

CUT & GLUE SORT

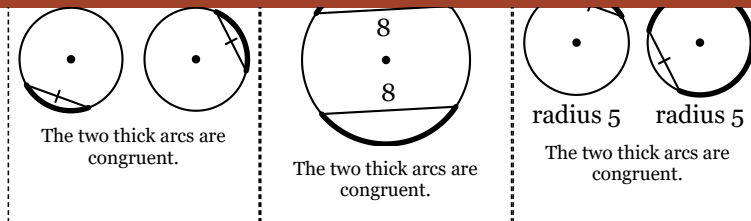


ARCS AND CHORDS

Congruent Chords, Congruent Arcs: Do the Marks Prove It?

Twelve pieces · true, false, or cannot tell · three rows

FREE



Row 1. Yes: the marks prove the sentence is true.

Row 2. No: the marks prove the sentence is false.

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. Congruent chords and congruent arcs go together only in one circle, or in two circles with the same radius.”*
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 rule: in the same circle, or in two circles with the same radius, congruent chords, congruent arcs and congruent central angles go together. Any one of them gives the other two, when both arcs are short arcs (or both are long arcs). Without that, nothing follows.

Row 3 holds the pieces where the rule cannot be used. Every piece in it is two circles drawn the same size, but nothing says they have the same radius. A student who trusts the drawing puts them in row 1. That is the mistake this sort is for.

Row 2 holds the pieces that fool students most. Two circles with one center are cut by the same two radii, so their arcs have the same measure, but they are not congruent because the radii differ. A short arc and a long arc with congruent chords are not congruent. Two arcs marked 100° and 104° look the same, and two circles marked radius 16 and radius 17 look the same size. The marks decide, not the look.

This sheet calls two arcs congruent when they have the same measure and lie in the same circle or in circles with the same radius. Some textbooks use other definitions, so tell the class which ones this sheet uses. Guessing does not work: a simple guessing rule, such as “if it looks true, it is true,” 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 — do the marks prove it?

Arcs and chords

Name _____

Period _____

Date _____

Each piece on the next page has a drawing and a sentence. Use only the marks, not how the drawing looks. **Do the marks prove the sentence true, prove it false, or not decide it? Glue the piece in its row.**

Row 1. Yes: the marks prove the sentence is true.

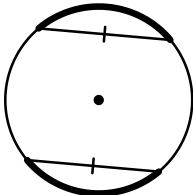
Row 2. No: the marks prove the sentence is false.

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

Cut & Glue Sort — the pieces

Cut along the dashed lines

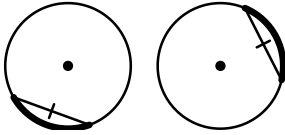
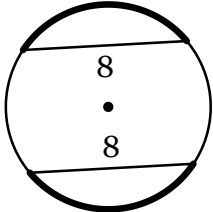
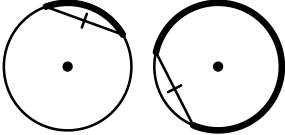
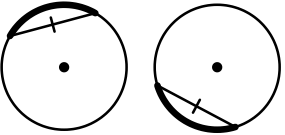
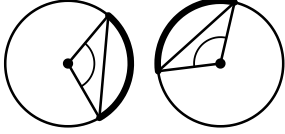
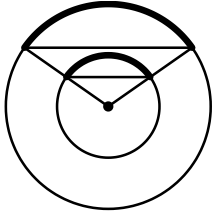
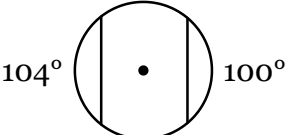
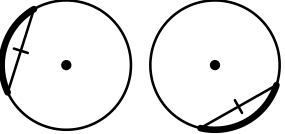
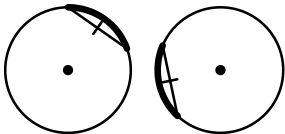
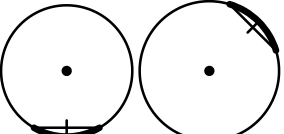
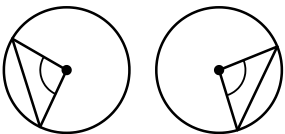
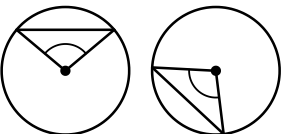
Cut out the twelve pieces. Glue each one in its row on the other sheet. The box below shows what each mark means.



Tick marks mean the two chords are congruent. **Matching marks** on two angles mean the angles are congruent. **“radius 5”** under a circle gives its radius. **Thick arcs** are the arcs the sentence is about.

In the same circle, or in two circles with the same radius: congruent chords, congruent arcs and congruent central angles go together. Any one of them gives the other two.

Two arcs are congruent only if they have the same measure **and** their circles have the same radius.

1  The two thick arcs are congruent.	2  The two thick arcs are congruent.	3  radius 5 radius 5 The two thick arcs are congruent.	4  radius 4 radius 4 The two thick arcs are congruent.
5  The two thick arcs are congruent.	6  The two thick arcs are congruent.	7  104° 100° The two chords are congruent.	8  radius 6 radius 6 The two thick arcs are congruent.
9  The two thick arcs are congruent.	10  radius 16 radius 17 The two thick arcs are congruent.	11  The two chords are congruent.	12  radius 5 radius 5 The two chords are congruent.



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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 the sentence is true.

2. One circle. Chords 8 and 8. “The two thick arcs are congruent.” *Why:* In one circle, chords, arcs and central angles go together. Here both chords are 8. Both thick arcs are short arcs, so they are congruent too.

4. Two circles, radius 4 and radius 4. Tick marks on the chords. “The two thick arcs are congruent.” *Why:* Both circles have radius 4, so chords, arcs and central angles go together. Here the tick marks make the chords congruent. Both thick arcs are short arcs, so they are congruent too.

8. Two circles, radius 6 and radius 6. Tick marks on the chords. “The two thick arcs are congruent.” *Why:* Both circles have radius 6, so chords, arcs and central angles go together. Here the tick marks make the chords congruent. Both thick arcs are short arcs, so they are congruent too.

12. Two circles, radius 5 and radius 5. Matching marks on the central angles. “The two chords are congruent.” *Why:* Both circles have radius 5, so chords, arcs and central angles go together. Here the matching marks make the central angles congruent, so the chords are congruent too.

2 No: the marks prove the sentence is false.

3. Two circles, radius 5 and radius 5. Tick marks on the chords. Thick: the short arc in one circle, the long arc in the other. “The two thick arcs are congruent.” *Why:* Both circles have radius 5 and the tick marks make the chords congruent, so their short arcs are congruent. But one thick arc is a short arc and the other is a long arc, more than half its circle, so the thick arcs are not congruent.

6. Two circles with one center, cut by the same two radii. “The two thick arcs are congruent.” *Why:* The same two radii cut both arcs, so the arcs have the same measure. But one circle is inside the other, so the radii are different and the arcs are not congruent.

7. One circle. Arcs 100° and 104° . “The two chords are congruent.” *Why:* In one circle, chords, arcs and central angles go together. Here the arcs are 100° and 104° , so the chords are not congruent.

10. Two circles, radius 16 and radius 17. Tick marks on the chords. “The two thick arcs are congruent.” *Why:* The circles have radius 16 and radius 17. Congruent chords in circles of different sizes cut arcs of different measures, so the arcs are not congruent.

3 Cannot tell: the marks do not decide it.

1. Two circles, no radius given. Tick marks on the chords. “The two thick arcs are congruent.” *Why:* Here the tick marks make the chords congruent, but nothing says the two circles have the same radius. They only look the same size, so the arcs could be different.

5. Two circles, no radius given. Matching marks on the central angles. “The two thick arcs are congruent.” *Why:* Here the matching marks make the central angles congruent, but nothing says the two circles have the same radius. They only look the same size, so the arcs could be different.

9. Two circles, no radius given. Tick marks on the chords. “The two thick arcs are congruent.” *Why:* Here the tick marks make the chords congruent, but nothing says the two circles have the same radius. They only look the same size, so the arcs could be different.

11. Two circles, no radius given. Matching marks on the central angles. “The two chords are congruent.” *Why:* Here the matching marks make the central angles congruent, but nothing says the two circles have the same radius. They only look the same size, so the chords could be different.

To check a piece with a student, ask: “Is it one circle? If there are two, does anything say they have the same radius? Which arcs are thick?”