

CUT & GLUE SORT

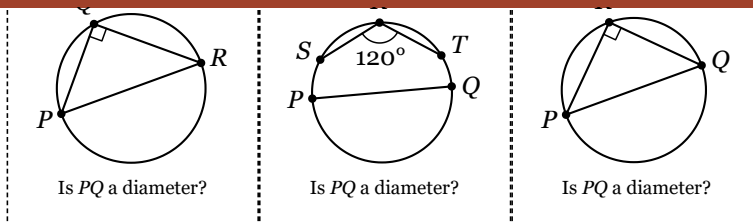


INSCRIBED ANGLES ON A DIAMETER AND INSCRIBED POLYGONS

Is It a Diameter? The Angle in a Semicircle

Twelve pieces · yes, no, or cannot tell · three rows

FREE



Row 1. Yes: the marks prove PQ is a diameter.

Row 2. No: the marks prove PQ is not a diameter.

Row 3. Cannot tell: the marks do not decide it.

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:** *“Use the marks, not how the drawing looks. The marks prove a chord is a diameter in two ways only: it goes through the center O , or a right angle with its corner on the circle stands across from it.”*
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 each mark means.

Answers page 5.

The two facts: if a chord is a diameter, the angle across from it at any point of the circle is 90° . And if an angle at a point of the circle is 90° , the chord across from it is a diameter. Students often mix up which one they are using.

Row 3 holds the pieces where neither fact can be used. In every one of them PQ is drawn through the middle of the circle and looks like a diameter, but no mark proves it. A dot at the middle of PQ is not known to be the center unless it is named O . A right angle where two chords cross inside the circle says nothing, because its corner is not on the circle. An angle whose sides do not end at P and Q says nothing about PQ . A student who trusts the drawing puts these pieces in row 1. That is the mistake this sort is for.

Row 2 holds the pieces that fool students most. Angles of 84° and 96° look like right angles, but they are not 90° , so PQ is not a diameter. In one piece the right angle is marked, but PQ touches it: PQ is a leg, and the diameter is the other chord. Guessing does not work: a simple guessing rule, such as “if it has a square, it is yes,” places at most six pieces correctly.



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Cut & Glue Sort — is PQ a diameter?

The angle in a semicircle

Name _____

Period _____

Date _____

Each piece on the next page shows a circle with some marks. Use only the marks, not how the drawing looks. **Do the marks prove that PQ is a diameter, prove that it is not, or not decide it? Glue the piece in its row.**

Row 1. Yes: the marks prove PQ is a diameter.

Row 2. No: the marks prove PQ is not a diameter.

Row 3. Cannot tell: the marks do not decide it.

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 each mark means.

What the marks mean. A dot named O is the center of the circle. Any other dot is just a point. It may or may not be the center. A small square means a right angle, 90° . A number gives the size of an angle. Tick marks mean two equal parts.

A diameter is a chord through the center. If the angle at a point of the circle is 90° , the chord across from it is a diameter. If a chord is a diameter, the angle across from it at any point of the circle is 90° .

1 Is PQ a diameter?	2 Is PQ a diameter?	3 Is PQ a diameter?	4 Is PQ a diameter?
5 Is PQ a diameter?	6 Is PQ a diameter?	7 Is PQ a diameter?	8 Is PQ a diameter?
9 Is PQ a diameter?	10 Is PQ a diameter?	11 Is PQ a diameter?	12 Is PQ a diameter?



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

1 Yes: the marks prove PQ is a diameter.

3. A square at R, between RP and RQ. *Why:* The right angle at R is on the circle and its sides end at P and Q. So PQ, across from it, is a diameter.

5. The center O is on PQ. R is joined to P and Q, with no mark. *Why:* PQ passes through the center O, so it is a diameter.

8. The angle at R, between RP and RQ, is marked 90° . *Why:* The angle at R is 90° and its sides end at P and Q, so PQ is a diameter.

12. Squares at R and at S, each between the chords to P and Q. *Why:* The right angle at S is on the circle and its sides end at P and Q. So PQ, across from it, is a diameter.

2 No: the marks prove PQ is not a diameter.

1. A square at Q, between QP and QR. PR is drawn too. *Why:* The right angle at Q makes PR, across from it, the diameter. A circle has only one diameter through P, so PQ is not one.

4. The angle at R, between RP and RQ, is marked 84° . *Why:* If PQ were a diameter, the angle at R would be 90° . It is 84° , so PQ is not a diameter.

9. The center O is marked, and PQ passes well to one side of it. S, beyond PQ, is joined to P and Q. *Why:* PQ does not pass through the center O, so it is not a diameter.

11. The angle at R, between RP and RQ, is marked 96° . *Why:* If PQ were a diameter, the angle at R would be 90° . It is 96° , so PQ is not a diameter.

3 Cannot tell: the marks do not decide it.

2. The angle at R, between RS and RT, is marked 120° . PQ is drawn too. *Why:* The angle marked 120° has its corner at R, and its sides do not end at P and Q. Only a right angle across from PQ, at a point of the circle, would decide PQ.

6. A square at R, between RS and RT. PQ crosses ST. *Why:* The right angle at R makes ST a diameter. PQ has no end in common with it, so nothing decides PQ.

7. A dot M at the middle of PQ, with one tick mark on each half. *Why:* The tick marks show the middle of PQ. Every chord has a middle, so they say nothing about the center.

10. Chord RS crosses PQ inside the circle, with a square where they cross. *Why:* The right angle stands where two chords cross inside the circle, not at a point of the circle. It says nothing about PQ.

To check a piece with a student, ask: “Is the center O marked? Is there a right angle with its corner on the circle? Do its two sides end at P and Q?”