

SCAVENGER HUNT



PERPENDICULAR BISECTORS OF CHORDS

Perpendicular Bisectors of Chords

Radius, half the chord, distance from the center · the cards check the answers

FREE

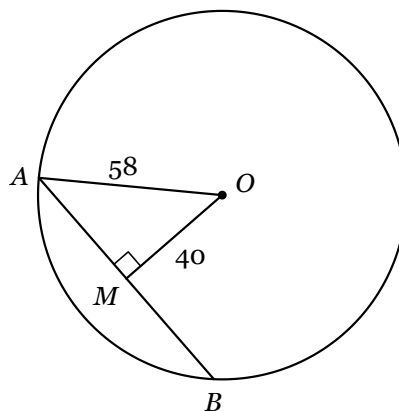
ANSWER

106

Find chord AB .

O is the center. The answer is a whole number.

The right triangle holds half of the chord. Double it for the whole chord.



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D

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: *D P B G E H K Q*. Calculators help.
2. **Say this once:** *“The segment with the small square goes from the center to the middle of the chord. The radius is the longest side of the right triangle. The triangle gives half of the chord. Every answer is a whole number. 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 right triangle with its sides named.
Answers	pages 12–13, for you only. Do not put them up in the room.

Every card shows one circle with its center O, a chord, and the segment from O that meets the chord at a right angle. That segment cuts the chord in half. The radius to one end of the chord, half of the chord, and that segment make a right triangle, and the radius is its longest side. Four ring cards ask for the chord: the triangle gives half of it, so the answer is twice that. The others ask for the diameter: the triangle gives the radius, so the answer is twice that. On three ring cards the whole chord is given, on a line with an arrow at each end, and the student must halve it first.

This sheet calls the length of the segment from the center that is perpendicular to the chord “the distance from the center to the chord.” 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. Two mistakes lead there: giving half of the chord when the card asks for the chord, and giving the radius when it asks for the diameter. That card sends the group back to the card it got wrong. Other mistakes, such as using the whole chord inside the triangle, give a number that is not whole, and the card says every answer is whole.

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 on the two printed numbers gets more than six of the cards. If a group is stuck, ask: *“Which side is the radius? Is your number half of something?”*



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ANSWER

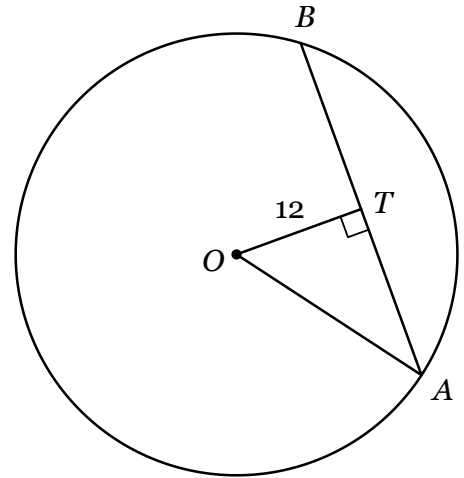
51

The diameter of this circle is 40.

Find chord AB .

O is the center. The answer is a whole number.

Twice the radius is the diameter. Which one does the card want?



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A

ANSWER

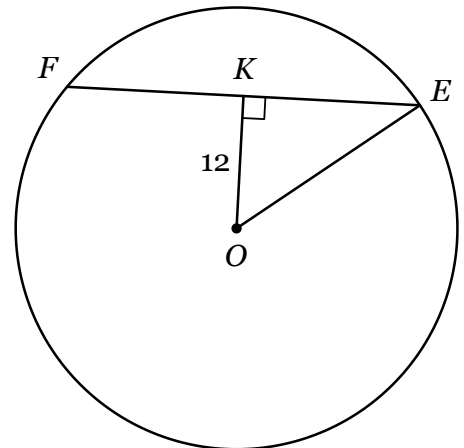
70

The diameter of this circle is 40.

Find chord EF .

O is the center. The answer is a whole number.

A diameter is two radii. Halve it before you use the right triangle.



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B

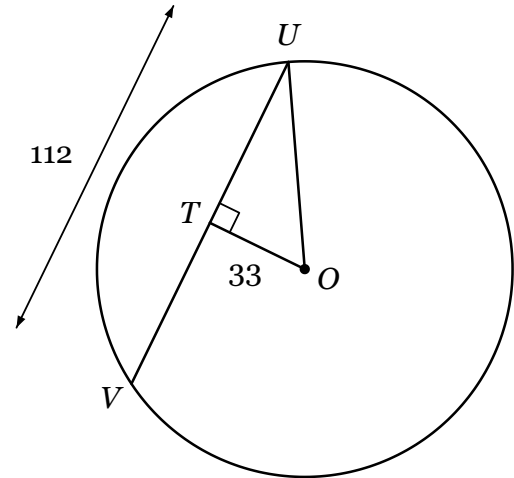
ANSWER

55

Find the diameter.

O is the center. The answer is a whole number.

Two halves make the chord. Do you have one half or both?



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C

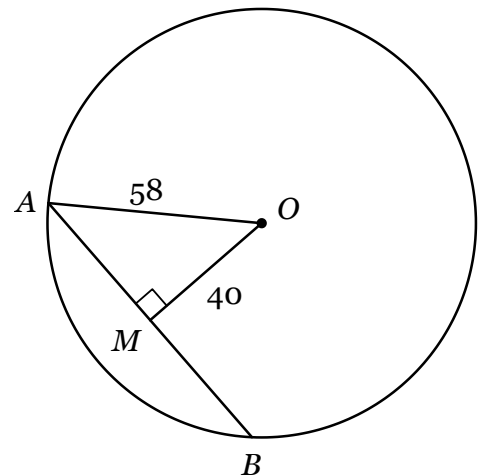
ANSWER

106

Find chord AB .

O is the center. The answer is a whole number.

The right triangle holds half of the chord. Double it for the whole chord.



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D

ANSWER

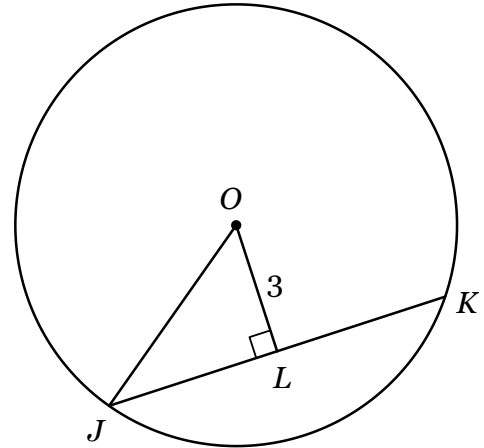
102

The diameter of this circle is 10.

Find chord JK .

O is the center. The answer is a whole number.

The chord runs from the circle to the circle. Is your answer all of it?



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E

ANSWER

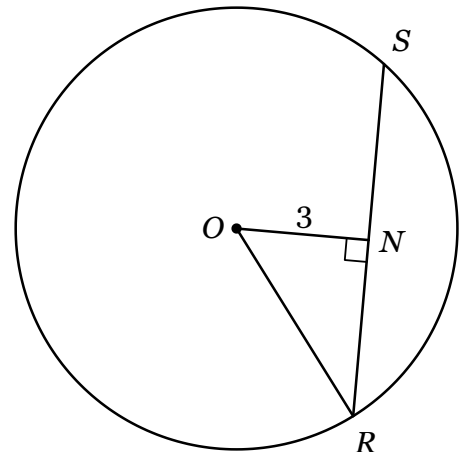
65

The diameter of this circle is 10.

Find chord RS .

O is the center. The answer is a whole number.

Is your answer the distance across the whole circle?



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F

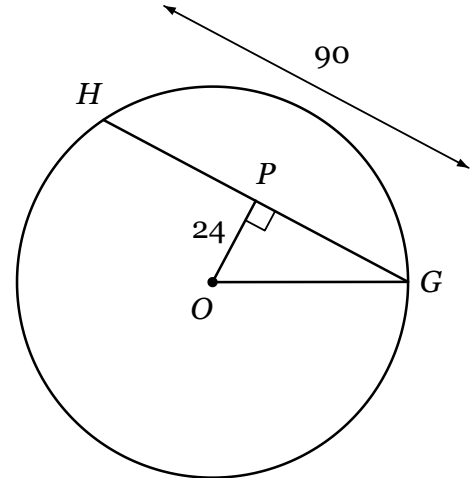
ANSWER

32

Find the diameter.

O is the center. The answer is a whole number.

An arrow at each end marks the whole chord. Halve it for the right triangle.



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G

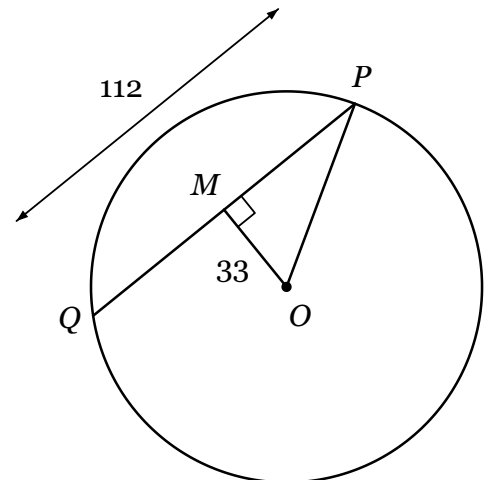
ANSWER

8

Find the diameter.

O is the center. The answer is a whole number.

Does the card ask for the radius or the diameter? Read the question again.



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H

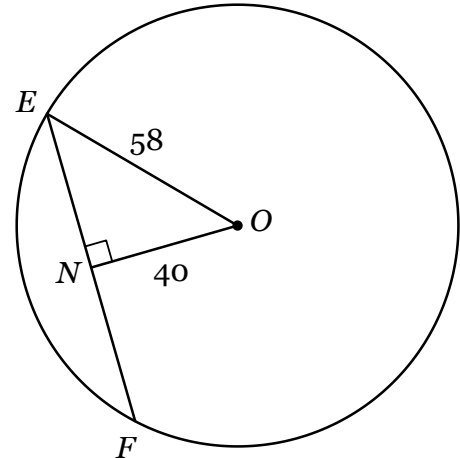
ANSWER

35

Find chord EF .

O is the center. The answer is a whole number.

A radius runs from the center to the circle. A diameter runs across the whole circle.



J

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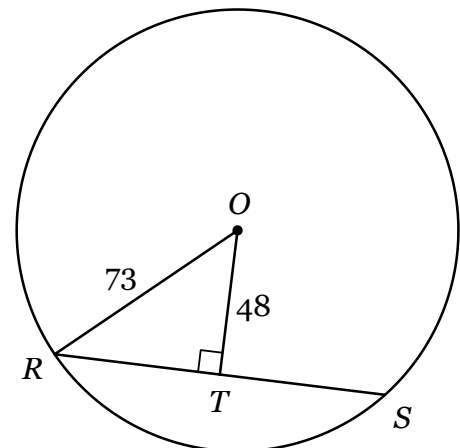
ANSWER

130

Find chord RS .

O is the center. The answer is a whole number.

Square the radius. Take away the square of the distance. Then take the root.



K

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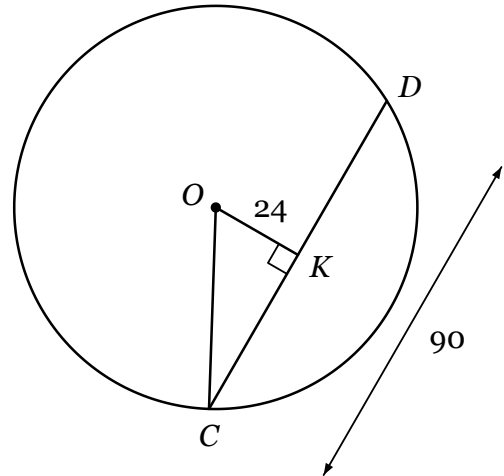
ANSWER

4

Find the diameter.

O is the center. The answer is a whole number.

Put a finger on each end of the chord. Does your number reach from end to end?



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L

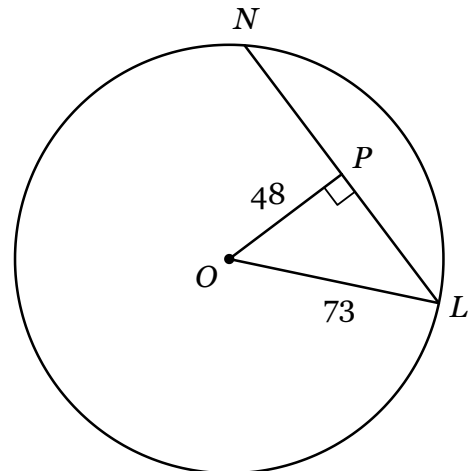
ANSWER

53

Find chord LN .

O is the center. The answer is a whole number.

The right triangle gives the radius first. The diameter is twice the radius.



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M

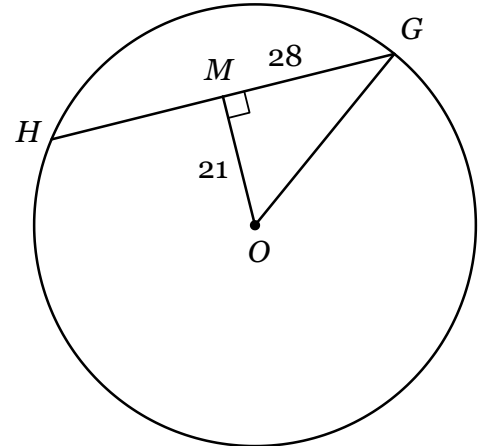
ANSWER

16

Find the diameter.

O is the center. The answer is a whole number.

The chord runs from one end to the other end, through the square.



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N

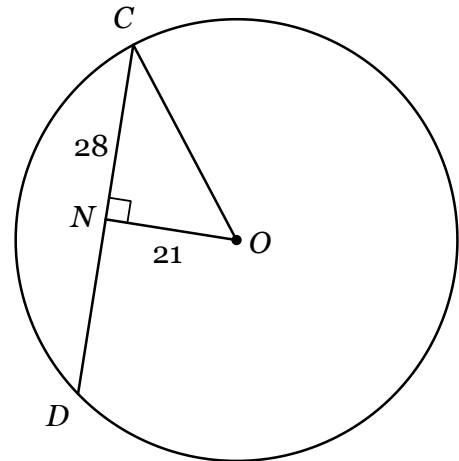
ANSWER

84

Find the diameter.

O is the center. The answer is a whole number.

The radius is the longest side of the right triangle. A diameter runs across the circle.



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P

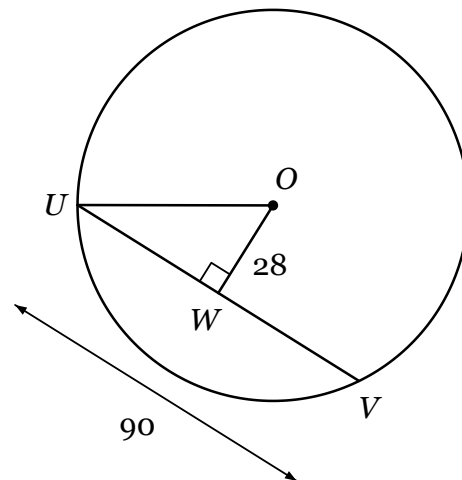
ANSWER

110

Find the diameter.

O is the center. The answer is a whole number.

Which side is across from the small square? That side is a radius.



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Q

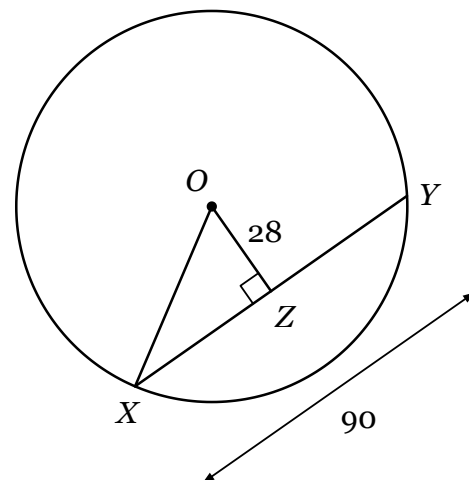
ANSWER

42

Find the diameter.

O is the center. The answer is a whole number.

Half of the chord runs from the square to the circle. Is that the whole chord?



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R

Scavenger Hunt — where I went

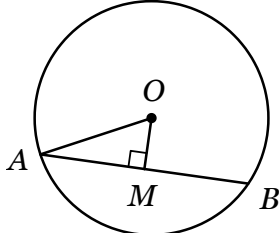
Perpendicular bisectors of chords

Name _____

Period _____

Date _____

For each card, write what it asks for, then your answer. **Every answer is a whole number.** If yours is not, check which side is the radius and which number is half. 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.**



O is the center. The small square shows that OM is perpendicular to the chord AB . So OM is the **distance** from O to the chord, and M is the middle of AB .

OA is a **radius**. It is the longest side of the right triangle OAM . AM is **half** of the chord.

radius² = (half the chord)² + distance². The chord is $2 \times AM$. The diameter is $2 \times$ the radius.

An arrow at each end of a number means it is the whole chord.

Card letter	What the card asks for	My answer
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

What does a line through the center do to a chord when it meets the chord at a right angle?

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.**

4 = A 8 = H 16 = L 32 = A 35 = H 42 = V 51 = E 53 = T 55 = I 65 = S 70 = L 84 = V 102 = E 106 = S 110 = I
130 = T

4	8	16	32	35	42	51	53	55	65	70	84	102	106	110	130



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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.

D (84) → P (70) → B (32) → G (102) → E (8) → H (130) → K (110) → Q (106) → D

What does a line through the center do to a chord when it meets the chord at a right angle? The answer is *HALVES IT!* It is read along the boxes of the record sheet, which run from the smallest number to the largest.

	Card	What the card shows	Answer, and why	The common wrong answer on this card, and why	Letter of its top
1	D	OA = 58. OM = 40. Find chord AB.	84. OA = 58 is the radius. It is the longest side of the right triangle OAM. $AM^2 = 58^2 - 40^2 = 1764$, so AM = 42. The chord is twice AM: 84.	42. 42 is AM, half of the chord. AB is twice AM: 84.	S
2	P	CN = 28. ON = 21. Find the diameter.	70. CN = 28 is half of the chord. The radius OC is the longest side of the right triangle: $OC^2 = 28^2 + 21^2 = 1225$, so OC = 35. The diameter is twice the radius: 70.	35. 35 is the radius OC. The diameter is twice the radius: 70.	V
3	B	The diameter is 40. OK = 12. Find chord EF.	32. The diameter is 40, so the radius OE is 20. It is the longest side of the right triangle OEK. $EK^2 = 20^2 - 12^2 = 256$, so EK = 16. The chord is twice EK: 32.	16. 16 is EK, half of the chord. EF is twice EK: 32.	L
4	G	Chord GH = 90. OP = 24. Find the diameter.	102. The whole chord is 90, so GP = $90 \div 2 = 45$. The radius OG is the longest side of the right triangle: $OG^2 = 45^2 + 24^2 = 2601$, so OG = 51. The diameter is twice the radius: 102.	51. 51 is the radius OG. The diameter is twice the radius: 102.	A
5	E	The diameter is 10. OL = 3. Find chord JK.	8. The diameter is 10, so the radius OJ is 5. It is the longest side of the right triangle OJL. $JL^2 = 5^2 - 3^2 = 16$, so JL = 4. The chord is twice JL: 8.	4. 4 is JL, half of the chord. JK is twice JL: 8.	E
6	H	Chord PQ = 112. OM = 33. Find the diameter.	130. The whole chord is 112, so PM = $112 \div 2 = 56$. The radius OP is the longest side of the right triangle: $OP^2 = 56^2 + 33^2 = 4225$, so OP = 65. The diameter is twice the radius: 130.	65. 65 is the radius OP. The diameter is twice the radius: 130.	H
7	K	OR = 73. OT = 48. Find chord RS.	110. OR = 73 is the radius. It is the longest side of the right triangle ORT. $RT^2 = 73^2 - 48^2 = 3025$, so RT = 55. The chord is twice RT: 110.	55. 55 is RT, half of the chord. RS is twice RT: 110.	T
8	Q	Chord UV = 90. OW = 28. Find the diameter.	106. The whole chord is 90, so UW = $90 \div 2 = 45$. The radius OU is the longest side of the right triangle: $OU^2 = 45^2 + 28^2 = 2809$, so OU = 53. The diameter is twice the radius: 106.	53. 53 is the radius OU. The diameter is twice the radius: 106.	I

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	Chord XY = 90. OZ = 28. Find the diameter.	106. The whole chord is 90, so $XZ = 90 \div 2 = 45$. The radius OX is the longest side of the right triangle: $OX^2 = 45^2 + 28^2 = 2809$, so $OX = 53$. The diameter is twice the radius: 106.	53. 53 is the radius OX. The diameter is twice the radius: 106.	V
J	OE = 58. ON = 40. Find chord EF.	84. OE = 58 is the radius. It is the longest side of the right triangle OEN. $EN^2 = 58^2 - 40^2 = 1764$, so $EN = 42$. The chord is twice EN: 84.	42. 42 is EN, half of the chord. EF is twice EN: 84.	H
N	GM = 28. OM = 21. Find the diameter.	70. GM = 28 is half of the chord. The radius OG is the longest side of the right triangle: $OG^2 = 28^2 + 21^2 = 1225$, so $OG = 35$. The diameter is twice the radius: 70.	35. 35 is the radius OG. The diameter is twice the radius: 70.	L
A	The diameter is 40. OT = 12. Find chord AB.	32. The diameter is 40, so the radius OA is 20. It is the longest side of the right triangle OAT. $AT^2 = 20^2 - 12^2 = 256$, so $AT = 16$. The chord is twice AT: 32.	16. 16 is AT, half of the chord. AB is twice AT: 32.	E
L	Chord CD = 90. OK = 24. Find the diameter.	102. The whole chord is 90, so $CK = 90 \div 2 = 45$. The radius OC is the longest side of the right triangle: $OC^2 = 45^2 + 24^2 = 2601$, so $OC = 51$. The diameter is twice the radius: 102.	51. 51 is the radius OC. The diameter is twice the radius: 102.	A
F	The diameter is 10. ON = 3. Find chord RS.	8. The diameter is 10, so the radius OR is 5. It is the longest side of the right triangle ORN. $RN^2 = 5^2 - 3^2 = 16$, so $RN = 4$. The chord is twice RN: 8.	4. 4 is RN, half of the chord. RS is twice RN: 8.	S
C	Chord UV = 112. OT = 33. Find the diameter.	130. The whole chord is 112, so $UT = 112 \div 2 = 56$. The radius OU is the longest side of the right triangle: $OU^2 = 56^2 + 33^2 = 4225$, so $OU = 65$. The diameter is twice the radius: 130.	65. 65 is the radius OU. The diameter is twice the radius: 130.	I
M	OL = 73. OP = 48. Find chord LN.	110. OL = 73 is the radius. It is the longest side of the right triangle OLP. $LP^2 = 73^2 - 48^2 = 3025$, so $LP = 55$. The chord is twice LP: 110.	55. 55 is LP, half of the chord. LN is twice LP: 110.	T

Other mistakes lead to no card. A group might use the whole chord inside the right triangle, add the squares when it should subtract them, use the diameter as the radius, add or subtract the two printed numbers, or copy one of them. Its answer is then not the number at the top of any card, and most of these answers are not whole numbers.