

Math 6d: Homework 11

HW#11 is due December 16; submit to Google classroom 15 minutes before the class time.

Please, write clearly which problem you are solving and show all steps of your solution.

Summary from the classwork

Central angle and the defined arc: An angle that has its vertex at the center of a circle and which rays are radii of the circle is called a central angle. The arc enclosed by this angle has the same measure as the angle:

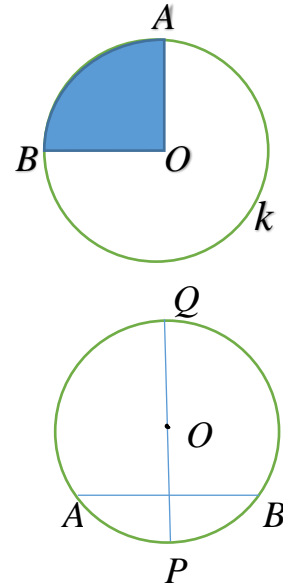
$$\angle AOB = 45^\circ, \text{ arc } \widehat{AB} = 45 \text{ arc}^\circ \text{ (arc degrees).}$$

Diameter perpendicular to a chord: If $k(O, r)$ is a circle in which the chord AB is perpendicular to the diameter PQ , then the diameter is also a bisector of AB , e.g. point $M = PQ \cap AB$ is a midpoint of AB , $AM = MB$.

The opposite is also true, if the diameter is a bisector of a chord AB , then the diameter is perpendicular to the chord, $PQ \perp AB$.

Proofs in geometry (guiding steps):

1. Draw the figures and all other elements (chords, diameters ...)
2. Label every figure and all that is mentioned in the problem.
3. Write what is known (given).
4. Write what you have to prove.
5. In your proofs, label steps with numbers and write why or how do you know this is a valid statement



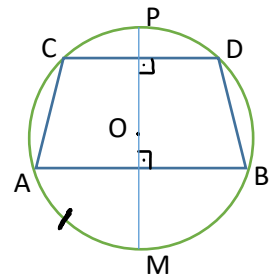
Homework questions

Require **proving the statements** (use theorems, properties of angles, triangle, congruency of triangles ... all you know)

1. Two concentric circles, where the circles have the same center and one has a larger radius, are crossed by a line at consecutive points A, B, C, and D. **Prove that** $AB = CD$. Please, do this problem again but this time with prove. You may consult the instructor's class notes from previous classes (Dec 2nd).

2. In the figure, AB and CD are parallel chords of a circle where the diameter PM is perpendicular to these chords. (Note that parts a), b), and c) are independent.)

- a) **Prove that** $AC = BD$. [Hint: draw a triangle connecting A, B and the middle of chord CD . What type of a triangle is this? Can you prove that its neighboring triangles are congruent?]
- b) If the radius $r = 5$ cm and the chord $AB = 8$ cm, find the area of $\triangle AOB$.
- c) If $\angle OAB = 15^\circ$, how big is the arc \widehat{AM} (with one checkmark drawn on top) and arc \widehat{ACP} .



3. In another circle, the chords AB and CD are intersecting and are perpendicular to each other. AB splits CD into segments with sizes 3 cm and 7 cm. Find the distance from the center of the circle to the chord AB (the distance is a line perpendicular to AB). Draw the circle, all chords, and label everything before you start.