

SCAVENGER HUNT



PROPERTIES OF PARALLELOGRAMS

Across or Next Door? Half or Whole?

One parallelogram on every card · angles and diagonals · the cards check the answers

FREE

ANSWER

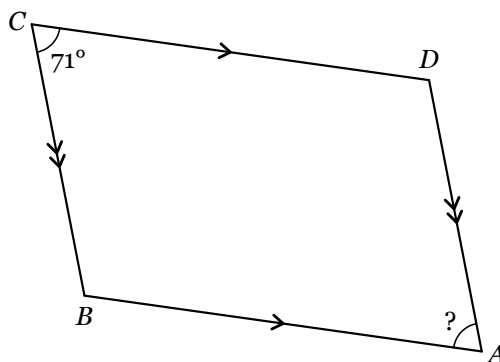
7

CDAB is a parallelogram.

$$\angle C = 71^\circ$$

How big is $\angle A$?

Angles across from each other match. Angles next to each other add to 180° .



J

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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: *J E K B R L A F*.
2. **Say this once:** “Angles across from each other are equal. Angles next to each other add to 180° . The diagonals cut each other in half. Before you work anything out, write which rule you use. Eight right answers bring you back to your first card.”
3. **Each group finds the answer, then walks to the card with that number at the top.** Nothing else is needed.

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, numbered 1, 2 and 3.
Answers	pages 12–13, for you only. Do not put them up in the room.

Every card shows one slanted parallelogram. The arrowheads on its sides say it is a parallelogram, and nothing else is given. On two ring cards one corner angle is given and the angle across from it is asked. The answer is the same angle. The common mistake is to take 180° minus it. On two ring cards the angle asked is next to the given one, at the other end of a side. The answer is 180° minus the given angle, and the common mistake is to copy it.

The other four ring cards are about the diagonals. The point where the diagonals cross cuts each diagonal into two equal pieces. It does not make the two diagonals equal. On two cards one piece of each diagonal is given and a whole diagonal is asked: the student doubles the piece of *that* diagonal. The common mistake is to add a piece of the other diagonal. On two cards a whole diagonal and a piece of the other one are given, and a piece of the first is asked: it is half of that whole diagonal. The common mistake is to copy the piece of the other diagonal.

The check is the length of the group's list. A clean run is **eight lines**. On every ring card, the common mistake gives the number at the top of one of the eight other cards. That card's answer sends the group back to the card it got wrong, so each wrong answer adds two lines. Every card has a line in small type under the question. It tells a group that arrived by a wrong answer what to check. If a group keeps coming back to the same cards, do not give the answer. Ask: “Put a finger on the two corners. Do they share a side?” or “Which diagonal is this piece part of?”



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

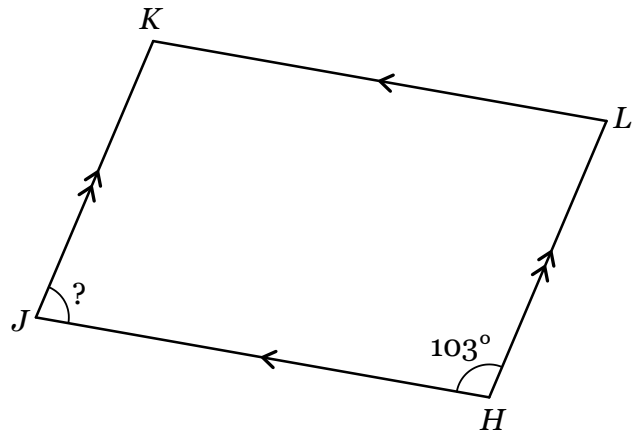
20

HJKL is a parallelogram.

$$\angle H = 103^\circ$$

How big is $\angle J$?

A sharp corner and a wide corner sit at the two ends of every side.



A

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ANSWER

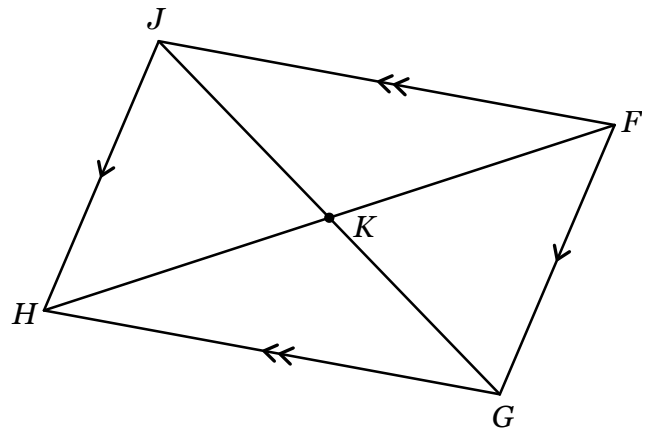
122

FGHJ is a parallelogram. Its diagonals cross at K.

$$GJ = 18 \text{ and } FK = 11$$

How long is KJ?

Which diagonal is this piece part of? Look at that diagonal only.



B

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ANSWER

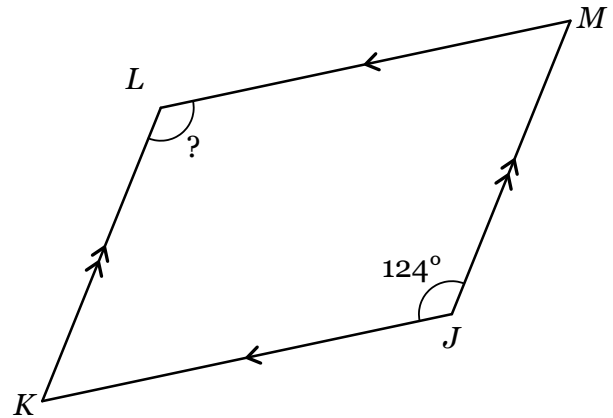
23

JKLM is a parallelogram.

$$\angle J = 124^\circ$$

How big is $\angle L$?

Put a finger on each corner. Do the two corners touch the same side?



C

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ANSWER

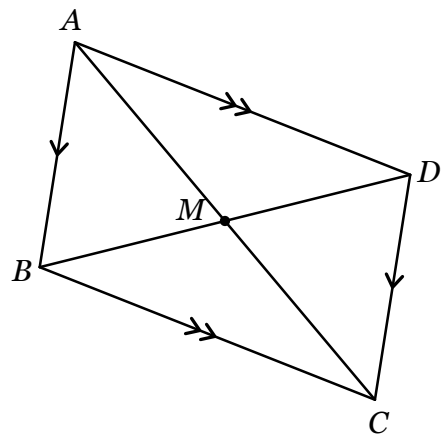
56

ABCD is a parallelogram. Its diagonals cross at M.

$$AM = 11 \text{ and } BD = 18$$

How long is MD?

Which diagonal holds the piece in the question? Use that diagonal.



D

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ANSWER

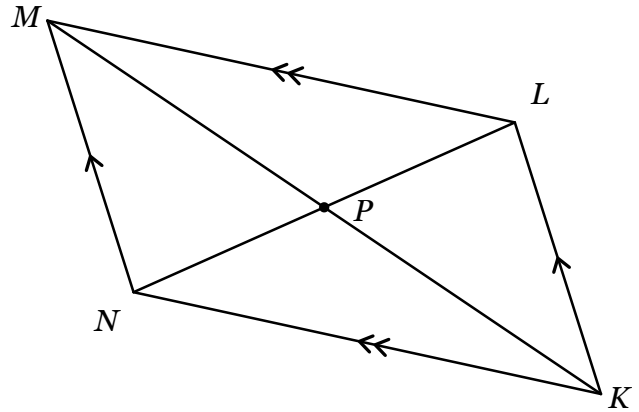
71

KLMN is a parallelogram. Its diagonals cross at P.

KP = 8 and LP = 5

How long is KM?

Each diagonal is cut in half where the two diagonals cross.



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E

ANSWER

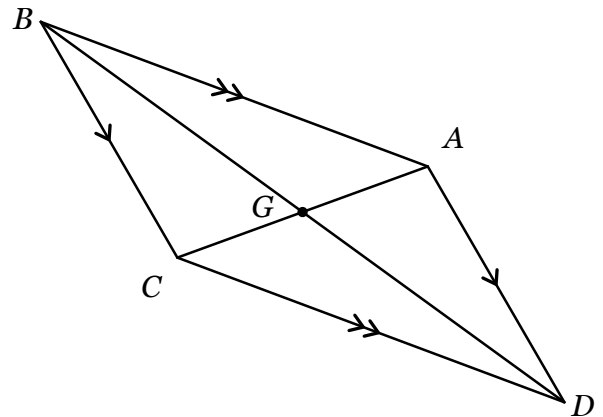
77

BCDA is a parallelogram. Its diagonals cross at G.

BG = 17 and CA = 14

How long is GA?

Two pieces of one diagonal are equal. Pieces of two different diagonals may not be.



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F

ANSWER

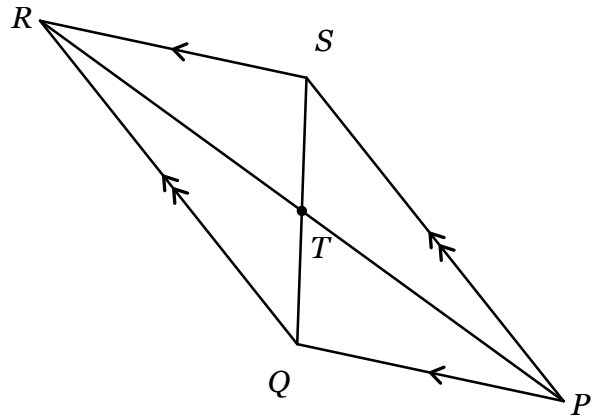
109

PQRS is a parallelogram. Its diagonals cross at T.

$QS = 14$ and $PT = 17$

How long is TS?

A piece of one diagonal says nothing about the other diagonal.



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G

ANSWER

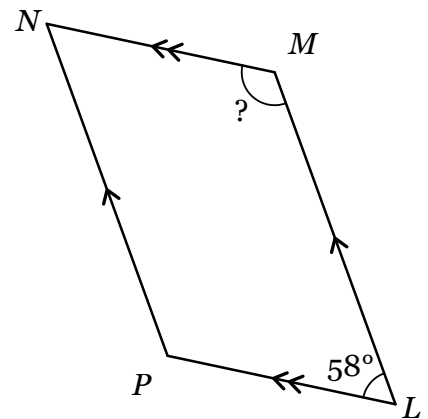
11

LMNP is a parallelogram.

$\angle L = 58^\circ$

How big is $\angle M$?

Do the two corners sit at the ends of one side? Then the angles add to 180° .



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H

ANSWER

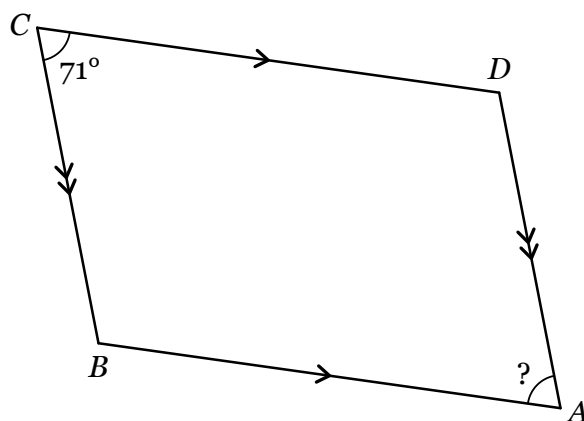
7

CDAB is a parallelogram.

$$\angle C = 71^\circ$$

How big is $\angle A$?

Angles across from each other match. Angles next to each other add to 180° .



J

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ANSWER

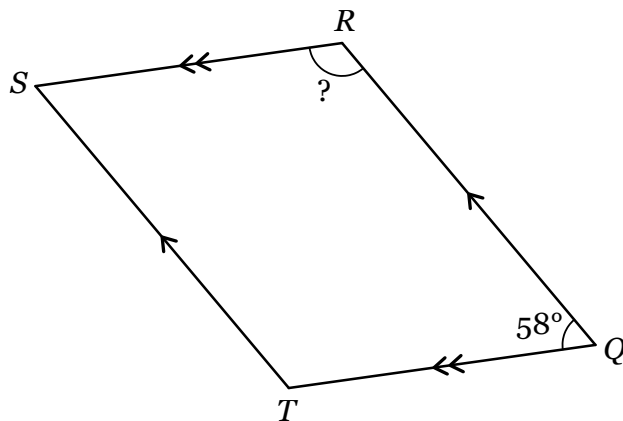
16

QRST is a parallelogram.

$$\angle Q = 58^\circ$$

How big is $\angle R$?

Two angles at the two ends of one side add to 180° .



K

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ANSWER

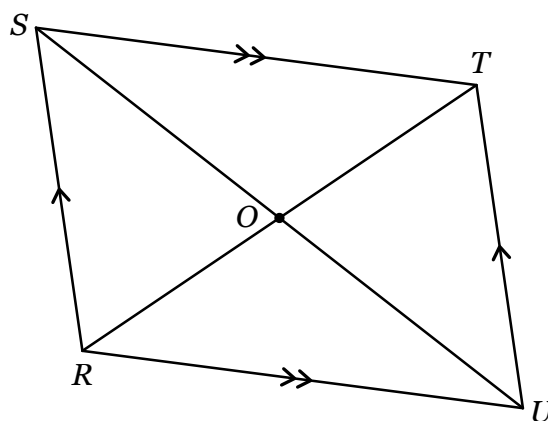
124

RSTU is a parallelogram. Its diagonals cross at O.

SO = 13 and RO = 10

How long is RT?

Find the other piece of the same diagonal. The two pieces make the whole.



L

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ANSWER

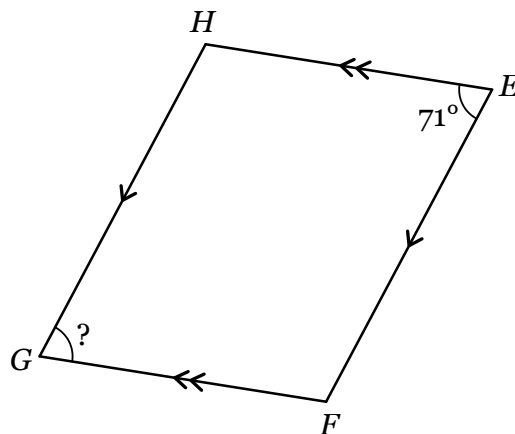
13

EFGH is a parallelogram.

$\angle E = 71^\circ$

How big is $\angle G$?

Across the figure, the two angles are the same size.



M

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ANSWER

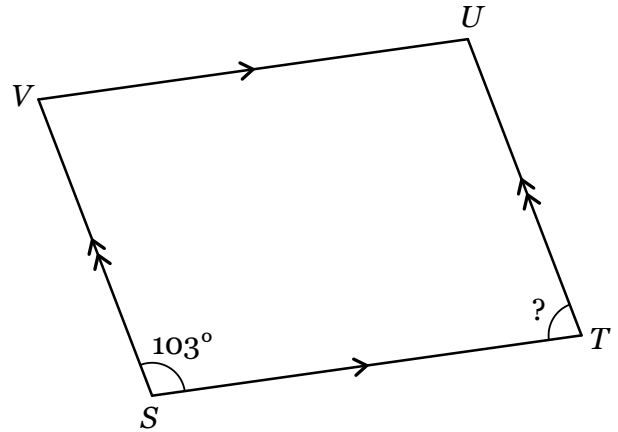
17

STUV is a parallelogram.

$$\angle S = 103^\circ$$

How big is $\angle T$?

Next to each other, one angle is sharp and one is wide.



N

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ANSWER

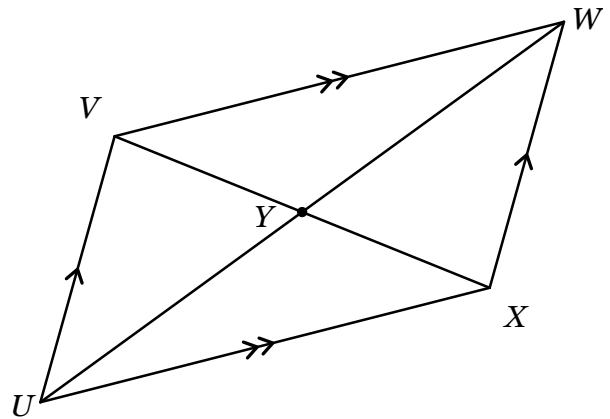
58

UVWX is a parallelogram. Its diagonals cross at Y.

$$VY = 5 \text{ and } UY = 8$$

How long is UW?

Each diagonal has two equal pieces. Which two pieces make this diagonal?



P

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ANSWER

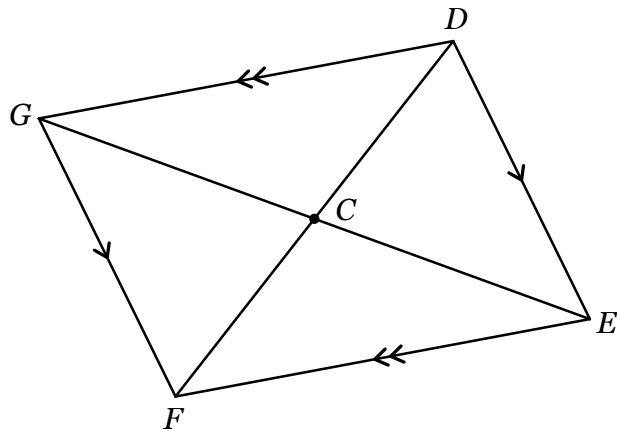
103

DEFG is a parallelogram. Its diagonals cross at C.

DC = 10 and EC = 13

How long is DF?

*The whole diagonal runs from corner to corner.
Which two pieces is it made of?*



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Q

ANSWER

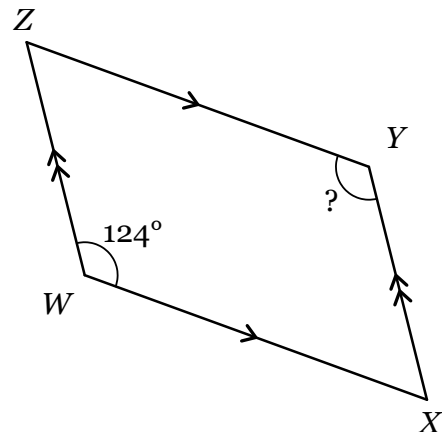
9

WXYZ is a parallelogram.

$\angle W = 124^\circ$

How big is $\angle Y$?

Is the other angle across from this one, or next to it?



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R

Scavenger Hunt — where I went

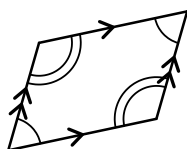
Properties of parallelograms

Name _____

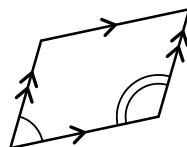
Period _____

Date _____

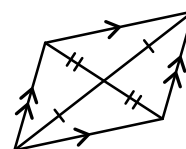
Do the card you are at. Fill in one line. Then find the card with your answer at the top. **Before you work anything out, write the number of the rule you use (1, 2 or 3).** A clean run is eight lines. Each card has a line in small type under the question. **If you are on a card because you went wrong, its line says what to check. If you were right, skip it.**



1. Angles **across** from each other are equal.



2. Two angles **next to each other** add to 180° .



3. The diagonals **cut each other in half**.

Card letter	Rule I use (1, 2 or 3)	My answer
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

How do the parts of a parallelogram come?

Every number stands for a letter. Write the letter for each of your answers in the box above that number. Leave the other boxes empty. Then read the boxes you filled, left to right. **If they do not spell the answer to the joke, one answer is wrong.**

7 = T 9 = W 11 = O 13 = T 16 = O 17 = W 20 = B 23 = T 56 = B 58 = Y 71 = Y 77 = T 103 = O 109 = W
122 = W 124 = O

7	9	11	13	16	17	20	23	56	58	71	77	103	109	122	124	



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Scavenger Hunt — answers

For the teacher

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

J → E → K → B → R → L → A → F → J

How do the parts of a parallelogram come? The answer is *TWO BY TWO*. The ring's answers, in the order of the boxes on the record sheet (smallest number first), with their letters: **7 T • 9 W • 16 O • 20 B • 71 Y • 77 T • 122 W • 124 O**.

The rule numbers are the ones on the record sheet: 1 is “angles across from each other are equal”, 2 is “angles next to each other add to 180°”, and 3 is “the diagonals cut each other in half”.

	Card	Given and asked	Answer, and why	Wrong answer from the common mistake	Joke letter for the number at its top
1	J	$\angle C = 71^\circ$; find $\angle A$	71 (rule 1). $\angle A$ is across from $\angle C$, and opposite angles of a parallelogram are equal. So $\angle A = 71^\circ$.	109, from taking 180° minus the angle, as if the corners were next to each other	T
2	E	KP = 8, LP = 5; find KM	16 (rule 3). P cuts KM in half, so PM = KP = 8 and KM = 8 + 8 = 16. LP is part of the other diagonal, so it is not used.	13, from adding LP, a piece of the other diagonal	Y
3	K	$\angle Q = 58^\circ$; find $\angle R$	122 (rule 2). $\angle Q$ and $\angle R$ are at the two ends of side QR, so they add to 180° . So $\angle R = 180^\circ - 58^\circ = 122^\circ$.	58, from copying the angle, as if the corners were across from each other	O
4	B	GJ = 18, FK = 11; find KJ	9 (rule 3). K cuts GJ in half, so KJ is half of 18, which is 9. FK is part of the other diagonal, so it is not used.	11, from copying FK, a piece of the other diagonal	W
5	R	$\angle W = 124^\circ$; find $\angle Y$	124 (rule 1). $\angle Y$ is across from $\angle W$, and opposite angles of a parallelogram are equal. So $\angle Y = 124^\circ$.	56, from taking 180° minus the angle, as if the corners were next to each other	W
6	L	RO = 10, SO = 13; find RT	20 (rule 3). O cuts RT in half, so OT = RO = 10 and RT = 10 + 10 = 20. SO is part of the other diagonal, so it is not used.	23, from adding SO, a piece of the other diagonal	O
7	A	$\angle H = 103^\circ$; find $\angle J$	77 (rule 2). $\angle H$ and $\angle J$ are at the two ends of side HJ, so they add to 180° . So $\angle J = 180^\circ - 103^\circ = 77^\circ$.	103, from copying the angle, as if the corners were across from each other	B
8	F	CA = 14, BG = 17; find GA	7 (rule 3). G cuts CA in half, so GA is half of 14, which is 7. BG is part of the other diagonal, so it is not used.	17, from copying BG, a piece of the other diagonal	T

Each wrong answer in the table is the number at the top of a card off the ring. Those cards are on the next page.

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 back to the card it got wrong. If the group makes the same mistake again, it goes to another card off the ring. So a second wrong answer never moves a group forward.

Card	Given and asked	Answer, and why	Wrong answer from the common mistake	Joke letter for the number at its top
G	QS = 14, PT = 17; find TS	7 (rule 3). T cuts QS in half, so TS is half of 14, which is 7. PT is part of the other diagonal, so it is not used.	17, from copying PT, a piece of the other diagonal	W
M	$\angle E = 71^\circ$; find $\angle G$	71 (rule 1). $\angle G$ is across from $\angle E$, and opposite angles of a parallelogram are equal. So $\angle G = 71^\circ$.	109, from taking 180° minus the angle, as if the corners were next to each other	T
P	UY = 8, VY = 5; find UW	16 (rule 3). Y cuts UW in half, so YW = UY = 8 and UW = 8 + 8 = 16. VY is part of the other diagonal, so it is not used.	13, from adding VY, a piece of the other diagonal	Y
H	$\angle L = 58^\circ$; find $\angle M$	122 (rule 2). $\angle L$ and $\angle M$ are at the two ends of side LM, so they add to 180° . So $\angle M = 180^\circ - 58^\circ = 122^\circ$.	58, from copying the angle, as if the corners were across from each other	O
D	BD = 18, AM = 11; find MD	9 (rule 3). M cuts BD in half, so MD is half of 18, which is 9. AM is part of the other diagonal, so it is not used.	11, from copying AM, a piece of the other diagonal	B
C	$\angle J = 124^\circ$; find $\angle L$	124 (rule 1). $\angle L$ is across from $\angle J$, and opposite angles of a parallelogram are equal. So $\angle L = 124^\circ$.	56, from taking 180° minus the angle, as if the corners were next to each other	T
Q	DC = 10, EC = 13; find DF	20 (rule 3). C cuts DF in half, so CF = DC = 10 and DF = 10 + 10 = 20. EC is part of the other diagonal, so it is not used.	23, from adding EC, a piece of the other diagonal	O
N	$\angle S = 103^\circ$; find $\angle T$	77 (rule 2). $\angle S$ and $\angle T$ are at the two ends of side ST, so they add to 180° . So $\angle T = 180^\circ - 103^\circ = 77^\circ$.	103, from copying the angle, as if the corners were across from each other	W

Other mistakes lead to no card at all. On a diagonal card a group might give a piece when the whole diagonal is asked, or the whole diagonal when a piece is asked, or double the piece of the other diagonal. Its answer is then not the number at the top of any card, and the group knows to check its work.

Guessing does not work. Every simple rule that uses only the printed numbers, such as always copying the number, answers at most six of the sixteen cards correctly.