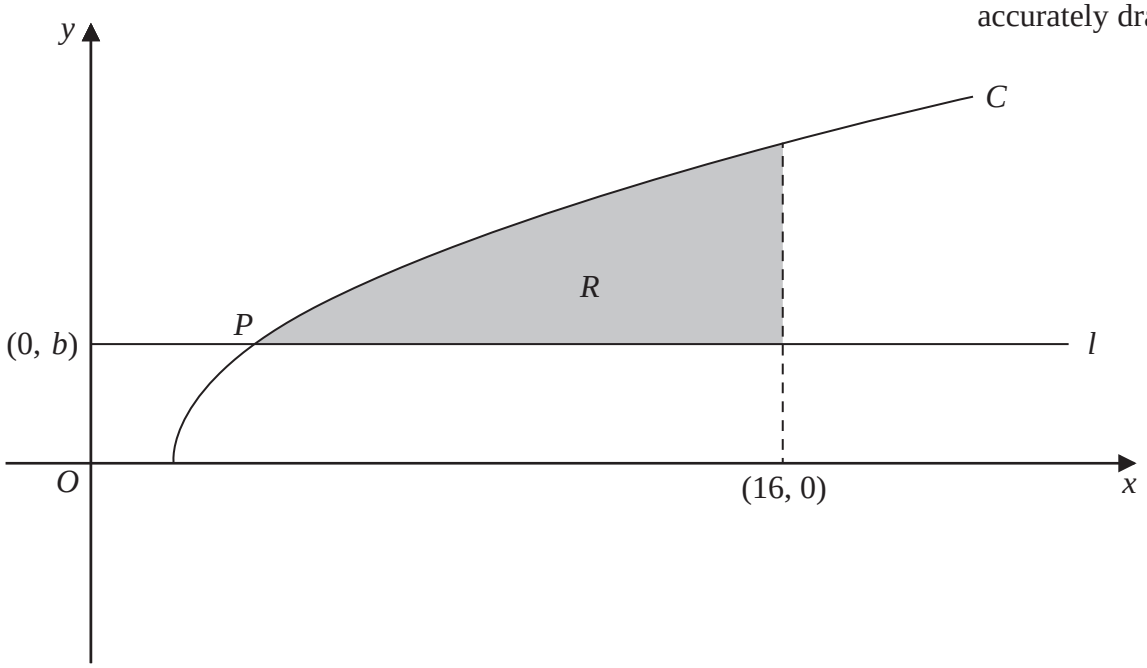

Figure 2

Figure 2 shows part of the curve C with equation $y = \sqrt{x - 2}$
Figure 2 also shows the straight line l with equation $y = b$ for $x > 0$ where $b > 0$

Given that C and l intersect at the point P with coordinates (a, b), where $2 < a < 16$

(a) show that $b^2 = a - 2$

(2)

The finite region R bounded by C, the straight line with equation $x = 16$ and l, shown shaded in Figure 2, is rotated through 360° about the x-axis to form a solid S.

Given that the volume of the solid formed is 50π

(b) use algebraic integration to find the value of a and the value of b.

(9)

Question 11 continued

Question 11 continued

Question 11 continued

Question 11 continued

(Total for Question 11 is 11 marks)

TOTAL FOR PAPER IS 100 MARKS