

figure (1)

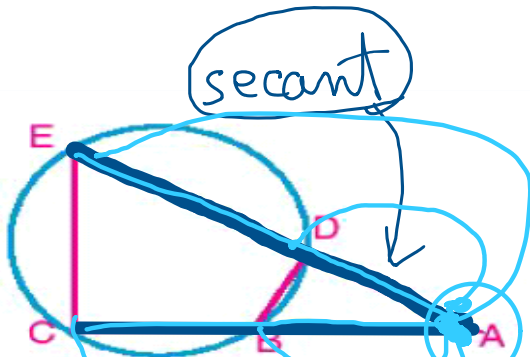


figure (2)

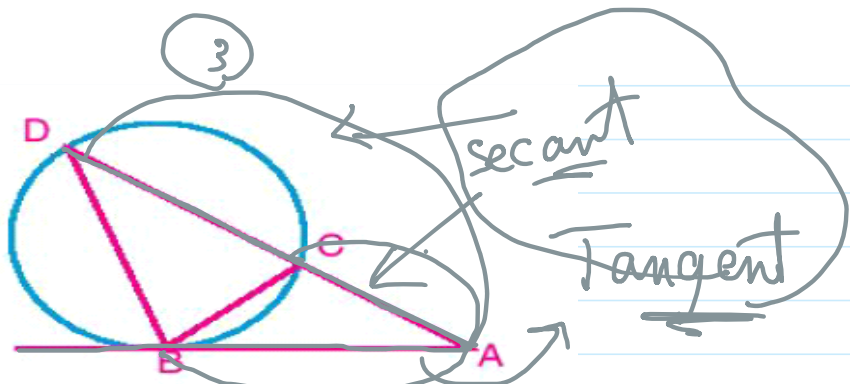


figure (3)

➤ In figure (1): Is there a relation between $EA \times EB$ and $EC \times ED$?

chords

➤ In figure (2): Is there a relation between $AE \times AD$ and $AC \times AB$?

secants

➤ In figure (3): Is there a relation between $AD \times AC$ and $(AB)^2$?

tangent + secant

$$EA \times EB = EC \times ED \Rightarrow$$

1 In the figure opposite: $\overline{AB} \cap \overline{CD} = \{E\}$, 2 chord

if $\frac{EA}{EB} = \frac{4}{3}$, $EC = 9\text{cm}$ and $ED = 4\text{cm}$

Find the length \overline{EB}

$$DE \times EC = BE \times EA$$

$$4 \times 9 = 4x \times 3x$$

$$\frac{36}{12} = \frac{12x^2}{12}$$

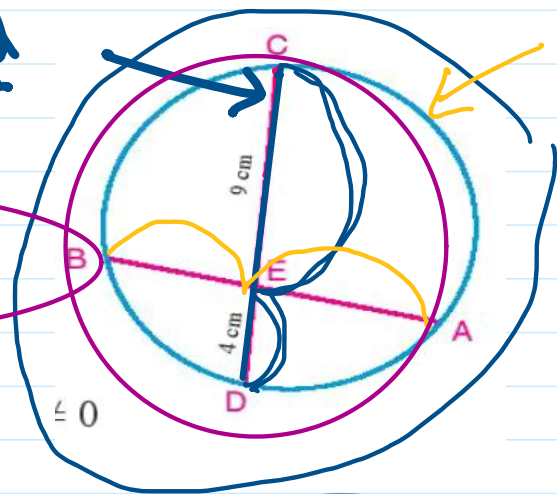
$$x^2 = 3$$

$$x = \sqrt{3}$$

$$EA = 4x$$

$$EB = 3x$$

$$BE = 3\sqrt{3} \text{ cm}$$



secant

2 In the figure opposite: $\overline{AB} \cap \overline{CD} = \{E\}$, $AB = 5\text{cm}$, $CD = 9\text{cm}$, $ED = 3\text{cm}$. Find the length of \overline{BE}

$$EB \times EA = ED \times EC$$

$$(x+9)(x-4) = 0$$

$$EB \times EA = 3 \times 12$$

$$x = -9$$

$$x = 4$$

$$x \times (5+x) = 36$$

refused

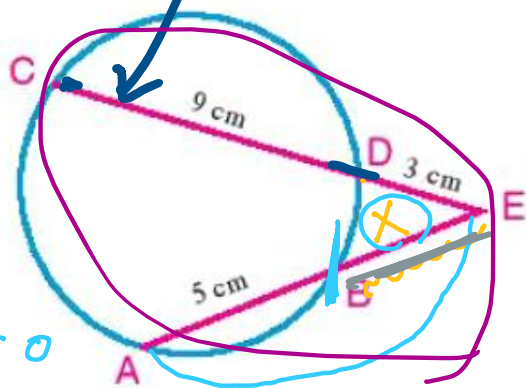
$$2 \times 18$$

$$3 \times 12$$

$$5x + x^2 - 36 = 0$$

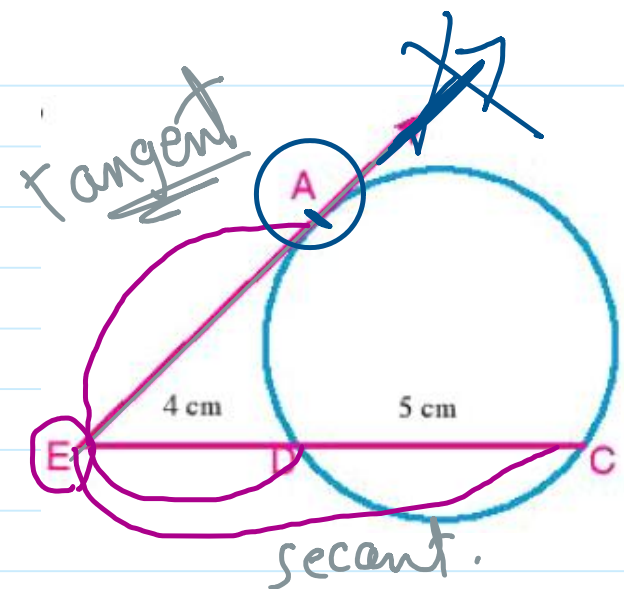
$$x^2 + 5x - 36 = 0$$

$$\therefore BE = 4 \text{ cm}$$



$$4 \times 9$$

③ In the figure opposite: \overrightarrow{EA} is a tangent to the circle, \overrightarrow{EA} intersects the circle at D and C respectively. where $ED = 4\text{cm}$, $CD = 5\text{cm}$, find the length of \overline{EA}



$$EA^2 = ED \cdot EC$$

$$= 4 \times 9 = 36$$

$$\sqrt{EA^2} = \sqrt{36}$$

$$EA = \pm 6$$

$$\therefore EA = 6\text{cm}$$

Converse of the well known problem

If the two lines containing the two segments \overline{AB} and \overline{CD} intersect at a point E (A, B, C, D, and E are distinct points) and $EA \times EB = EC \times ED$ then: the points A, B, C and D lie on a circle.

