

## Math 6e: Homework 11

HW#11 is due December 10; submit to Google Classroom 15 minutes before class.

*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 with its vertex at the center of a circle and its rays as radii of the circle is called a central angle. The arc enclosed by this angle has the same measure as the angle:

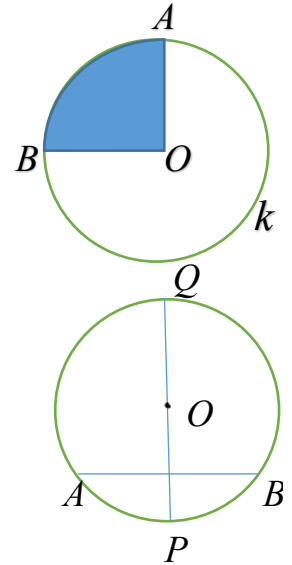
$$\angle AOB = 45^\circ, \text{ arc } \widehat{AB} = 45^\circ \text{ (arc degrees).}$$

**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 you know this is a valid statement



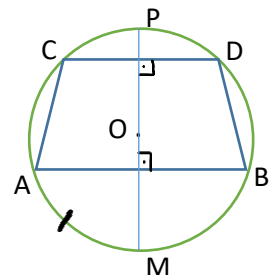
## Homework questions

Require **proving the statements** (use theorems, properties of angles, triangles, 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 (it was on a homework assignment, and I went over it in class), but this time with proof. You may consult the instructor's class notes from previous classes.

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 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  $CD$  intersect 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.