

CUT & GLUE SORT

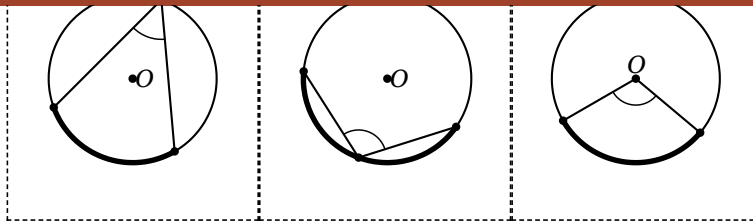


INSCRIBED ANGLES

Inscribed and Central Angles: Half, Equal, or Neither?

Twelve pieces · which arc is inside the angle? · three rows

FREE



Row 1. Half: the marked angle is half of the thick arc.

Row 2. Equal: the marked angle is equal to the thick arc.

Row 3. Neither: the thick arc is not the arc inside the marked angle.

Cut & Glue Sort — how to run it

25 minutes, including the cutting

1. **Hand out pages 3 and 4**, one of each per student, with scissors and glue. No calculator is needed.
2. **Say this once:** *“Find the vertex first. At the center, the angle equals the arc inside it. On the circle, the angle is half of the arc inside it. Then check: is the thick arc the arc inside the angle?”*
3. **Check a sheet in ten seconds:** every row gets four pieces.

Student sheets	pages 3 and 4, one of each per student. Page 3 has the three rows. Page 4 has the pieces and a box that shows what the marks mean.
Answers	page 5.

The rule: a central angle (vertex at the center) equals the arc inside it. An inscribed angle (vertex on the circle) is half of the arc inside it. The arc inside an inscribed angle is the one that does not pass through the vertex.

Row 3 holds the pieces where the thick arc is the wrong arc. On three of them the vertex is on the circle and the thick arc passes through it. On the other one the vertex is the center, and the thick arc is outside the marked angle. A student who looks only at the vertex puts these in rows 1 and 2. That is the mistake this sort is for.

Rows 1 and 2 each hold two pieces that surprise students. In row 1, an obtuse inscribed angle has its vertex on the short arc, so the arc inside it is the long arc. In row 2, a central angle is marked the long way around, more than 180° , and the thick arc is the long arc inside it.

This sheet calls an angle inscribed when its vertex is on the circle and each side meets the circle again, and central when its vertex is the center. Some textbooks use other definitions, so tell the class which ones this sheet uses. Guessing does not work: a simple guessing rule, such as “a long thick arc is always wrong,” places at most six pieces correctly.



This is the free lesson this activity came from. The worksheet, the full answers and the lesson plan are on it, at three levels of difficulty.
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Cut & Glue Sort — half, equal, or neither?

Inscribed angles

Name _____

Period _____

Date _____

Each piece on the next page has one marked angle and one thick arc. Find the vertex of the angle. Then find the arc inside the angle. **Is the marked angle half of the thick arc, equal to it, or neither? Glue the piece in its row.**

Row 1. Half: the marked angle is half of the thick arc.

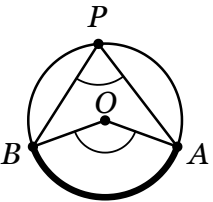
Row 2. Equal: the marked angle is equal to the thick arc.

Row 3. Neither: the thick arc is not the arc inside the marked angle.

Cut & Glue Sort — the pieces

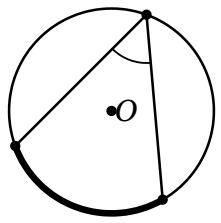
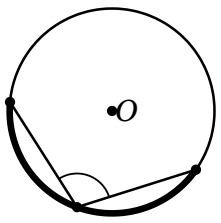
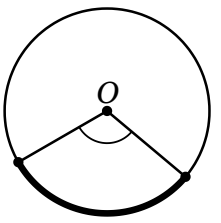
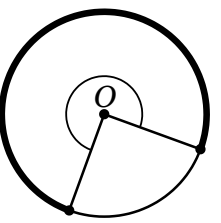
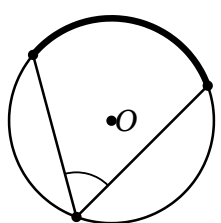
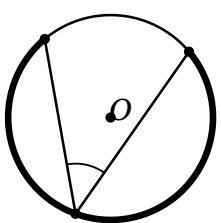
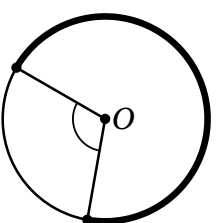
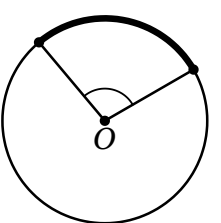
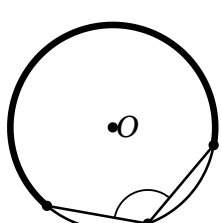
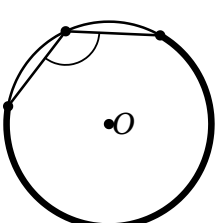
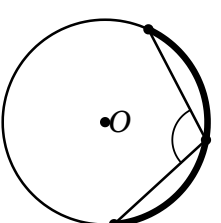
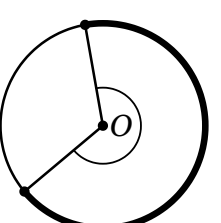
Cut along the dashed lines

Cut out the twelve pieces. Glue each one in its row on the other sheet. The box below shows what the marks mean.



O is the center on every piece. **The arc inside an angle** (thick here) does not pass through the vertex.

Inscribed angle (vertex on the circle): half of the arc inside it. **Central angle** (vertex at O): equal to the arc inside it.

1 	2 	3 	4 
5 	6 	7 	8 
9 	10 	11 	12 



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Each row holds four pieces. Every piece is listed by the number printed on its corner, with the reason.

1 Half: the marked angle is half of the thick arc.

- 1.** A circle with its center O. An angle with its vertex on the circle is marked; its sides are two chords. The thick arc is the short arc between the two ends of the angle. *Why:* The vertex is on the circle, so it is an inscribed angle. The thick arc does not pass through the vertex, so it is the arc inside the angle. The angle is half of it (here 50° and 100°).
- 5.** A circle with its center O. An angle with its vertex on the circle is marked; its sides are two chords. The thick arc is the short arc between the two ends of the angle. *Why:* The vertex is on the circle, so it is an inscribed angle. The thick arc does not pass through the vertex, so it is the arc inside the angle. The angle is half of it (here 60° and 120°).
- 9.** A circle with its center O. An angle with its vertex on the circle is marked; its sides are two chords. The thick arc is the long arc between the two ends of the angle. *Why:* The vertex is on the short arc, so the angle is obtuse and opens onto the long arc. That long arc is thick, and the angle is half of it (here 120° and 240°).
- 10.** A circle with its center O. An angle with its vertex on the circle is marked; its sides are two chords. The thick arc is the long arc between the two ends of the angle. *Why:* The vertex is on the short arc, so the angle is obtuse and opens onto the long arc. That long arc is thick, and the angle is half of it (here 125° and 250°).

2 Equal: the marked angle is equal to the thick arc.

- 3.** A circle with its center O. The angle at the center O is marked the short way, less than 180° . The thick arc is the short arc between the two ends of the angle. *Why:* The vertex is the center O, so it is a central angle. The thick arc is inside it, so they are equal (110°).
- 4.** A circle with its center O. The angle at the center O is marked the long way around, more than 180° . The thick arc is the long arc between the two ends of the angle. *Why:* The vertex is the center O, and the angle is marked the long way around. The thick arc is the long arc inside it, so they are equal (270°).
- 8.** A circle with its center O. The angle at the center O is marked the short way, less than 180° . The thick arc is the short arc between the two ends of the angle. *Why:* The vertex is the center O, so it is a central angle. The thick arc is inside it, so they are equal (100°).
- 12.** A circle with its center O. The angle at the center O is marked the long way around, more than 180° . The thick arc is the long arc between the two ends of the angle. *Why:* The vertex is the center O, and the angle is marked the long way around. The thick arc is the long arc inside it, so they are equal (240°).

3 Neither: the thick arc is not the arc inside the marked angle.

- 2.** A circle with its center O. An angle with its vertex on the circle is marked; its sides are two chords. The thick arc is the short arc between the two ends of the angle. The vertex stands on the thick arc. *Why:* The thick arc passes through the vertex, so it is not the arc inside the angle. The angle is half of the other arc (here 105° against a thick arc of 150°).
- 6.** A circle with its center O. An angle with its vertex on the circle is marked; its sides are two chords. The thick arc is the long arc between the two ends of the angle. The vertex stands on the thick arc. *Why:* The thick arc passes through the vertex, so it is not the arc inside the angle. The angle is half of the other arc (here 45° against a thick arc of 270°).
- 7.** A circle with its center O. The angle at the center O is marked the short way, less than 180° . The thick arc is the long arc between the two ends of the angle. *Why:* The vertex is the center O, but the angle is marked the short way and the thick arc is the long arc outside it (here 110° and 250°).
- 11.** A circle with its center O. An angle with its vertex on the circle is marked; its sides are two chords. The thick arc is the short arc between the two ends of the angle. The vertex stands on the thick arc. *Why:* The thick arc passes through the vertex, so it is not the arc inside the angle. The angle is half of the other arc (here 105° against a thick arc of 150°).

To check a piece with a student, ask: “Where is the vertex? Which arc is inside the angle? Is that the thick arc?”