Question 38

Ana Bhattacharjee

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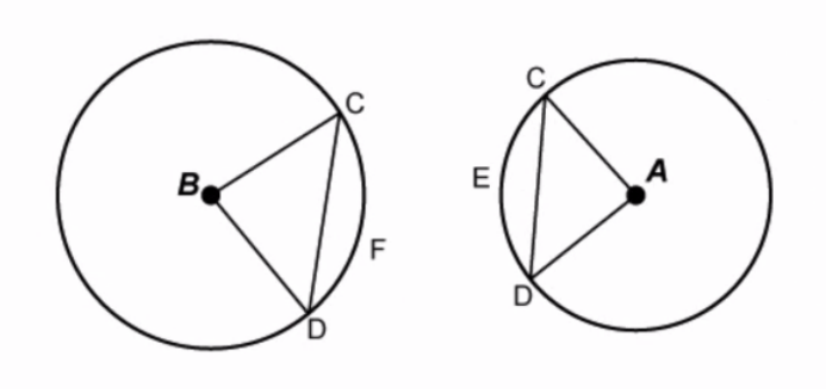


Of segments CFD and CED, which of the segments has a greater area based on the given information? Justify with your work. Circle A Information:

$r = 10m$, $m\angle CAD = 90°$

Circle B Information:

$r = 12m$, $m\angle CBD = 60°$

The first step is to find the area of $\triangledown CD$ for both $\circ B$ and $\circ A$.

$$A_{\circ B} = \pi(12)^2 = 144\pi \tag{1}$$

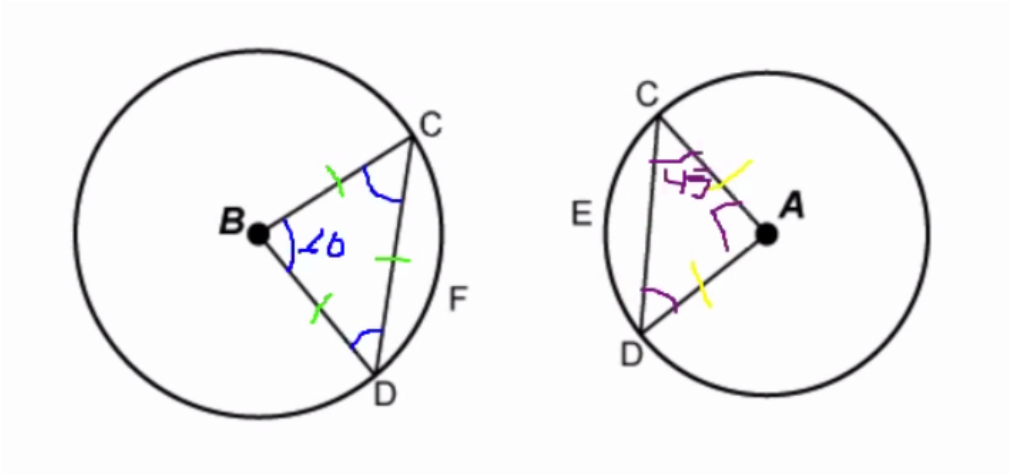
$$A_{\triangledown CD_{\circ B}} = \frac{60}{360}A_{\circ B} = \frac{1}{6}144\pi \tag{2}$$

$$A_{\circ A} = \pi(10)^2 = 100\pi \tag{3}$$

$$A_{\triangledown CD_{\circ A}} = \frac{90}{360}A_{\circ A} = \frac{1}{4}100\pi \tag{4}$$

The next step would be to find the area of $\triangledown CBD$ and $\triangledown CAD$.

The new image below shows the visual explanation of why $\triangledown CBD$ is an equilateral triangle and $\triangledown CAD$ is a 45-45-90 special right triangle.



$$\overleftrightarrow{CA} = 10 \tag{5}$$

$$\overleftrightarrow{AD} = 10 \tag{6}$$

$$\overleftrightarrow{CD} = 10\sqrt{2} \tag{7}$$

$$\overleftrightarrow{AE} = \sqrt{10^2 - (5\sqrt{2})^2} \tag{8}$$

$$\overleftrightarrow{AE} = 5\sqrt{2} = h \tag{9}$$

$$A_{\triangledown CBD} = \frac{1}{4}(12)^2\sqrt{3} \tag{10}$$

$$A_{\triangledown CBD} = 36\sqrt{3} \tag{11}$$

$$A_{\triangledown CAD} = \frac{1}{2}10\sqrt{2} * 5\sqrt{2} \tag{12}$$

$$A_{\triangledown CAD} = (5\sqrt{2})^2 = 50 \tag{13}$$

Finally, find the area of both segments $\overset{\frown}{CFD}$ and $\overset{\frown}{CED}$.

$$\overset{\frown}{CFD} = A_{\triangledown CD_{\circ B}} - A_{\triangledown CBD} \tag{14}$$

$$\overset{\frown}{CAD} = A_{\triangledown CD_{\circ A}} - A_{\triangledown CAD} \tag{15}$$

$$\overset{\frown}{CFD} = \frac{144\pi}{6} - 36\sqrt{3} \approx 13.04 \tag{16}$$

$$\overset{\frown}{CAD} = \frac{100\pi}{4} - 50 \approx 28.54 \tag{17}$$

$$\overset{\frown}{CAD} > \overset{\frown}{CFD} \tag{18}$$

Due to the above calculations, $\overbracket{CAD}$ is greater than $\overbracket{CFD}$.