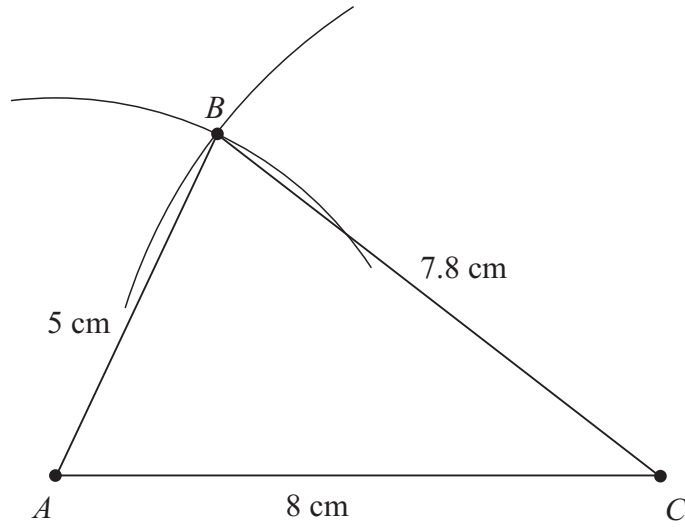


SAMPLE PAPER 5: PAPER 2

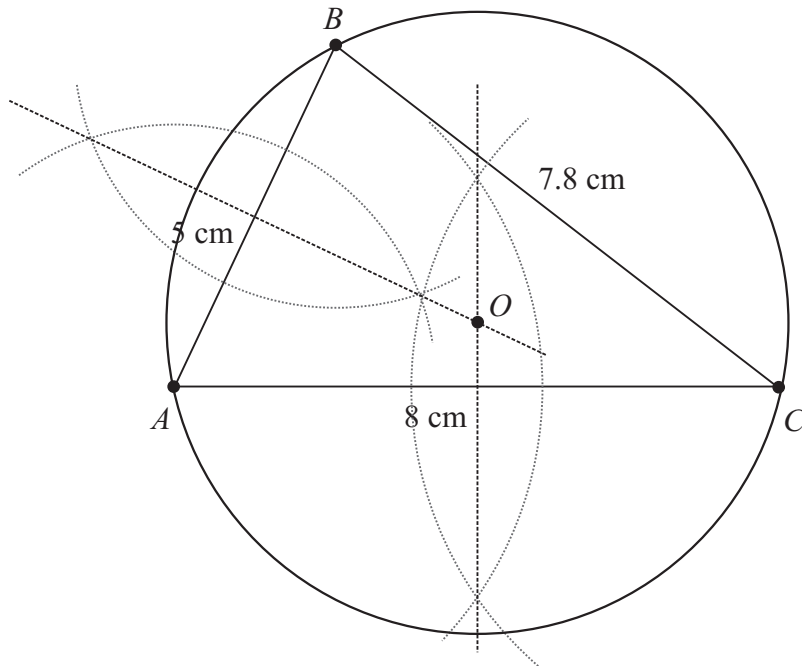
QUESTION 8 (35 MARKS)

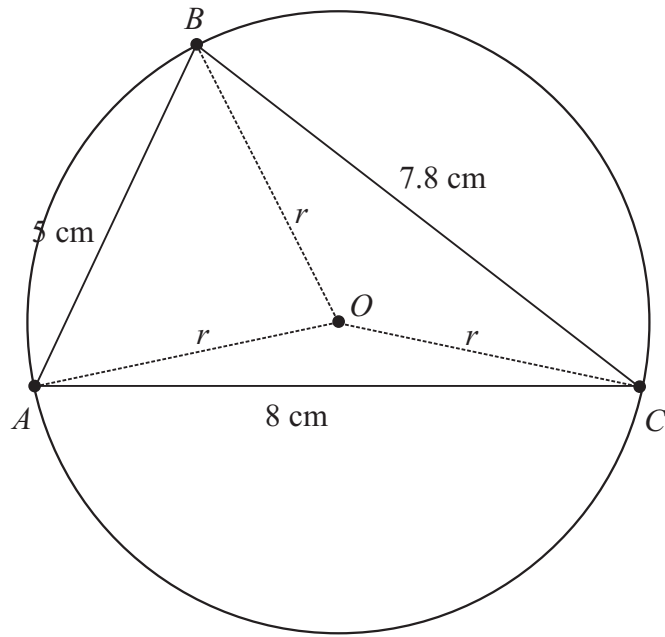
Question 8 (a)



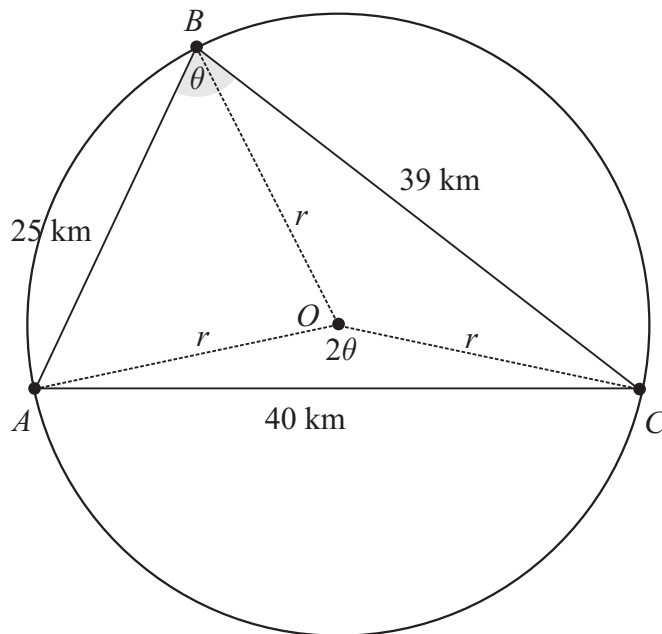
Tell students to draw the base of the triangle up near the centre of the rectangle in order to leave room below to draw the perpendicular bisectors.

Question 8 (b)





Question 8 (c)



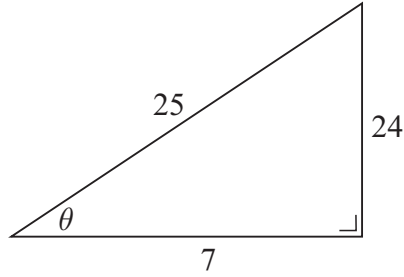
Let $|\angle ABC| = \theta$

$$40^2 = 25^2 + 39^2 - 2(25)(39)\cos\theta$$

$$1950\cos\theta = 546$$

$$\therefore \cos\theta = \frac{546}{1950} = \frac{7}{25}$$

Question 8 (d)



The angle AOC at the centre standing on the arc AC is twice the angle ABC at the circle.

Apply the Cosine rule to triangle AOC :

$$40^2 = r^2 + r^2 - 2(r)(r) \cos 2\theta$$

$$1600 = 2r^2 - 2r^2 \cos 2\theta$$

$$1600 = 2r^2(1 - \cos 2\theta)$$

$$1600 = 2r^2(1 - \cos^2 \theta + \sin^2 \theta)$$

$$800 = r^2(\sin^2 \theta + \sin^2 \theta)$$

$$800 = 2r^2 \sin^2 \theta$$

$$400 = r^2 \left(\frac{24}{25} \right)^2$$

$$\therefore r = \frac{20 \times 25}{24} = 20.83 \text{ km}$$

Alternative method:

Apply the Cosine rule to triangle AOC :

$$\cos^2 \theta = \frac{1}{2}(1 + \cos 2\theta)$$

$$\therefore \cos 2\theta = 2 \cos^2 \theta - 1$$

$$40^2 = r^2 + r^2 - 2(r)(r) \cos 2\theta$$

$$1600 = 2r^2 - 2r^2 \cos 2\theta$$

$$1600 = 2r^2(1 - \cos 2\theta)$$

$$1600 = 2r^2(1 - 2 \cos^2 \theta + 1)$$

$$1600 = 4r^2(1 - \cos^2 \theta)$$

$$400 = r^2 \times \left(1 - \frac{49}{625} \right) = r^2 \left(\frac{576}{625} \right)$$

$$\therefore r = \sqrt{\frac{400 \times 625}{576}} = 20.83 \text{ km}$$