

SCAVENGER HUNT



THE TRIANGLE PROPORTIONALITY THEOREM

Which Piece Goes With Which?

One cut triangle on every card · find the length · the cards check the answers

FREE

ANSWER

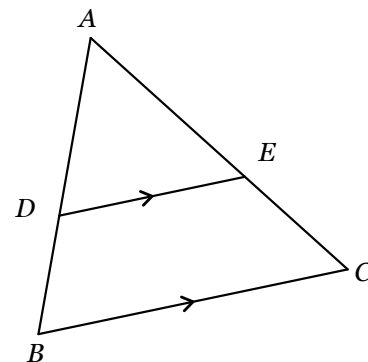
21

$DE \parallel BC$

$AD = 3$, $DB = 2$, $AE = 6$

How long is EC?

Name the four pieces first. Two lie on each side that is cut.



L

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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: *L H E J G B F N*.
2. **Say this once:** “A line parallel to one side cuts the other two sides into pieces that are in proportion. Before any arithmetic, write whether the length asked is a piece, a whole side, or the segment across. Eight right answers bring you back to your first card.”
3. **Each group finds the length, 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 four pieces and the two triangles as two small drawings.
Answers	pages 12–13, for you only. Do not put them up in the room.

Every card shows one triangle with a segment across two of its sides. The segment cuts each of those sides into two pieces. When the segment is parallel to the third side, the pieces are in proportion: the corner piece (the one that touches the corner where the two cut sides meet) over the other piece is the same on both sides. The segment across is not one of the four pieces. It goes with the third side, and with a piece over its whole side.

There are four kinds of card, two of each on the ring. Three pieces given, the fourth asked: the common mistake mixes a piece over a whole side with a piece over a piece. A whole side asked: the common mistake stops at the missing piece. A piece and its whole side given, a piece asked: the common mistake gives the whole side. The segment across asked: the common mistake puts it in a proportion with two pieces. On two ring cards nothing says the segment is parallel, and the question asks what length makes it parallel. That is the converse, and the arithmetic is the same.

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. The common mistake on a ring card gives the number at the top of one of the other cards. That card's answer sends the group back to the card it got wrong. **A clean run is eight lines**, and each wrong answer adds two. 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, ask: “Which four lengths are the pieces?”



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

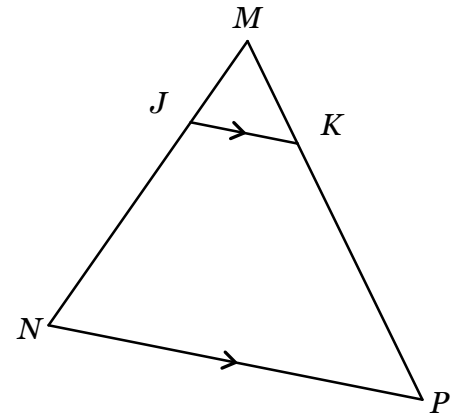
26

$JK \parallel NP$

$MK = 2$, $MJ = 8$, $MP = 7$

How long is JN?

A piece is its whole side take away the other piece.



A

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ANSWER

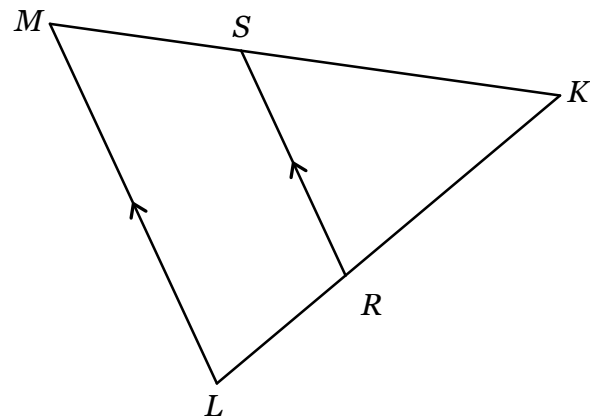
16

$RS \parallel LM$

$KR = 5$, $RL = 3$, $LM = 24$

How long is RS?

The segment across goes with the side it runs beside.



B

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ANSWER

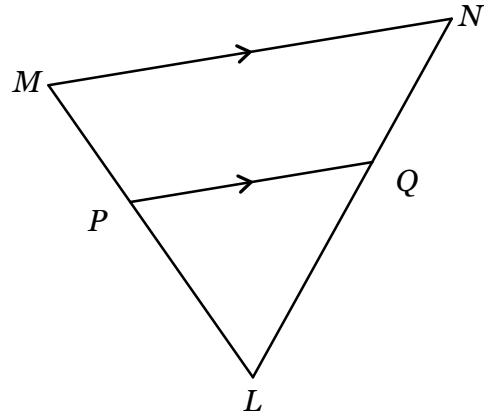
8

$PQ \parallel MN$

$PM = 2$, $LP = 3$, $LQ = 6$

How long is QN?

Read the proportion aloud. Both halves sound the same.



C

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ANSWER

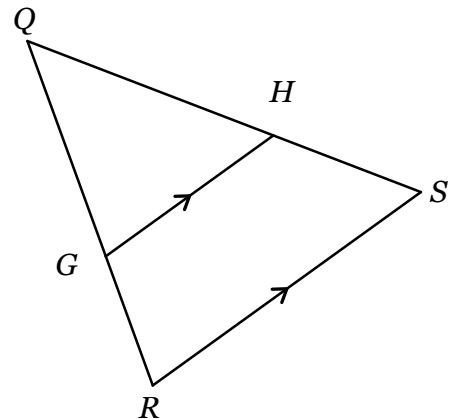
27

$GH \parallel RS$

$RS = 24$, $QH = 5$, $HS = 3$

How long is GH?

With the segment across, use whole sides. Which ones are they?



D

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ANSWER

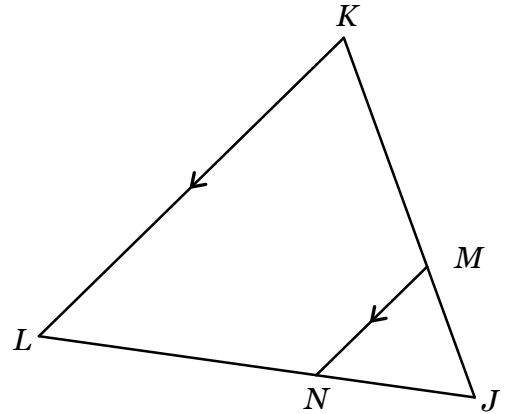
6

$MN \parallel KL$

$JN = 8$, $JM = 4$, $MK = 7$

How long is JL?

Does the question ask for a piece or for a whole side?



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E

ANSWER

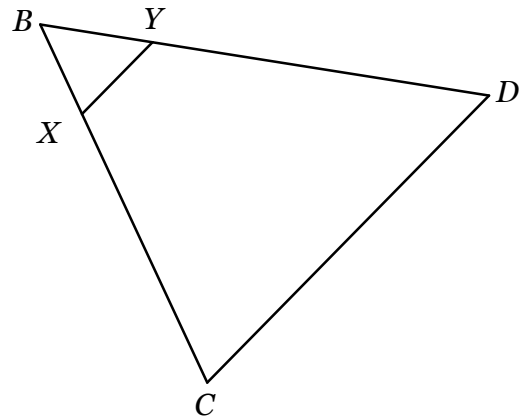
15

Nothing says XY is parallel to CD.

$BY = 3$, $BX = 9$, $YD = 9$

How long must BC be to make XY parallel to CD?

Find the missing piece first. Then read the question again.



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F

ANSWER

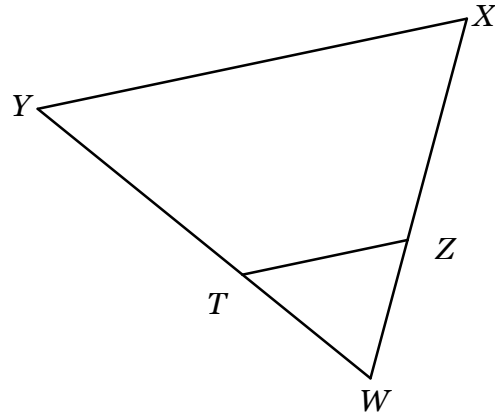
20

Nothing says ZT is parallel to XY .

$WZ = 10$, $WT = 5$, $TY = 8$

How long must ZX be to make ZT parallel to XY ?

Build both fractions the same way: corner piece over the other piece.



G

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ANSWER

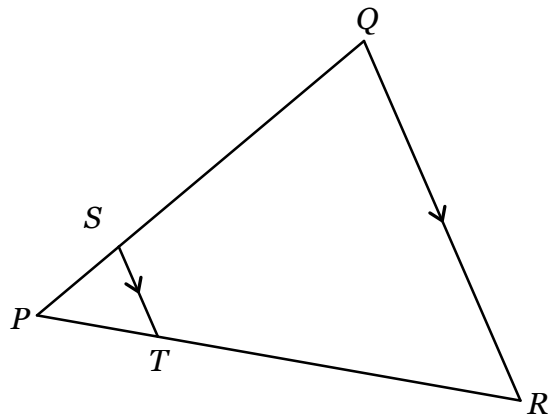
4

$ST \parallel QR$

$QR = 24$, $PT = 3$, $TR = 9$

How long is ST ?

The segment across the triangle is not one of the four pieces.



H

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ANSWER

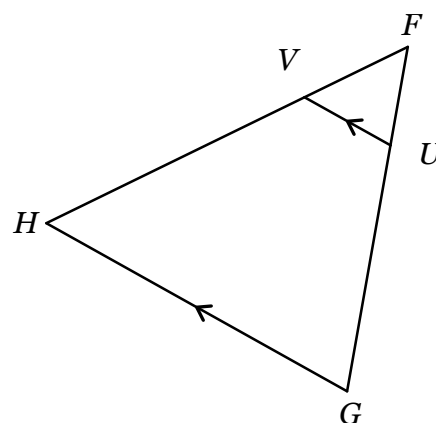
22

$UV \parallel GH$

$FH = 7$, $FV = 2$, $FU = 8$

How long is UG ?

Is each number given a piece or a whole side?



J

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ANSWER

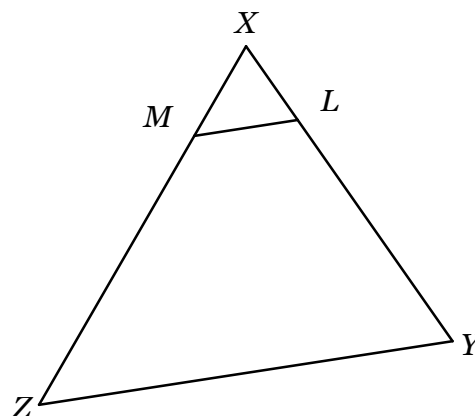
35

Nothing says LM is parallel to YZ .

$LY = 9$, $XM = 9$, $XL = 3$

How long must XZ be to make LM parallel to YZ ?

Put the answer into the proportion. Do the two fractions match?



K

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ANSWER

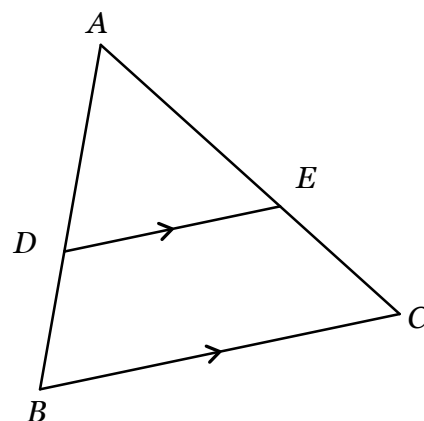
21

$DE \parallel BC$

$AD = 3$, $DB = 2$, $AE = 6$

How long is EC?

Name the four pieces first. Two lie on each side that is cut.



L

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ANSWER

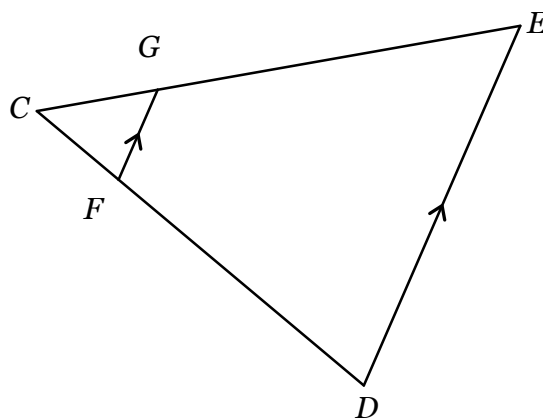
14

$FG \parallel DE$

$CG = 3$, $DE = 24$, $GE = 9$

How long is FG?

Which small triangle has the segment across as one side?



M

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ANSWER

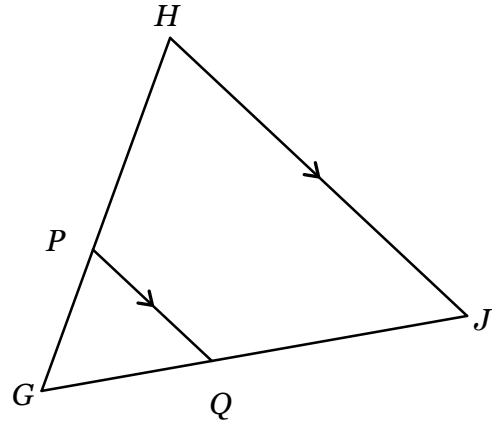
36

$PQ \parallel HJ$

$GQ = 14$, $GH = 15$, $GP = 6$

How long is QJ?

Add the two pieces of a side to get the whole side.



N

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ANSWER

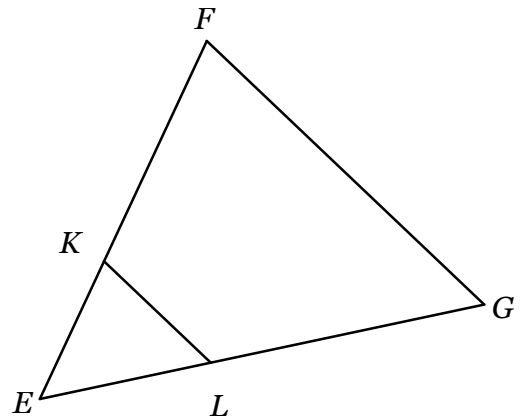
40

Nothing says KL is parallel to FG.

$KF = 8$, $EL = 10$, $EK = 5$

How long must LG be to make KL parallel to FG?

Use pieces on both sides of the equals sign. Never mix a whole side in.



P

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ANSWER

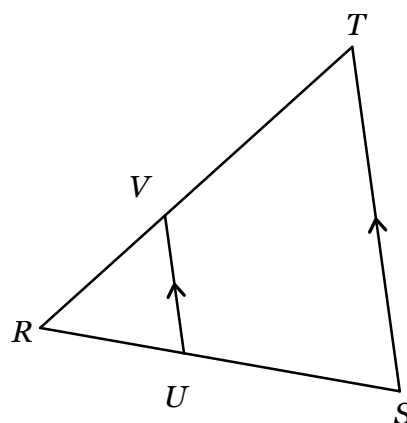
10

$UV \parallel ST$

$RS = 15$, $RV = 14$, $RU = 6$

How long is VT?

A whole side is the sum of its two pieces.



Q

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ANSWER

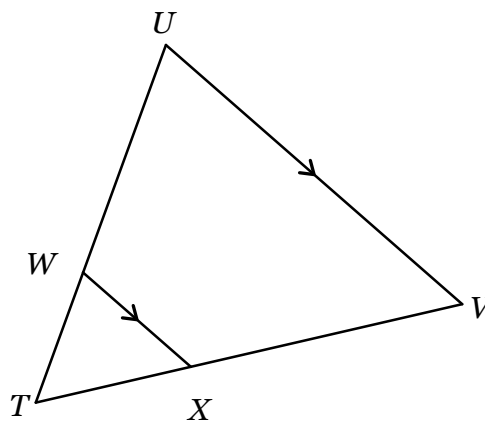
28

$WX \parallel UV$

$TW = 8$, $XV = 7$, $TX = 4$

How long is TU?

The question names a segment. Is it one piece or two?



R

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Scavenger Hunt — where I went

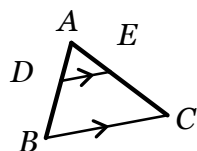
The triangle proportionality theorem

Name _____

Period _____

Date _____

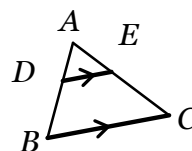
Do the card you are at. Fill in one line. Then find the card with your answer at the top. **Before any arithmetic, write what the question asks for: a piece, a whole side, or the segment across.** The drawings are not to scale. A clean run is eight lines. Each card has a line in small type under the question. **If you are on a card because you went wrong, its line says what to check. If you were right, skip it.**



DE $\parallel$ BC. The four **pieces**: $\frac{AD}{DB} = \frac{AE}{EC}$

DE goes with BC and the **whole** sides: $\frac{DE}{BC} = \frac{AD}{AB}$

AD and AE are the **corner pieces**: they touch A, where the two cut sides meet.



Card letter	The question asks for (a piece, a whole side, or the segment across)	My answer
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

What does a line parallel to one side give the other two sides?

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, one answer is wrong.**

4 = A 6 = F 8 = I 10 = A 14 = F 15 = A 16 = I 20 = R 21 = C 22 = U 26 = R 27 = C 28 = U 35 = T 36 = T
40 = A

4	6	8	10	14	15	16	20	21	22	26	27	28	35	36	40



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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.

L → H → E → J → G → B → F → N → L

What does a line parallel to one side give the other two sides? The answer is *A FAIR CUT*. The ring's answers, in the order of the boxes on the record sheet (smallest number first), with their letters: **4 A • 6 F • 15 A • 16 I • 20 R • 21 C • 22 U • 36 T**.

Card	The question on the card	Answer, and why	Wrong answer from the common mistake	Joke letter for the number at its top
1 L	DE BC. AD = 3, DB = 2, AE = 6. How long is EC?	4. Corner piece over the other piece on both sides: AD/DB = AE/EC, so $3/2 = 6/EC$ and $EC = 6 \times 2 \div 3 = 4$.	10, from a piece over a piece on one side, and a piece over the whole side on the other	C
2 H	ST QR. QR = 24, PT = 3, TR = 9. How long is ST?	6. ST goes with QR and a piece over its whole side: PR = 3 + 9 = 12, and ST/QR = PT/PR, so $ST = 24 \times 3 \div 12 = 6$.	8, from putting the segment across into a proportion with two pieces	A
3 E	MN KL. JN = 8, JM = 4, MK = 7. How long is JL?	22. First the missing piece: JM/MK = JN/NL, so $NL = 8 \times 7 \div 4 = 14$. Then $JL = 8 + 14 = 22$.	14, from finding the missing piece and stopping there	F
4 J	UV GH. FH = 7, FV = 2, FU = 8. How long is UG?	20. Piece over whole side on both sides: FV/FH = FU/FG, so $FG = 8 \times 7 \div 2 = 28$. Then $UG = 28 - 8 = 20$.	28, from giving the whole side instead of the piece	U
5 G	Nothing says ZT is parallel to XY. WZ = 10, WT = 5, TY = 8. How long must ZX be to make ZT parallel to XY?	16. For ZT to be parallel to XY, the pieces must be in proportion. Corner piece over the other piece on both sides: WT/TY = WZ/ZX, so $5/8 = 10/ZX$ and $ZX = 10 \times 8 \div 5 = 16$.	26, from a piece over a piece on one side, and a piece over the whole side on the other	R
6 B	RS LM. KR = 5, RL = 3, LM = 24. How long is RS?	15. RS goes with LM and a piece over its whole side: KL = 5 + 3 = 8, and RS/LM = KR/KL, so $RS = 24 \times 5 \div 8 = 15$.	40, from putting the segment across into a proportion with two pieces	I
7 F	Nothing says XY is parallel to CD. BY = 3, BX = 9, YD = 9. How long must BC be to make XY parallel to CD?	36. For XY to be parallel to CD, the pieces must be in proportion. First the missing piece: BY/YD = BX/XC, so $XC = 9 \times 9 \div 3 = 27$. Then $BC = 9 + 27 = 36$.	27, from finding the missing piece and stopping there	A
8 N	PQ HJ. GQ = 14, GH = 15, GP = 6. How long is QJ?	21. Piece over whole side on both sides: GP/GH = GQ/GJ, so $GJ = 14 \times 15 \div 6 = 35$. Then $QJ = 35 - 14 = 21$.	35, from giving the whole side instead of the piece	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	The question on the card	Answer, and why	Wrong answer from the common mistake	Joke letter for the number at its top
Q	UV $\parallel$ ST. RS = 15, RV = 14, RU = 6. How long is VT?	21. Piece over whole side on both sides: RU/RS = RV/RT, so RT = $14 \times 15 \div 6 = 35$. Then VT = $35 - 14 = 21$.	35, from giving the whole side instead of the piece	A
C	PQ $\parallel$ MN. PM = 2, LP = 3, LQ = 6. How long is QN?	4. Corner piece over the other piece on both sides: LP/PM = LQ/QN, so $3/2 = 6/QN$ and QN = $6 \times 2 \div 3 = 4$.	10, from a piece over a piece on one side, and a piece over the whole side on the other	I
M	FG $\parallel$ DE. CG = 3, DE = 24, GE = 9. How long is FG?	6. FG goes with DE and a piece over its whole side: CE = $3 + 9 = 12$, and FG/DE = CG/CE, so FG = $24 \times 3 \div 12 = 6$.	8, from putting the segment across into a proportion with two pieces	F
R	WX $\parallel$ UV. TW = 8, XV = 7, TX = 4. How long is TU?	22. First the missing piece: TX/XV = TW/WU, so WU = $8 \times 7 \div 4 = 14$. Then TU = $8 + 14 = 22$.	14, from finding the missing piece and stopping there	U
A	JK $\parallel$ NP. MK = 2, MJ = 8, MP = 7. How long is JN?	20. Piece over whole side on both sides: MK/MP = MJ/MN, so MN = $8 \times 7 \div 2 = 28$. Then JN = $28 - 8 = 20$.	28, from giving the whole side instead of the piece	R
P	Nothing says KL is parallel to FG. KF = 8, EL = 10, EK = 5. How long must LG be to make KL parallel to FG?	16. For KL to be parallel to FG, the pieces must be in proportion. Corner piece over the other piece on both sides: EK/KF = EL/LG, so $5/8 = 10/LG$ and LG = $10 \times 8 \div 5 = 16$.	26, from a piece over a piece on one side, and a piece over the whole side on the other	A
D	GH $\parallel$ RS. RS = 24, QH = 5, HS = 3. How long is GH?	15. GH goes with RS and a piece over its whole side: QS = $5 + 3 = 8$, and GH/RS = QH/QS, so GH = $24 \times 5 \div 8 = 15$.	40, from putting the segment across into a proportion with two pieces	C
K	Nothing says LM is parallel to YZ. LY = 9, XM = 9, XL = 3. How long must XZ be to make LM parallel to YZ?	36. For LM to be parallel to YZ, the pieces must be in proportion. First the missing piece: XL/LY = XM/MZ, so MZ = $9 \times 9 \div 3 = 27$. Then XZ = $9 + 27 = 36$.	27, from finding the missing piece and stopping there	T

Other mistakes lead to no card at all. A group might turn one fraction upside down, add the difference between two pieces instead of multiplying, or take half of the third side. 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 multiplying two of them and dividing by the third, answers at most two of the sixteen cards correctly.