

SCAVENGER HUNT



INSCRIBED ANGLES

Inscribed Angles: Half the Arc

Which arc does the angle open onto? · the cards check the answers

FREE

ANSWER

49°

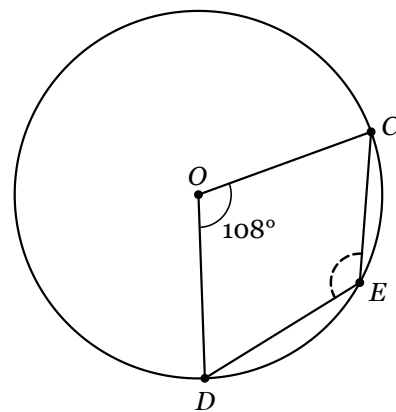
O is the center of the circle.

Find $m\angle CED$.

Write it in whole degrees, like 37° .

Is the angle at the circle obtuse? Then its arc is the long arc.

N



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Scavenger Hunt — how to run it

a full class period

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: *Q N G M E A J C*.
2. **Say this once:** “An inscribed angle is half of the arc inside it. First find that arc. It is the arc that does not pass through the vertex. Write your answer in whole degrees, like 37° . 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 an inscribed angle, a central angle and the arc they share.
Answers	pages 12–13, for you only. Do not put them up in the room.

Most cards show the center O , a central angle with its measure, and an inscribed angle on the same two points. On six of these the vertex is on the long arc. Then the inscribed angle is half the central angle. On the other six the vertex is on the short arc. Then the inscribed angle is obtuse. It opens onto the long arc, which is 360° minus the central angle, and it is half of that. The other four cards give the inscribed angle and ask for its arc, which is twice the angle.

This sheet calls an angle inscribed when its vertex is on the circle and each side meets the circle again. The arc it intercepts is the arc inside the angle. Arc AB , with two letters, is the short arc. Some textbooks use other definitions, so tell the class which ones this sheet uses.

Eight of the sixteen cards make the ring. A group reaches the other eight only by a wrong answer, but all the cards look the same. Three mistakes lead there: copying the central angle, halving the short arc when the vertex stands on it, and halving the angle instead of doubling it to get the arc. 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. Every card has a line in italics under the boxed rule. It tells a group that arrived by a wrong answer what to check. Guessing does not work: no single rule that ignores the vertex, such as always halving the number, gets more than six of the cards. If a group is stuck, ask: “*Where is the vertex? Which arc is inside the angle?*”



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

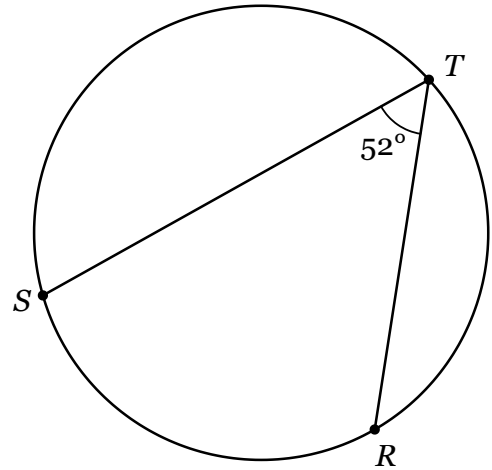
121°

Two letters name the short arc.

Find arc RS .

Write it in whole degrees, like 37° .

The arc inside an angle at the circle is double the angle.



A

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ANSWER

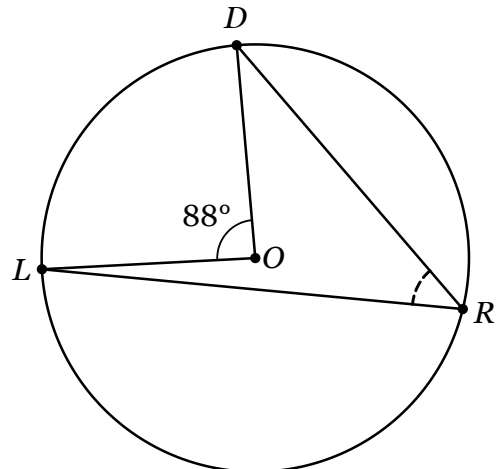
59°

O is the center of the circle.

Find $m\angle DRL$.

Write it in whole degrees, like 37° .

The angle at the center is twice the angle at the circle on one arc.



B

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ANSWER

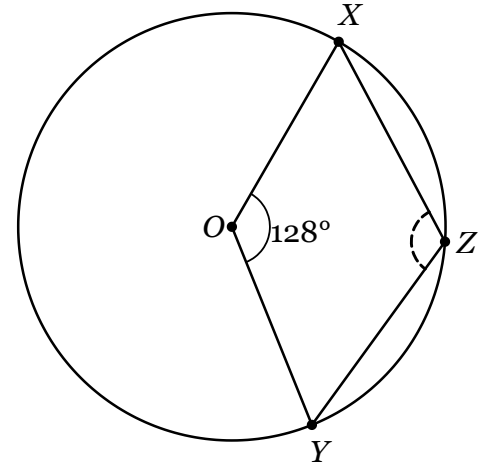
71°

O is the center of the circle.

Find $m\angle XZY$.

Write it in whole degrees, like 37° .

The long arc and the short arc with the same ends make 360° .



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C

ANSWER

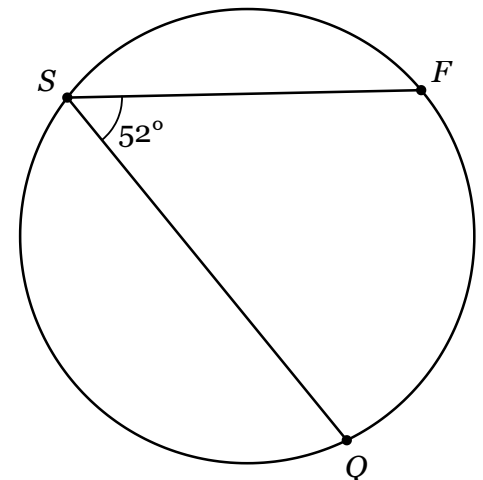
142°

Two letters name the short arc.

Find arc FQ .

Write it in whole degrees, like 37° .

Say first which is bigger, the arc or the angle at the circle.



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D

ANSWER

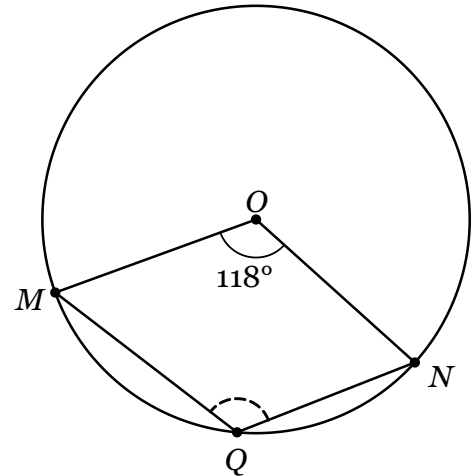
44°

O is the center of the circle.

Find $m\angle MQN$.

Write it in whole degrees, like 37° .

Look at the vertex. The arc of the angle never passes through it.



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E

ANSWER

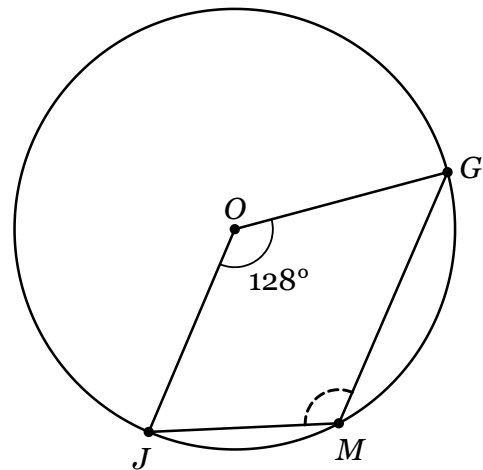
98°

O is the center of the circle.

Find $m\angle GMJ$.

Write it in whole degrees, like 37° .

Is the angle at the circle obtuse? Then its arc is more than 180° .



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F

ANSWER

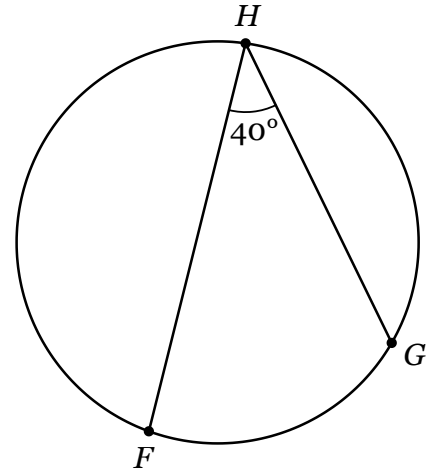
126°

Two letters name the short arc.

Find arc FG .

Write it in whole degrees, like 37° .

The arc is twice the angle at the circle. Which one is bigger?



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G

ANSWER

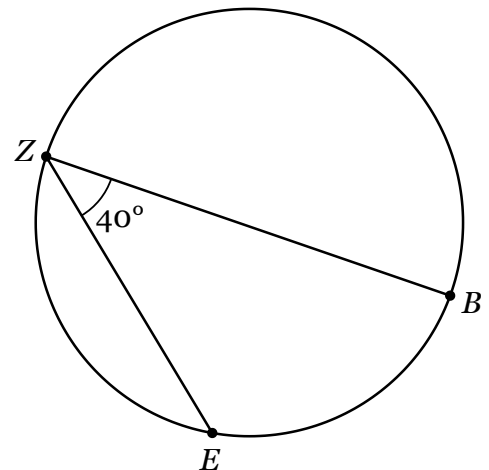
88°

Two letters name the short arc.

Find arc BE .

Write it in whole degrees, like 37° .

Is the answer bigger than the angle? An arc is twice its angle.



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H

ANSWER

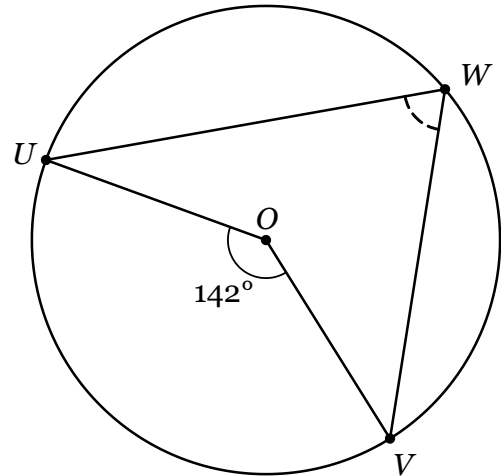
104°

O is the center of the circle.

Find $m\angle UWV$.

Write it in whole degrees, like 37° .

Is the vertex on the long arc? Then the angle at the center shows its arc.



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J

ANSWER

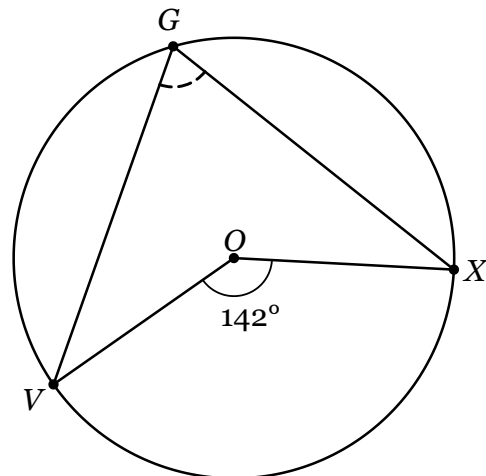
64°

O is the center of the circle.

Find $m\angle VGX$.

Write it in whole degrees, like 37° .

Halve the arc inside the angle. A copy of the arc is too big.



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K

ANSWER

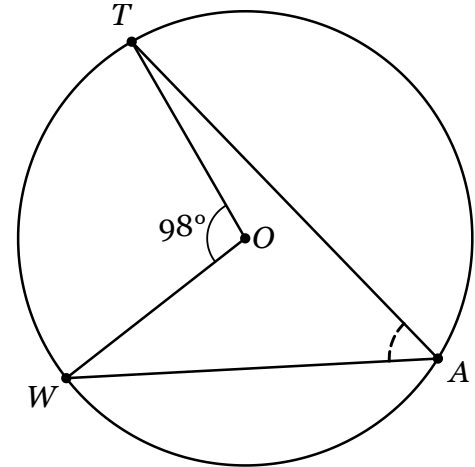
54°

O is the center of the circle.

Find $m\angle TAW$.

Write it in whole degrees, like 37° .

The vertex is on the circle, not at the center. Halve the arc.



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L

ANSWER

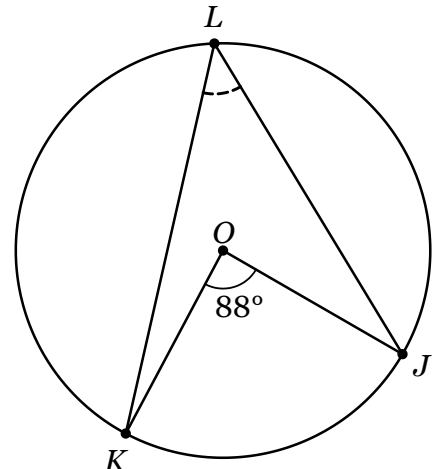
80°

O is the center of the circle.

Find $m\angle JLK$.

Write it in whole degrees, like 37° .

Find the arc between the two sides of the angle. Then halve it.



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M

ANSWER

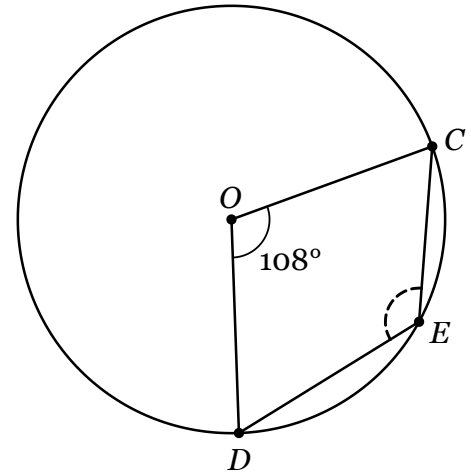
49°

O is the center of the circle.

Find $m\angle CED$.

Write it in whole degrees, like 37° .

Is the angle at the circle obtuse? Then its arc is the long arc.



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N

ANSWER

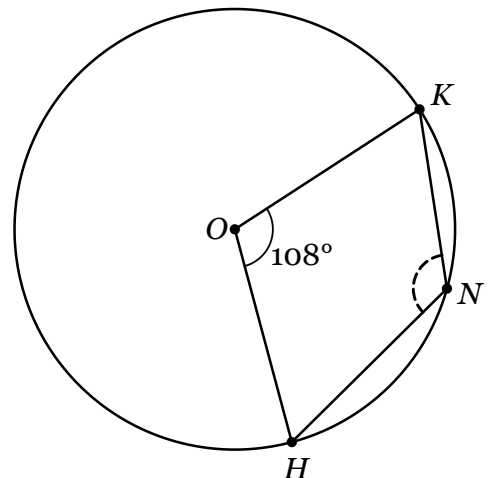
20°

O is the center of the circle.

Find $m\angle HNK$.

Write it in whole degrees, like 37° .

Which arc does the angle open onto? Trace it from one side to the other.



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P

ANSWER

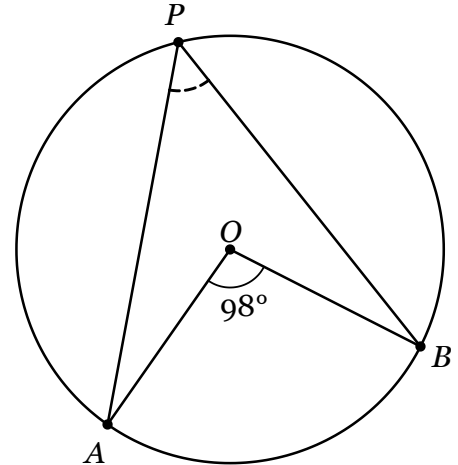
116°

O is the center of the circle.

Find $m\angle APB$.

Write it in whole degrees, like 37° .

An angle at the circle is half of the arc inside it.



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Q

ANSWER

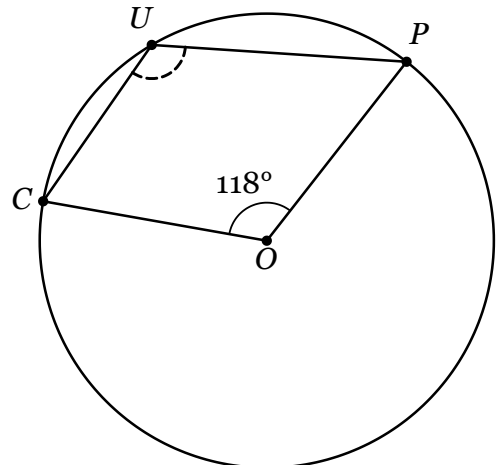
26°

O is the center of the circle.

Find $m\angle CUP$.

Write it in whole degrees, like 37° .

Put a finger on the vertex. Its arc is the long way around, or the short way?



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R

Scavenger Hunt — where I went

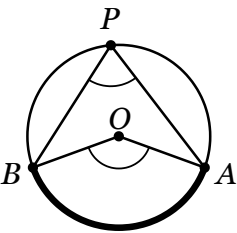
Inscribed angles

Name _____

Period _____

Date _____

For each card, first say which arc is inside the angle: the short arc or the long arc. Then find the answer. **Write it in whole degrees, like 37° .** Then find the card with your answer at the top. A clean run is eight lines. Each card has a line in italics under the boxed rule. **If you are on a card because you went wrong, its line says what to check. If you were right, skip it.**



Inscribed angle $\angle APB$: its vertex P is on the circle. **Central angle $\angle AOB$:** its vertex is the center O .

The intercepted arc (thick) is the arc inside the angle. It is the arc that does **not** pass through the vertex.

An inscribed angle is half of its intercepted arc. The arc is twice the angle. $\angle AOB$ equals arc AB .

If the vertex is on the short arc, the angle intercepts the long arc. The long arc is 360° minus the short arc.

Card letter	The arc inside the angle: short or long?	The answer, in degrees
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

How much of its arc does an inscribed angle get?

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.**

$20^\circ = H$ $26^\circ = F$ $44^\circ = J$ $49^\circ = U$ $54^\circ = L$ $59^\circ = A$ $64^\circ = J$ $71^\circ = S$ $80^\circ = T$ $88^\circ = S$ $98^\circ = U$ $104^\circ = H$ $116^\circ = A$
 $121^\circ = L$ $126^\circ = F$ $142^\circ = T$

20°	26°	44°	49°	54°	59°	64°	71°	80°	88°	98°	104°	116°	121°	126°	142°



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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.

Q (49°) → N (126°) → G (80°) → M (44°) → E (121°) → A (104°) → J (71°) → C (116°) → Q

How much of its arc does an inscribed angle get? The answer is *JUST HALF!* It is read along the boxes of the record sheet, which run from the smallest number to the largest.

Card	What the card shows and asks	Answer, and why	The common wrong answer on this card, and why	Letter of its top
1 Q	O is the center and $\angle AOB = 98^\circ$. P is on the long arc from A to B . Find $m\angle APB$.	49° . P is on the long arc, so the arc inside $\angle APB$ is the short arc AB , and it measures the same as the central angle, 98° . An inscribed angle is half its arc: $98^\circ \div 2 = 49^\circ$.	98° . 98° is the central angle copied. The inscribed angle on the same arc is half of it: 49° .	A
2 N	O is the center and $\angle COD = 108^\circ$. E is on the short arc from C to D . Find $m\angle CED$.	126° . E is on the short arc, so the arc inside $\angle CED$ is the long arc from C to D : $360^\circ - 108^\circ = 252^\circ$. Half of it is 126° . An angle that opens onto an arc of more than 180° is obtuse, so an answer over 90° is right.	54° . 54° is half of the short arc, the arc E stands on. The angle at E opens onto the long arc, 252° , so it is 126° .	U
3 G	$\angle FHG = 40^\circ$, with H on the long arc. Find arc FG .	80° . Arc FG is the arc inside $\angle FHG$; it does not pass through H . An inscribed angle is half its arc, so the arc is twice the angle: $2 \times 40^\circ = 80^\circ$.	20° . 20° is half of the angle. The arc is bigger than its inscribed angle, so the angle is doubled, not halved: 80° .	F
4 M	O is the center and $\angle JOK = 88^\circ$. L is on the long arc from J to K . Find $m\angle JLK$.	44° . L is on the long arc, so the arc inside $\angle JLK$ is the short arc JK , and it measures the same as the central angle, 88° . An inscribed angle is half its arc: $88^\circ \div 2 = 44^\circ$.	88° . 88° is the central angle copied. The inscribed angle on the same arc is half of it: 44° .	T
5 E	O is the center and $\angle MON = 118^\circ$. Q is on the short arc from M to N . Find $m\angle MQN$.	121° . Q is on the short arc, so the arc inside $\angle MQN$ is the long arc from M to N : $360^\circ - 118^\circ = 242^\circ$. Half of it is 121° . An angle that opens onto an arc of more than 180° is obtuse, so an answer over 90° is right.	59° . 59° is half of the short arc, the arc Q stands on. The angle at Q opens onto the long arc, 242° , so it is 121° .	J
6 A	$\angle RTS = 52^\circ$, with T on the long arc. Find arc RS .	104° . Arc RS is the arc inside $\angle RTS$; it does not pass through T . An inscribed angle is half its arc, so the arc is twice the angle: $2 \times 52^\circ = 104^\circ$.	26° . 26° is half of the angle. The arc is bigger than its inscribed angle, so the angle is doubled, not halved: 104° .	L
7 J	O is the center and $\angle UOV = 142^\circ$. W is on the long arc from U to V . Find $m\angle UWV$.	71° . W is on the long arc, so the arc inside $\angle UWV$ is the short arc UV , and it measures the same as the central angle, 142° . An inscribed angle is half its arc: $142^\circ \div 2 = 71^\circ$.	142° . 142° is the central angle copied. The inscribed angle on the same arc is half of it: 71° .	H
8 C	O is the center and $\angle XOY = 128^\circ$. Z is on the short arc from X to Y . Find $m\angle XZY$.	116° . Z is on the short arc, so the arc inside $\angle XZY$ is the long arc from X to Y : $360^\circ - 128^\circ = 232^\circ$. Half of it is 116° . An angle that opens onto an arc of more than 180° is obtuse, so an answer over 90° is right.	64° . 64° is half of the short arc, the arc Z stands on. The angle at Z opens onto the long arc, 232° , so it is 116° .	S

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 and asks	Answer, and why	The common wrong answer on this card, and why	Letter of its top
F	O is the center and $\angle GOJ = 128^\circ$. M is on the short arc from G to J . Find $m\angle GMJ$.	116° . M is on the short arc, so the arc inside $\angle GMJ$ is the long arc from G to J : $360^\circ - 128^\circ = 232^\circ$. Half of it is 116° . An angle that opens onto an arc of more than 180° is obtuse, so an answer over 90° is right.	64° . 64° is half of the short arc, the arc M stands on. The angle at M opens onto the long arc, 232° , so it is 116° .	U
L	O is the center and $\angle TOW = 98^\circ$. A is on the long arc from T to W . Find $m\angle TAW$.	49° . A is on the long arc, so the arc inside $\angle TAW$ is the short arc TW , and it measures the same as the central angle, 98° . An inscribed angle is half its arc: $98^\circ \div 2 = 49^\circ$.	98° . 98° is the central angle copied. The inscribed angle on the same arc is half of it: 49° .	L
P	O is the center and $\angle HOK = 108^\circ$. N is on the short arc from H to K . Find $m\angle HNK$.	126° . N is on the short arc, so the arc inside $\angle HNK$ is the long arc from H to K : $360^\circ - 108^\circ = 252^\circ$. Half of it is 126° . An angle that opens onto an arc of more than 180° is obtuse, so an answer over 90° is right.	54° . 54° is half of the short arc, the arc N stands on. The angle at N opens onto the long arc, 252° , so it is 126° .	H
H	$\angle BZE = 40^\circ$, with Z on the long arc. Find arc BE .	80° . Arc BE is the arc inside $\angle BZE$: it does not pass through Z . An inscribed angle is half its arc, so the arc is twice the angle: $2 \times 40^\circ = 80^\circ$.	20° . 20° is half of the angle. The arc is bigger than its inscribed angle, so the angle is doubled, not halved: 80° .	S
B	O is the center and $\angle DOL = 88^\circ$. R is on the long arc from D to L . Find $m\angle DRL$.	44° . R is on the long arc, so the arc inside $\angle DRL$ is the short arc DL , and it measures the same as the central angle, 88° . An inscribed angle is half its arc: $88^\circ \div 2 = 44^\circ$.	88° . 88° is the central angle copied. The inscribed angle on the same arc is half of it: 44° .	A
R	O is the center and $\angle COP = 118^\circ$. U is on the short arc from C to P . Find $m\angle CUP$.	121° . U is on the short arc, so the arc inside $\angle CUP$ is the long arc from C to P : $360^\circ - 118^\circ = 242^\circ$. Half of it is 121° . An angle that opens onto an arc of more than 180° is obtuse, so an answer over 90° is right.	59° . 59° is half of the short arc, the arc U stands on. The angle at U opens onto the long arc, 242° , so it is 121° .	F
D	$\angle FSQ = 52^\circ$, with S on the long arc. Find arc FQ .	104° . Arc FQ is the arc inside $\angle FSQ$: it does not pass through S . An inscribed angle is half its arc, so the arc is twice the angle: $2 \times 52^\circ = 104^\circ$.	26° . 26° is half of the angle. The arc is bigger than its inscribed angle, so the angle is doubled, not halved: 104° .	T
K	O is the center and $\angle VOX = 142^\circ$. G is on the long arc from V to X . Find $m\angle VGX$.	71° . G is on the long arc, so the arc inside $\angle VGX$ is the short arc VX , and it measures the same as the central angle, 142° . An inscribed angle is half its arc: $142^\circ \div 2 = 71^\circ$.	142° . 142° is the central angle copied. The inscribed angle on the same arc is half of it: 71° .	J

Other mistakes lead to no card: 180° minus the given number, 360° minus the given number, 360° minus the answer, doubling where the rule halves and giving the other arc. 180° minus the answer leads to no card except when the vertex is on the short arc. Copying the given number leads to no card except when the vertex is on the long arc. Halving the arc the vertex stands on leads to no card when the vertex is on the long arc. Such an answer is not the number at the top of any card, so the group knows to check its work.