

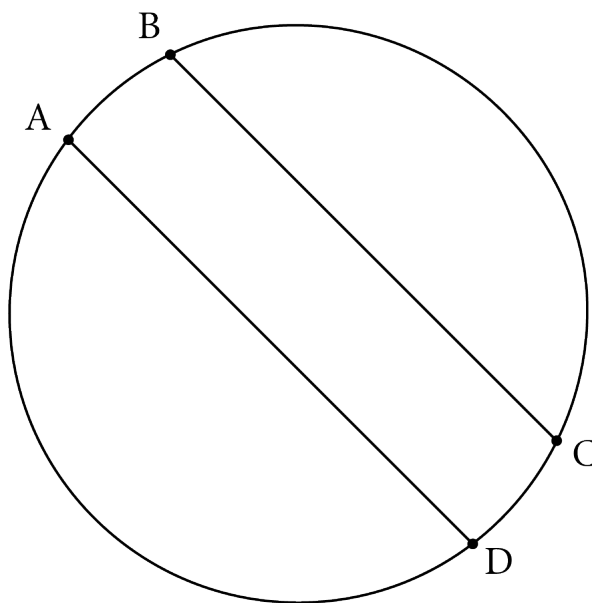


Grade 7/8 Math Circles

February 6/7/8/9, 2023

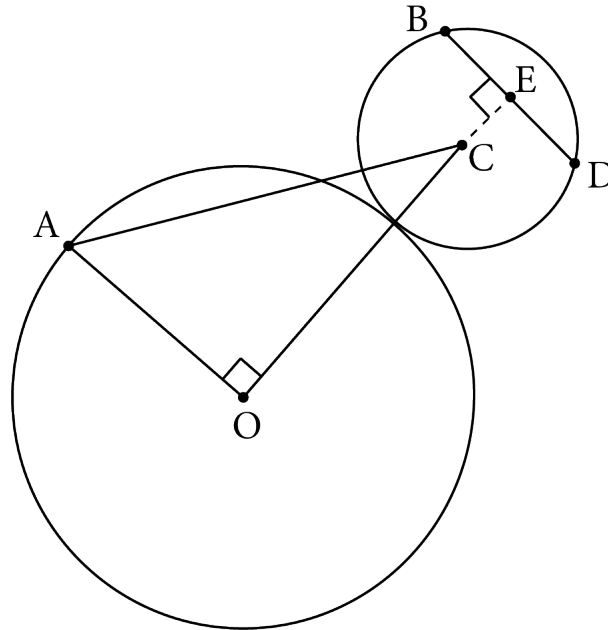
Circle Geometry - Problem Set

1. Explain in your own words what the relationship between the circumference and radius is.
2. Calculate the radius of a circle if the angle between two lines from the origin to the perimeter is 38.5° and the arc length created by those lines is 15. Answer in exact form.
3. Calculate the length of a chord given that the radius of its circle is 7 and the perpendicular distance from the origin to the chord is 6. Answer in exact form. Draw a diagram and label the chord, radius, and perpendicular distance from the origin.
4. Your classmate says that they drew a circle with a radius of 5 m and a chord with a length of 11 m. Is what your classmate saying possible? Why or why not?
5. What is the maximum that an arc length can be in terms of the radius r ? Explain your answer briefly.
6. Suppose that $\widehat{BC} = 15\pi$, $\widehat{AB} = 3\pi$, and $\overline{AD} \parallel \overline{BC}$. What is \widehat{AD} ?

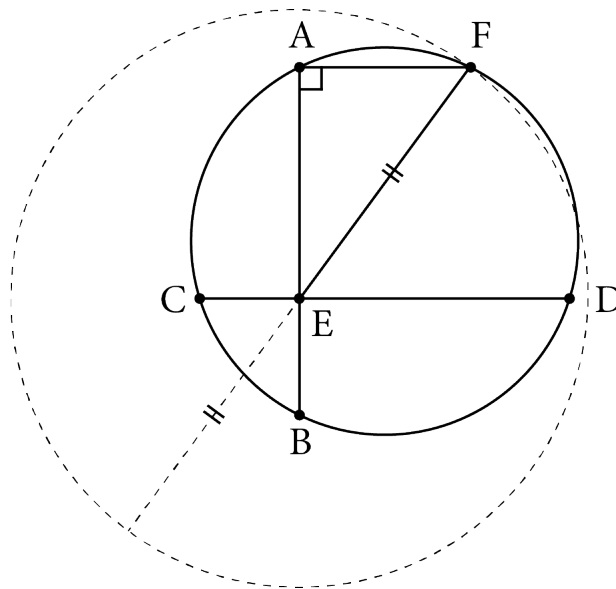




7. Suppose \overline{OC} joins the origins of the two circles. Given that $\overline{OC} = 8$, $\overline{AC} = 10$, and $\overline{CE} = 1$, find the chord length of \overline{BD} . Answer in exact form.



8. Suppose the large dotted circle has a radius of 6 and E is its centre. Suppose $\overline{CE} = 2$, $\overline{DE} = 5.75$, and $\overline{BE} = 2.5$. What is the length of \overline{AF} ?





Challenge Question

10. A mail man needs to deliver mail throughout Colossal Circle City. It just so happens that Second Ave. has no mail, so he only has to travel the route highlighted in red. Suppose that the following are true:

- First Ave. is $80\sqrt{5} \approx 178.89$ km long
- Second Ave. is $160\sqrt{2} \approx 226.27$ km long
- Diameter Ave. is 240 km long and is the diameter of Round Highway
- The distance travelled on Round St. between First and Second Ave. is 15π km long
- The distance travelled on Round St. between Second and Diameter Ave. is 13π km long
- The proportion of the circumference that the arc from start to point A is $\frac{2}{15}$
- All avenues are parallel to each other

What is the total distance travelled by the mail man (rounded to 2 decimal places)?

