

SCAVENGER HUNT



INSCRIBED (CYCLIC) QUADRILATERALS

Cyclic Quadrilaterals: Opposite Angles

Four corners on a circle · opposite and exterior angles · the cards check the answers

FREE

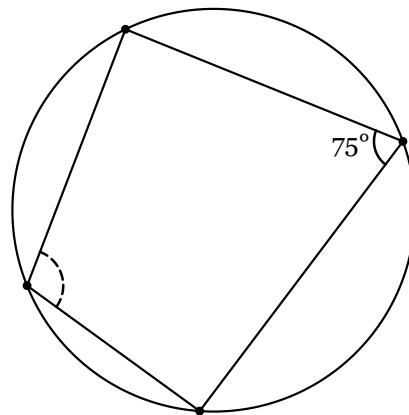
ANSWER

58°

All four corners are on the circle.

Find the angle with the dashed arc.

Supplementary or congruent? Opposite corners of this shape add to 180° .



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P

1. **Tape the 16 cards around the room**, in any order. Each card has a large letter in its bottom left corner. Start each group at a *different* one of these eight cards: *P L J A F Q M G*.
2. **Say this once:** “All four corners are on the circle. Opposite angles add to 180° . Find the angle with the dashed arc. Then walk to the card with that answer at the top.”
3. **Each group writes one line per card.** Eight right answers bring the group back to its first card.

16 cards	pages 3–10, one copy. There are two cards on each sheet. Cut the whole stack once.
Record sheet	page 11, one per student. It shows the three rules as small drawings.
Answers	pages 12–13, for you only. Do not put them in the room.

Every card shows a circle with four points on it, joined to make a quadrilateral. This sheet calls a quadrilateral *cyclic* when all four of its corners lie on one circle. Its angles are the angles inside it. Some textbooks use other definitions, so tell the class which ones this sheet uses. Opposite angles of a cyclic quadrilateral add to 180° . A given angle has a solid arc and its number. The angle to find has a dashed arc.

The cards are of four kinds. Four give one angle and ask for the one across from it. Four give two angles next to each other, and only one of them is across from the dashed arc. Four carry one side on past a corner. The angle outside there, the exterior angle, equals the angle inside at the opposite corner. Four have a diagonal that cuts one angle into two parts. The two parts must be added before the rule is used.

Eight of the sixteen cards make the ring. A group reaches the other eight only by a wrong answer: taking opposite angles as equal, using an angle next to the dashed one, or taking an exterior angle as the angle inside. That card sends the group back to the card it got wrong.

The check is the length of the group’s list. A clean run is **eight lines**. Each wrong answer adds two. The line in italics under each card’s question is for a group that arrived by a wrong answer. Guessing does not work: no single rule, such as always taking 180° minus the first number, gets more than eight of the cards. If a group keeps coming back to the same cards, ask: “Which corner is across from the dashed arc? Do the two angles add to 180° ?”



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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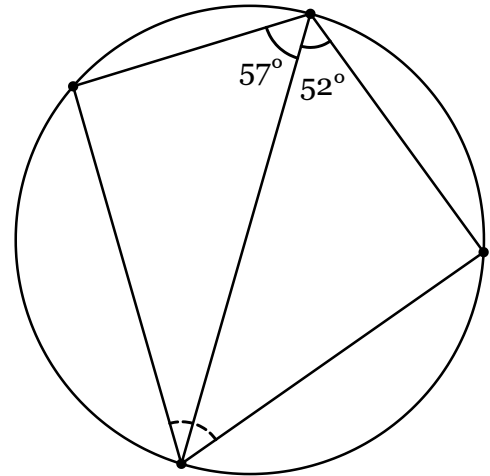
ANSWER

94°

All four corners are on the circle. A diagonal cuts one angle into two parts. The arc with no number covers the whole angle at its corner, both parts.

Find the angle with the dashed arc.

Add the two parts first. Then use the rule for opposite angles.



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A

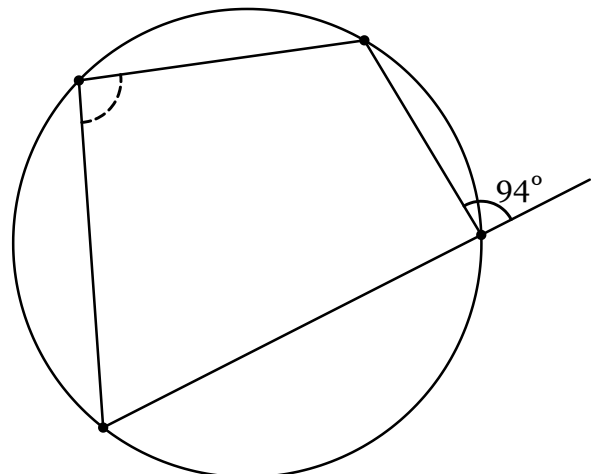
ANSWER

109°

All four corners are on the circle. One side goes on past a corner.

Find the angle with the dashed arc.

A diagonal cuts one angle in two. Do the two parts make the whole angle?



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B

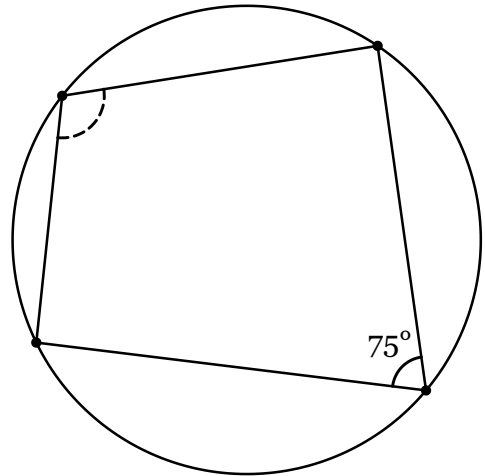
ANSWER

117°

All four corners are on the circle.

Find the angle with the dashed arc.

Find the corner that shares no side with the arc with no number.



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C

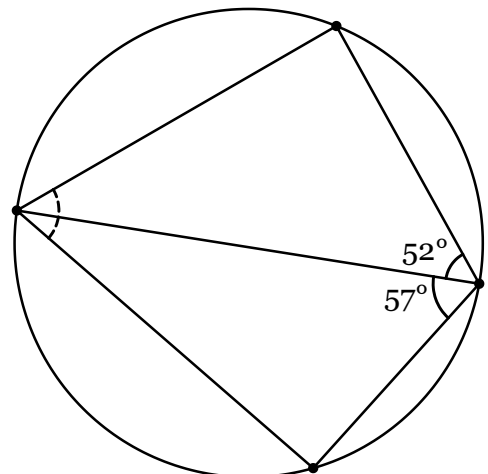
ANSWER

67°

All four corners are on the circle. A diagonal cuts one angle into two parts. The arc with no number covers the whole angle at its corner, both parts.

Find the angle with the dashed arc.

Do the two angles across from each other add to 180°?



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D

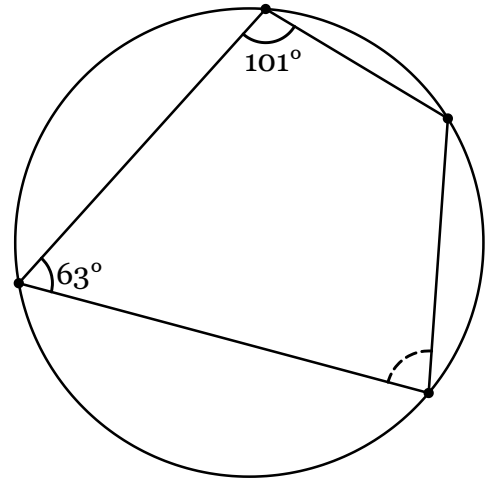
ANSWER

86°

All four corners are on the circle.

Find the angle with the dashed arc.

Where does a side go on past a corner? The angle beside it is outside.



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E

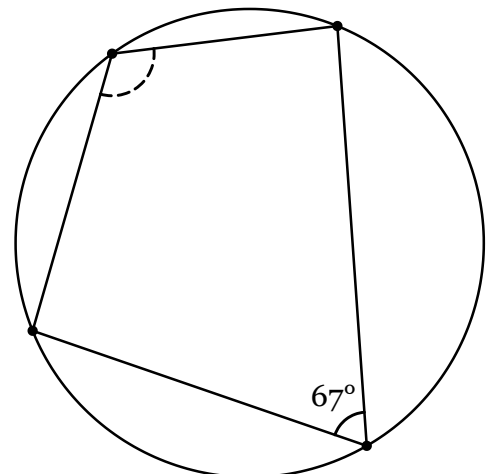
ANSWER

71°

All four corners are on the circle.

Find the angle with the dashed arc.

Angles across from each other add to 180° . They are not the same size here.



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F

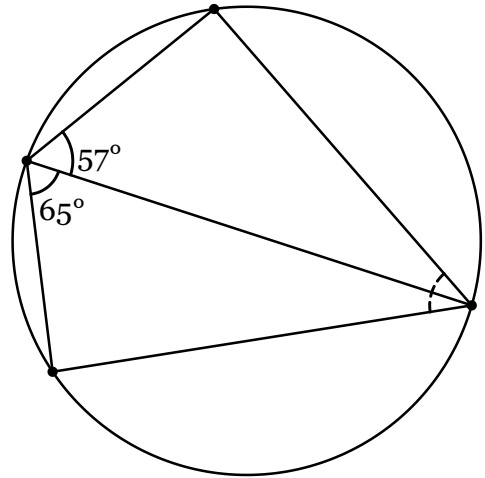
ANSWER

83°

All four corners are on the circle. A diagonal cuts one angle into two parts. The arc with no number covers the whole angle at its corner, both parts.

Find the angle with the dashed arc.

The four angles of the shape add to 360° . Check your answer with that total.



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G

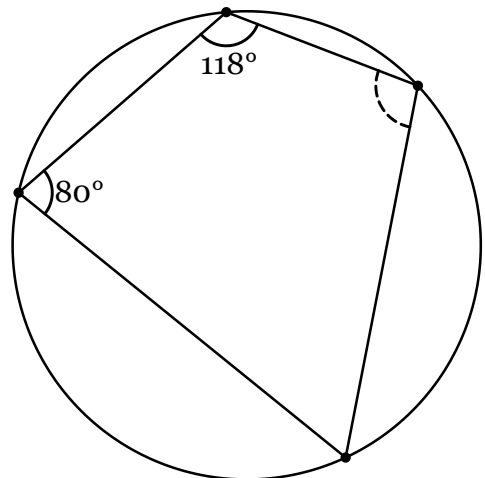
ANSWER

97°

All four corners are on the circle.

Find the angle with the dashed arc.

An angle inside the shape and the angle outside it at one corner make 180° .



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H

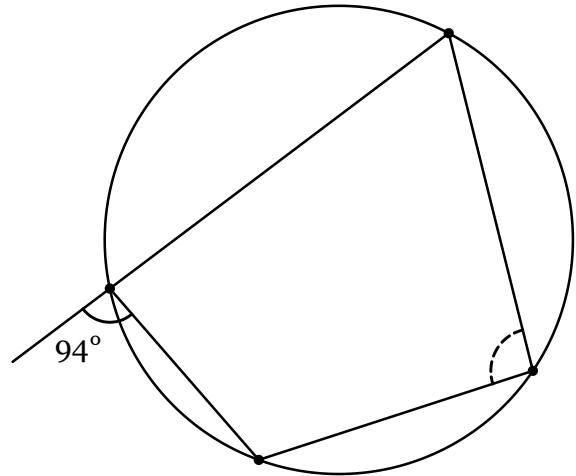
ANSWER

79°

All four corners are on the circle. One side goes on past a corner.

Find the angle with the dashed arc.

An angle outside the shape is not an angle inside it. Look where each arc is.



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J

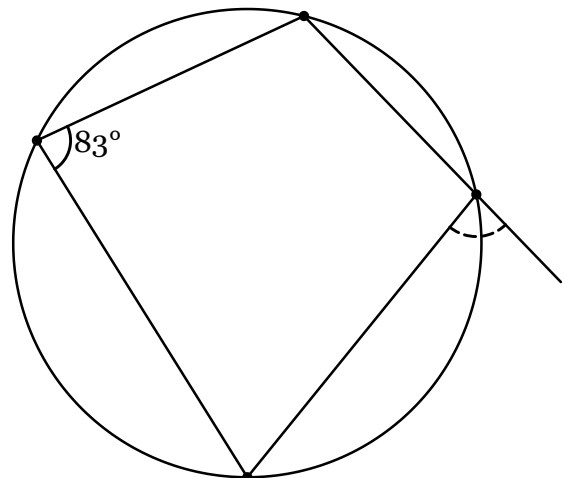
ANSWER

122°

All four corners are on the circle. One side goes on past a corner.

Find the angle with the dashed arc.

Add the parts of the angle first. Is the total the angle at the whole corner?



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K

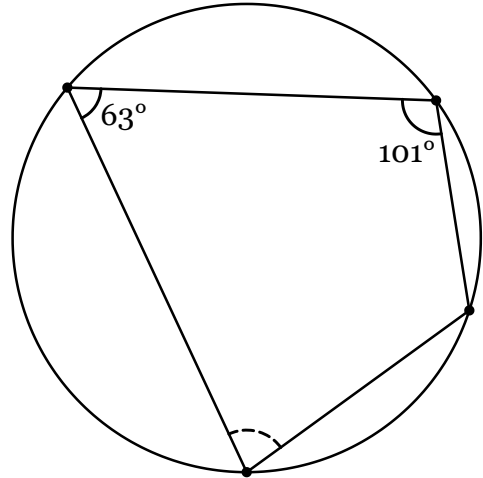
ANSWER

105°

All four corners are on the circle.

Find the angle with the dashed arc.

Put a finger on the arc with no number. Which corner is across from it?



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L

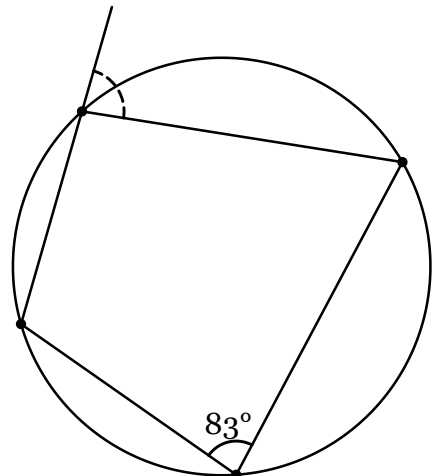
ANSWER

100°

All four corners are on the circle. One side goes on past a corner.

Find the angle with the dashed arc.

The arc with no number is outside the shape. Which angle inside matches it?



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M

ANSWER

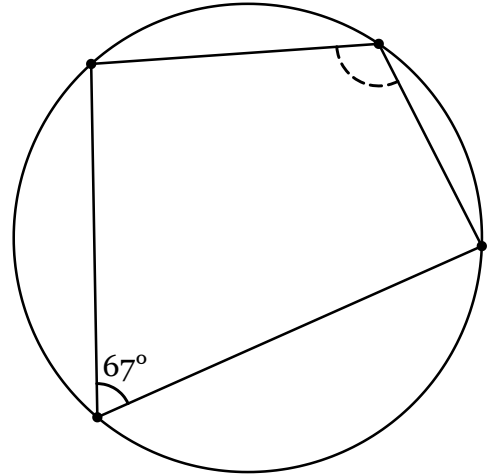
62°

All four corners are on the circle.

Find the angle with the dashed arc.

Which corner touches neither side of the angle with no number?

N



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ANSWER

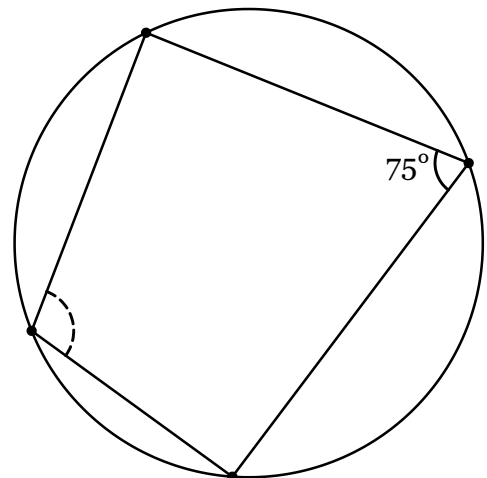
58°

All four corners are on the circle.

Find the angle with the dashed arc.

Supplementary or congruent? Opposite corners of this shape add to 180° .

P



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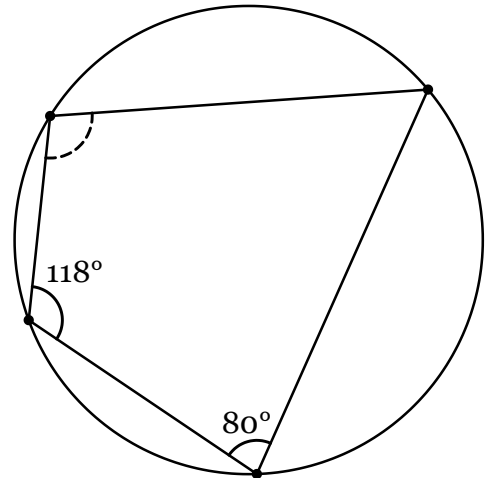
ANSWER

113°

All four corners are on the circle.

Find the angle with the dashed arc.

Two corners on one side are next to each other. Skip them and find the corner across.



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Q

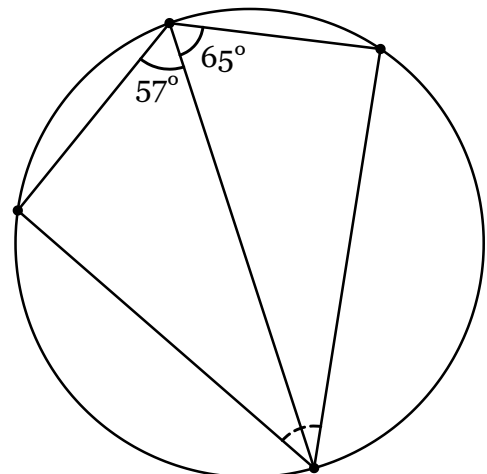
ANSWER

75°

All four corners are on the circle. A diagonal cuts one angle into two parts. The arc with no number covers the whole angle at its corner, both parts.

Find the angle with the dashed arc.

In a circle, opposite angles add to 180° . Check both pairs of corners.



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R

Scavenger Hunt — where I went

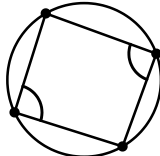
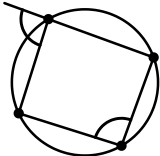
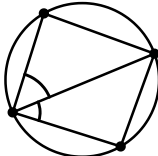
Cyclic quadrilaterals

Name _____

Period _____

Date _____

All four corners are on the circle on every card. Find the angle with the dashed arc. Write your work and the answer. Then find the card with your answer at the top. A clean run is eight lines. Each card has a line in italics under its question. **If you are on a card because you went wrong, its line says what to check. If you were right, skip it.**

	All four corners on one circle: opposite angles (across from each other) add to 180°.		An exterior angle is outside the shape, where one side goes on past a corner. With all four corners on one circle, it equals the angle at the opposite corner.		A diagonal cuts an angle into two parts. Add the two parts to get the whole angle.
Check: the four angles inside the shape add to 360°.					

Card letter	Your work	Answer, in degrees
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

What does a cyclic quadrilateral ride?

Every number stands for a letter. Write the letter for each answer in the box above its number. Read the boxes you filled, left to right. **If they do not spell the answer, one of your answers is wrong.**

$58^\circ = A$ $62^\circ = C$ $67^\circ = Y$ $71^\circ = B$ $75^\circ = E$ $79^\circ = I$ $83^\circ = C$ $86^\circ = L$ $94^\circ = Y$ $97^\circ = B$ $100^\circ = C$ $105^\circ = L$ $109^\circ = I$
 $113^\circ = E$ $117^\circ = C$ $122^\circ = A$

58	62	67	71	75	79	83	86	94	97	100	105	109	113	117	122



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Scavenger Hunt — answers

For the teacher

The ring in order, with the answer found on each card. A group may begin anywhere on it. Wherever it begins, eight right answers bring it back to that card.

P (105°) → L (79°) → J (94°) → A (71°) → F (113°) → Q (100°) → M (83°) → G (58°) → P

What does a cyclic quadrilateral ride? The answer is *A BICYCLE!* It is read along the boxes of the record sheet, which run from the smallest number to the largest. On every card all four corners are on the circle, so opposite angles add to 180° and an exterior angle equals the angle at the opposite corner.

Card	What the card shows	Answer, and why	The common wrong answer on this card, and why	Letter of its top
1 P	One angle is 75°. The dashed arc is at the corner across from it.	105° . All four corners are on the circle, so opposite angles add to 180°: $180^\circ - 75^\circ = 105^\circ$.	75°. The two opposite angles are taken as equal. They are supplementary, not congruent.	A
2 L	Two angles next to each other are 63° and 101°. The dashed arc is across from the 101°.	79° . The dashed angle is across from the 101°, so it is $180^\circ - 101^\circ = 79^\circ$. The 63° is next to it and is not used.	117°. $180^\circ - 63^\circ$: the 63° is next to the dashed angle, not across from it.	L
3 J	One side goes on past a corner. The angle outside there is 94°. The dashed arc is at the opposite corner.	94° . The angle inside at that corner is $180^\circ - 94^\circ = 86^\circ$, and the dashed angle is across from it: $180^\circ - 86^\circ = 94^\circ$. So the exterior angle equals the angle at the opposite corner.	86°. $180^\circ - 94^\circ$: the 94° is taken as the angle inside the shape at its corner. It is outside.	I
4 A	A diagonal cuts one angle into parts of 52° and 57°. The dashed arc is at the other end of the diagonal.	71° . The whole angle is $52^\circ + 57^\circ = 109^\circ$. The dashed angle is across from it: $180^\circ - 109^\circ = 71^\circ$.	109°. 109° is the whole angle across from it, copied. Opposite angles add to 180°; they are not equal.	Y
5 F	One angle is 67°. The dashed arc is at the corner across from it.	113° . All four corners are on the circle, so opposite angles add to 180°: $180^\circ - 67^\circ = 113^\circ$.	67°. The two opposite angles are taken as equal. They are supplementary, not congruent.	B
6 Q	Two angles next to each other are 118° and 80°. The dashed arc is across from the 80°.	100° . The dashed angle is across from the 80°, so it is $180^\circ - 80^\circ = 100^\circ$. The 118° is next to it and is not used.	62°. $180^\circ - 118^\circ$: the 118° is next to the dashed angle, not across from it.	E
7 M	One angle is 83°. A side goes on past the opposite corner, and the dashed arc is the angle outside there.	83° . The angle inside at the dashed corner is $180^\circ - 83^\circ = 97^\circ$. The dashed angle is outside, beside it on a straight line: $180^\circ - 97^\circ = 83^\circ$. It equals the angle at the opposite corner.	97°. $180^\circ - 83^\circ$: that is the angle inside the shape at the dashed corner, not the angle outside.	C
8 G	A diagonal cuts one angle into parts of 65° and 57°. The dashed arc is at the other end of the diagonal.	58° . The whole angle is $65^\circ + 57^\circ = 122^\circ$. The dashed angle is across from it: $180^\circ - 122^\circ = 58^\circ$.	122°. 122° is the whole angle across from it, copied. Opposite angles add to 180°; they are not equal.	C

Scavenger Hunt — the cards off the ring

For the teacher

A group reaches these eight cards only by a wrong answer. The number at the top of each one is the wrong answer from one ring card. Its right answer is the number at the top of that ring card, so the group goes to the card it got wrong and tries it again. If the group makes the same mistake here, it goes to another card off the ring. So a second wrong answer never moves a group forward.

Card	What the card shows	Answer, and why	The common wrong answer on this card, and why	Letter of its top
R	A diagonal cuts one angle into parts of 65° and 57° . The dashed arc is at the other end of the diagonal.	58° . The whole angle is $65^\circ + 57^\circ = 122^\circ$. The dashed angle is across from it: $180^\circ - 122^\circ = 58^\circ$.	122° . 122° is the whole angle across from it, copied. Opposite angles add to 180° ; they are not equal.	E
C	One angle is 75° . The dashed arc is at the corner across from it.	105° . All four corners are on the circle, so opposite angles add to 180° : $180^\circ - 75^\circ = 105^\circ$.	75° . The two opposite angles are taken as equal. They are supplementary, not congruent.	C
E	Two angles next to each other are 63° and 101° . The dashed arc is across from the 101° .	79° . The dashed angle is across from the 101° , so it is $180^\circ - 101^\circ = 79^\circ$. The 63° is next to it and is not used.	117° . $180^\circ - 63^\circ$: the 63° is next to the dashed angle, not across from it.	L
B	One side goes on past a corner. The angle outside there is 94° . The dashed arc is at the opposite corner.	94° . The angle inside at that corner is $180^\circ - 94^\circ = 86^\circ$, and the dashed angle is across from it: $180^\circ - 86^\circ = 94^\circ$. So the exterior angle equals the angle at the opposite corner.	86° . $180^\circ - 94^\circ$: the 94° is taken as the angle inside the shape at its corner. It is outside.	I
D	A diagonal cuts one angle into parts of 52° and 57° . The dashed arc is at the other end of the diagonal.	71° . The whole angle is $52^\circ + 57^\circ = 109^\circ$. The dashed angle is across from it: $180^\circ - 109^\circ = 71^\circ$.	109° . 109° is the whole angle across from it, copied. Opposite angles add to 180° ; they are not equal.	Y
N	One angle is 67° . The dashed arc is at the corner across from it.	113° . All four corners are on the circle, so opposite angles add to 180° : $180^\circ - 67^\circ = 113^\circ$.	67° . The two opposite angles are taken as equal. They are supplementary, not congruent.	C
H	Two angles next to each other are 118° and 80° . The dashed arc is across from the 80° .	100° . The dashed angle is across from the 80° , so it is $180^\circ - 80^\circ = 100^\circ$. The 118° is next to it and is not used.	62° . $180^\circ - 118^\circ$: the 118° is next to the dashed angle, not across from it.	B
K	One angle is 83° . A side goes on past the opposite corner, and the dashed arc is the angle outside there.	83° . The angle inside at the dashed corner is $180^\circ - 83^\circ = 97^\circ$. The dashed angle is outside, beside it on a straight line: $180^\circ - 97^\circ = 83^\circ$. It equals the angle at the opposite corner.	97° . $180^\circ - 83^\circ$: that is the angle inside the shape at the dashed corner, not the angle outside.	A

Other mistakes lead to no card. A group might use only one part of a cut angle (on card A that gives 128°), copy a printed number, take a number from 360° , or add the numbers. Its answer is then not the number at the top of any card, and the group should check its work.