

SCAVENGER HUNT



SCALE DRAWINGS AND SCALE FACTOR

How Many Times Bigger, and Which Way?

An original and a drawing on every card · find the factor or a side · the cards check the answers

FREE

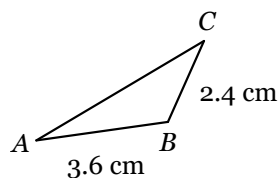
ANSWER

8

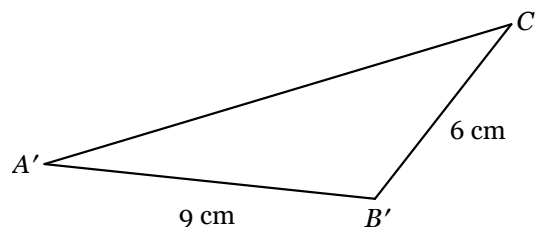
$AB = 3.6$ cm, $BC = 2.4$ cm, $A'B' = 9$ cm, $B'C' = 6$ cm

Find the scale factor from the ORIGINAL to the DRAWING.

For a factor, divide a side of the second figure by its match in the first.



ORIGINAL



DRAWING

E

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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: *E L A Q G N C J*.
2. **Say this once:** “A scale drawing multiplies every length by the same number. Read which figure the factor goes from. Write your division before you answer. Eight right answers bring you back to your first card.”
3. **Each group finds the number, then walks to the card with that number at the top.** Calculators are fine.

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 original and a scale drawing of it, with the factor worked out both ways.
Answers	pages 12–13, for you only. Do not put them up in the room.

Every card shows a triangle marked ORIGINAL and a scale drawing of it marked DRAWING. Matching corners have matching letters, such as A and A'. On four ring cards the group finds the scale factor from one figure to the other. The factor from the original to the drawing is a drawing length divided by the matching original length. The other way round, it is the original length divided by the drawing length. The most common mistake is to divide the wrong way round, often because students think a factor must be more than 1. On the other four ring cards the group finds a missing side. The most common mistake is to add the difference of two matching sides instead of multiplying by the factor.

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. On every ring card, the common mistake gives the number at the top of one of the eight other cards. The group does that card, and its answer sends the group back to the card it got wrong. If the group makes the same mistake there, it goes one more card back and still does not reach the ring.

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 small type under the question. It tells a group that arrived by a wrong answer what to check. A group that arrived by a right answer skips it. If a group keeps coming back to the same cards, do not give the answer. Ask: “Which figure does the factor go from? Which length goes on top of your division?”



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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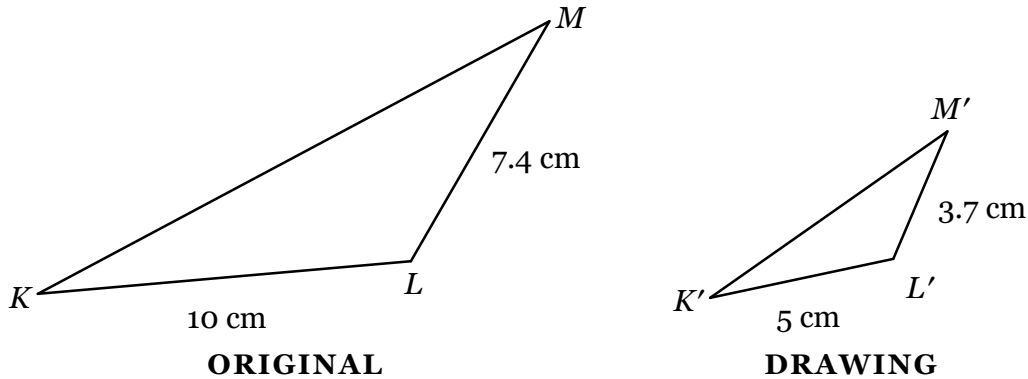
ANSWER

7

$KL = 10 \text{ cm}$, $LM = 7.4 \text{ cm}$, $K'L' = 5 \text{ cm}$, $L'M' = 3.7 \text{ cm}$

Find the scale factor from the ORIGINAL to the DRAWING.

A factor less than 1 makes a figure smaller. Which figure is smaller here?



A

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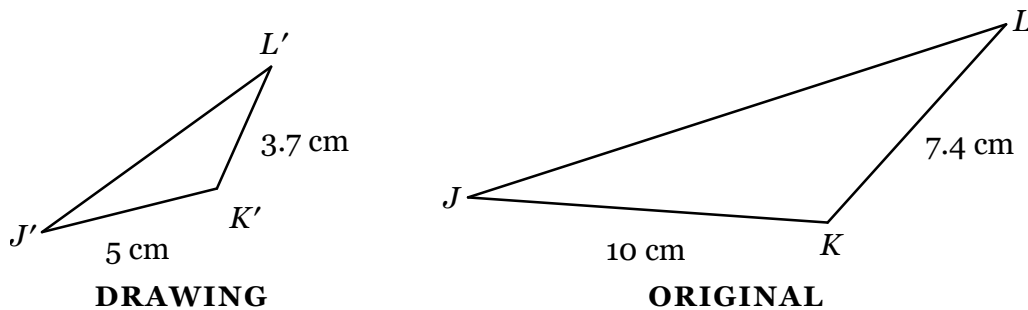
ANSWER

3.4

$JK = 10 \text{ cm}$, $KL = 7.4 \text{ cm}$, $J'K' = 5 \text{ cm}$, $K'L' = 3.7 \text{ cm}$

Find the scale factor from the ORIGINAL to the DRAWING.

A factor more than 1 makes a figure bigger. Is the second figure bigger?



B

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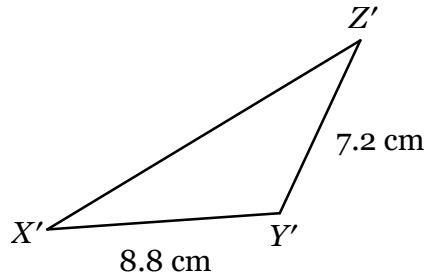
ANSWER

4

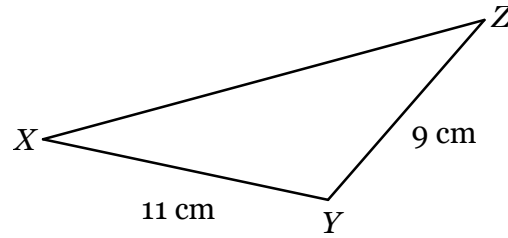
$XY = 11\text{ cm}$, $YZ = 9\text{ cm}$, $X'Y' = 8.8\text{ cm}$, $Y'Z' = 7.2\text{ cm}$

Find the scale factor from the DRAWING to the ORIGINAL.

Divide the second pair too. Both divisions give the same factor.



DRAWING



ORIGINAL

C

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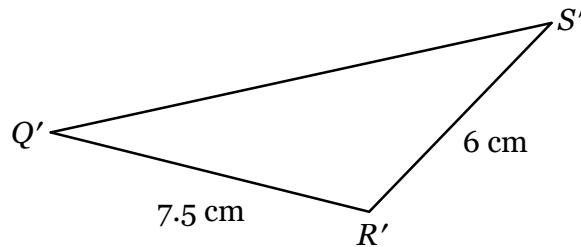
ANSWER

0.8

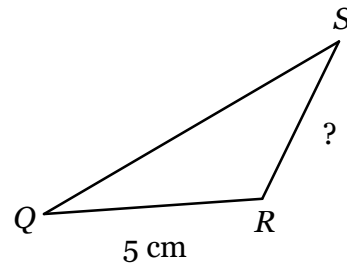
$Q'R' = 7.5\text{ cm}$, $QR = 5\text{ cm}$, $R'S' = 6\text{ cm}$

How long is RS?

Two matching sides give the factor. Does your answer give it too?



DRAWING



ORIGINAL

D

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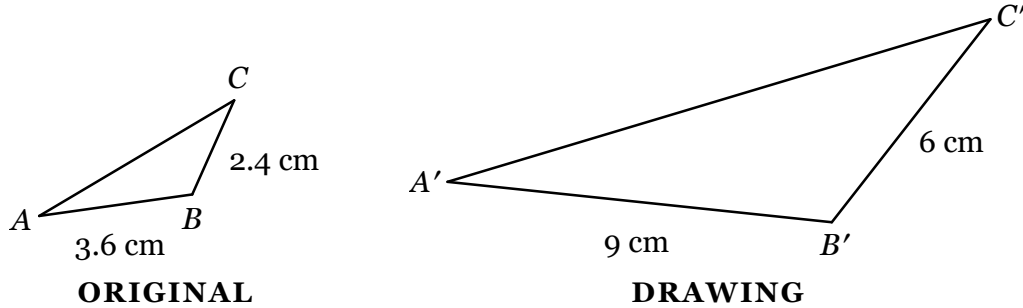
ANSWER

8

$AB = 3.6$ cm, $BC = 2.4$ cm, $A'B' = 9$ cm, $B'C' = 6$ cm

Find the scale factor from the ORIGINAL to the DRAWING.

For a factor, divide a side of the second figure by its match in the first.



E

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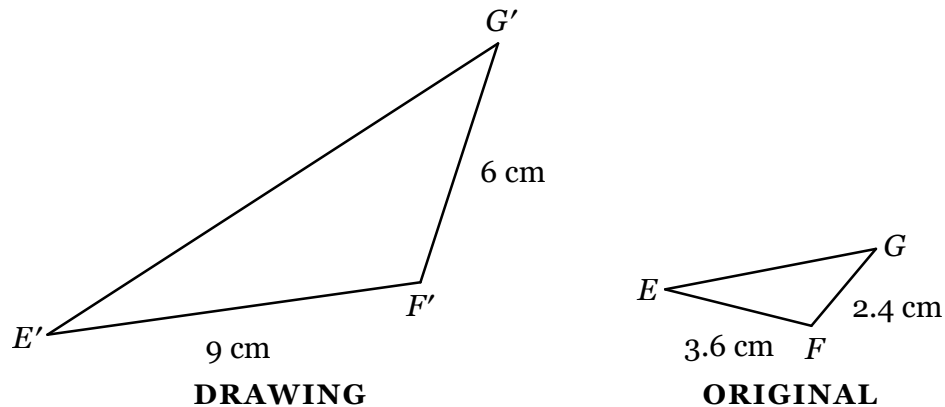
ANSWER

8.5

$EF = 3.6$ cm, $FG = 2.4$ cm, $E'F' = 9$ cm, $F'G' = 6$ cm

Find the scale factor from the ORIGINAL to the DRAWING.

Which figure comes first in the question? Its length goes on the bottom.



F

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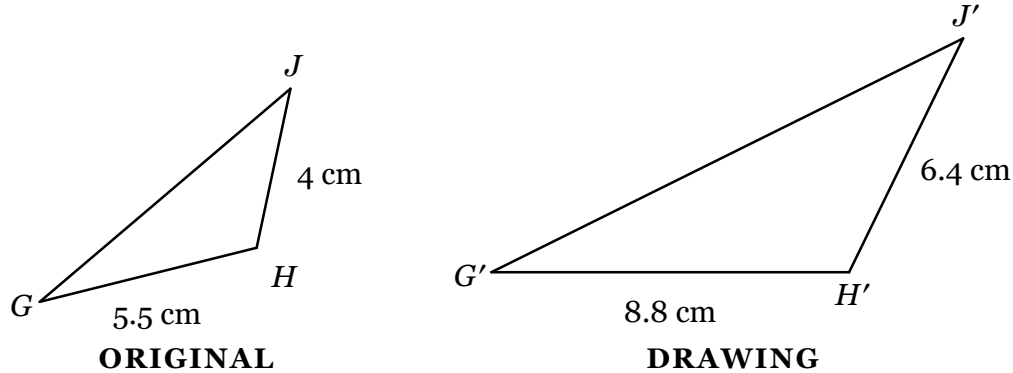
ANSWER

4.8

$GH = 5.5$ cm, $HJ = 4$ cm, $G'H' = 8.8$ cm, $H'J' = 6.4$ cm

Find the scale factor from the DRAWING to the ORIGINAL.

Read the question again. Which figure does the factor start from?



G

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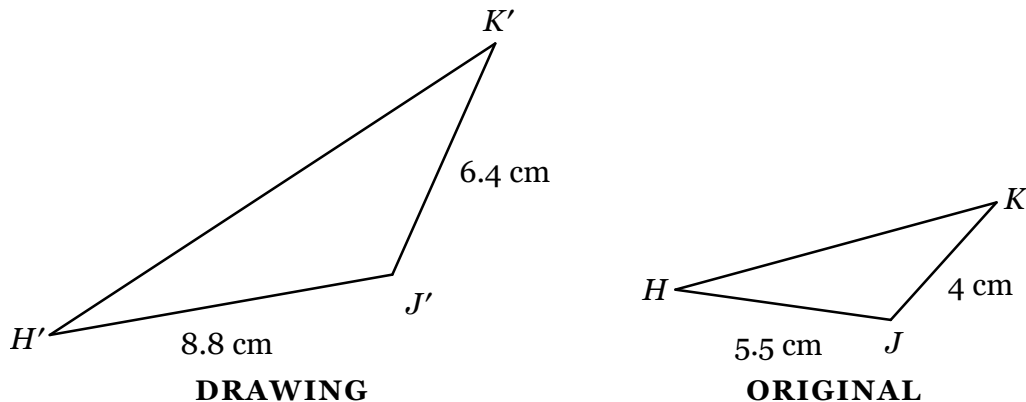
ANSWER

3.5

$HJ = 5.5$ cm, $JK = 4$ cm, $H'J' = 8.8$ cm, $J'K' = 6.4$ cm

Find the scale factor from the DRAWING to the ORIGINAL.

Write the division first. The figure the factor goes to is on top.



H

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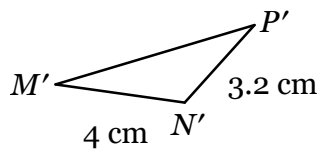
ANSWER

1.25

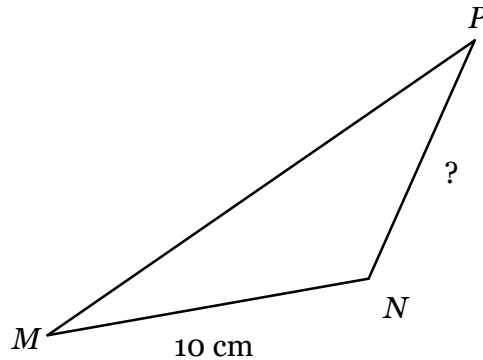
$M'N' = 4$ cm, $MN = 10$ cm, $N'P' = 3.2$ cm

How long is NP?

Is the original the bigger figure? Then its side is longer than the matching side.



DRAWING



ORIGINAL

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J

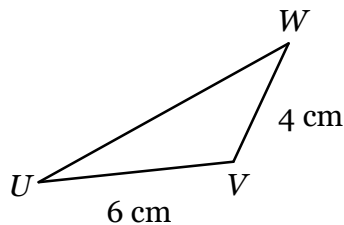
ANSWER

2

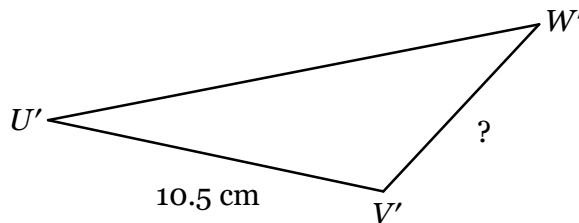
$UV = 6$ cm, $U'V' = 10.5$ cm, $VW = 4$ cm

How long is V'W'?

Divide a pair of matching sides. Then multiply the third side by that factor.



ORIGINAL



DRAWING

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K

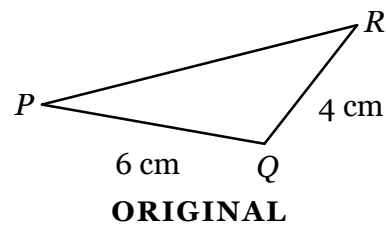
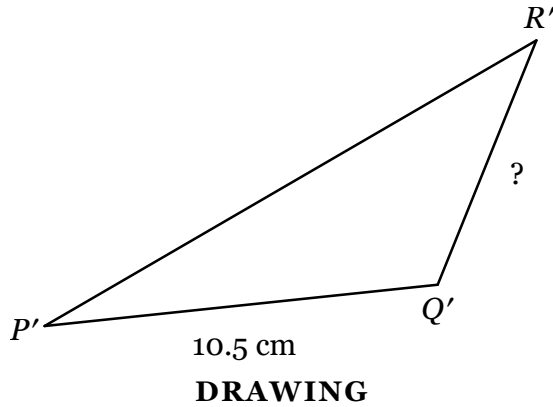
ANSWER

2.5

$PQ = 6 \text{ cm}$, $P'Q' = 10.5 \text{ cm}$, $QR = 4 \text{ cm}$

How long is $Q'R'$?

Find the factor first. Then multiply the other side by it.



L

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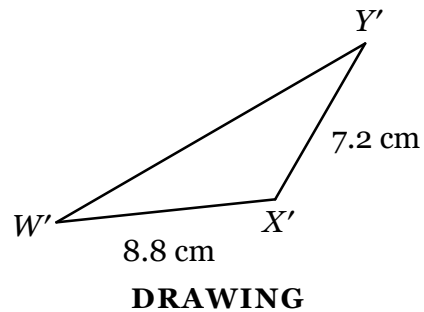
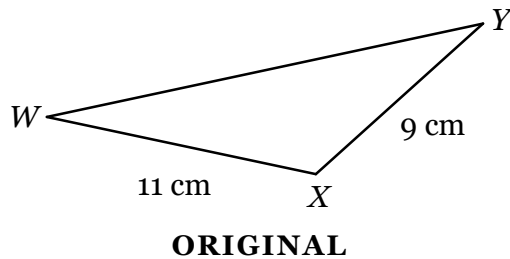
ANSWER

9.2

$WX = 11 \text{ cm}$, $XY = 9 \text{ cm}$, $W'X' = 8.8 \text{ cm}$, $X'Y' = 7.2 \text{ cm}$

Find the scale factor from the DRAWING to the ORIGINAL.

Check both pairs of sides. The two divisions must agree.



M

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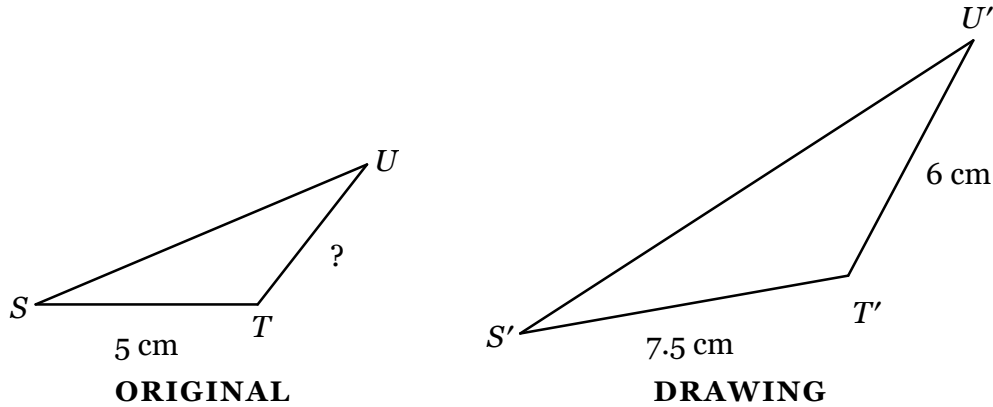
ANSWER

0.625

$S'T' = 7.5$ cm, $ST = 5$ cm, $T'U' = 6$ cm

How long is TU?

The two pairs of matching sides give the same factor. Test your answer with it.



N

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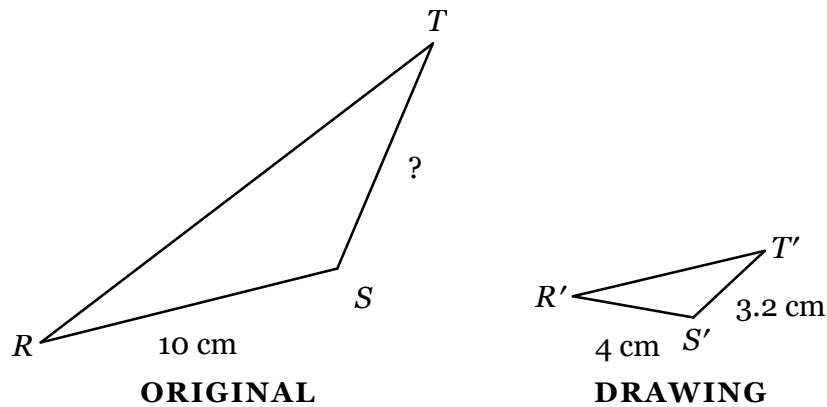
ANSWER

0.4

$R'S' = 4$ cm, $RS = 10$ cm, $S'T' = 3.2$ cm

How long is ST?

Multiply, do not add. Each side of the drawing is the factor times its match.



P

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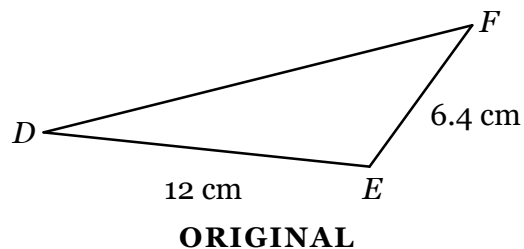
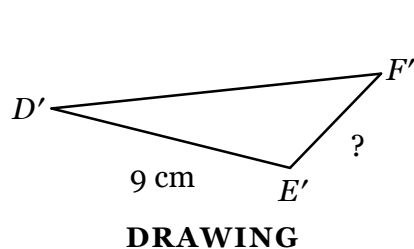
ANSWER

0.5

$DE = 12\text{ cm}$, $D'E' = 9\text{ cm}$, $EF = 6.4\text{ cm}$

How long is $E'F'$?

A scale drawing multiplies every length. Adding one amount to each side changes the shape.



Q

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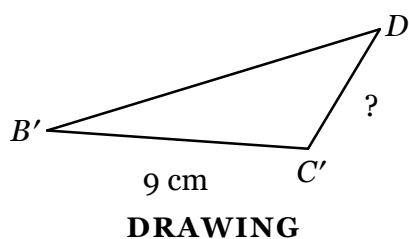
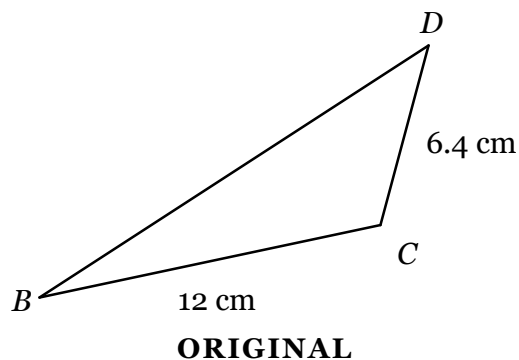
ANSWER

1.6

$BC = 12\text{ cm}$, $B'C' = 9\text{ cm}$, $CD = 6.4\text{ cm}$

How long is $C'D'$?

Adding one amount to every side is not a scale drawing. Use the factor.



R

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Scavenger Hunt — where I went

Scale drawings and scale factor

Name _____

Period _____

Date _____

Do the card you are at. Fill in one line. Then find the card with your answer at the top. The drawings on the cards are not full size, so use the numbers printed on them. **Write your division before you write your answer.** 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.**

2.4 cm  4 cm <i>original</i> 3.6 cm  6 cm <i>drawing</i>	A scale drawing multiplies every length by the same number. The angles do not change. The scale factor from the original to the drawing is $6 \div 4 = 1.5$. Check with the other pair: $3.6 \div 2.4 = 1.5$. The scale factor from the drawing to the original is $4 \div 6 = 2/3$. A factor more than 1 makes a figure bigger. Less than 1 makes it smaller.
--	---

Card letter	My division	My answer
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Where does a scale drawing of a city live?

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 a word, one answer is wrong.**

0.4 = N 0.5 = T 0.625 = I 0.8 = O 1.25 = N 1.6 = T 2 = W 2.5 = Y 3.4 = I 3.5 = N 4 = T 4.8 = O 7 = W 8 = N
8.5 = T 9.2 = Y

0.4	0.5	0.625	0.8	1.25	1.6	2	2.5	3.4	3.5	4	4.8	7	8	8.5	9.2	



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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.

E → L → A → Q → G → N → C → J → E

Where does a scale drawing of a city live? The answer is *TINY TOWN*. The ring's answers, in the order of the boxes on the record sheet (smallest number first), with their letters: **0.5 T • 0.625 I • 1.25 N • 2.5 Y • 4 T • 4.8 O • 7 W • 8 N**.

Card	Given and asked	Answer, and why	Wrong answer from the common mistake	Joke letter for the number at its top
1 E	AB = 3.6 cm, BC = 2.4 cm, A'B' = 9 cm, B'C' = 6 cm. Find the scale factor from the ORIGINAL to the DRAWING.	2.5 . From the original to the drawing: $9 \div 3.6 = 2.5$, and the other pair gives $6 \div 2.4 = 2.5$.	0.4, from dividing the other way round: $3.6 \div 9$	N
2 L	PQ = 6 cm, P'Q' = 10.5 cm, QR = 4 cm. How long is Q'R'?	7 . The factor from the original to the drawing is $10.5 \div 6 = 1.75$, so $Q'R' = 4 \times 1.75 = 7$ cm.	8.5, from adding the difference: $4 + 4.5$	Y
3 A	KL = 10 cm, LM = 7.4 cm, K'L' = 5 cm, L'M' = 3.7 cm. Find the scale factor from the ORIGINAL to the DRAWING.	0.5 . From the original to the drawing: $5 \div 10 = 0.5$, and the other pair gives $3.7 \div 7.4 = 0.5$.	2, from dividing the other way round: $10 \div 5$	W
4 Q	DE = 12 cm, D'E' = 9 cm, EF = 6.4 cm. How long is E'F'?	4.8 . The factor from the original to the drawing is $9 \div 12 = 0.75$, so $E'F' = 6.4 \times 0.75 = 4.8$ cm.	3.4, from taking the difference away: $6.4 - 3$	T
5 G	GH = 5.5 cm, HJ = 4 cm, G'H' = 8.8 cm, H'J' = 6.4 cm. Find the scale factor from the DRAWING to the ORIGINAL.	0.625 . From the drawing to the original: $5.5 \div 8.8 = 0.625$, and the other pair gives $4 \div 6.4 = 0.625$.	1.6, from dividing the other way round: $8.8 \div 5.5$	O
6 N	S'T' = 7.5 cm, ST = 5 cm, T'U' = 6 cm. How long is TU?	4 . The factor from the drawing to the original is $5 \div 7.5$, so $TU = 6 \times 5 \div 7.5 = 4$ cm.	3.5, from taking the difference away: $6 - 2.5$	I
7 C	XY = 11 cm, YZ = 9 cm, X'Y' = 8.8 cm, Y'Z' = 7.2 cm. Find the scale factor from the DRAWING to the ORIGINAL.	1.25 . From the drawing to the original: $11 \div 8.8 = 1.25$, and the other pair gives $9 \div 7.2 = 1.25$.	0.8, from dividing the other way round: $8.8 \div 11$	T
8 J	M'N' = 4 cm, MN = 10 cm, N'P' = 3.2 cm. How long is NP?	8 . The factor from the drawing to the original is $10 \div 4 = 2.5$, so $NP = 3.2 \times 2.5 = 8$ cm.	9.2, from adding the difference: $3.2 + 6$	N

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
P	$R'S' = 4$ cm, $RS = 10$ cm, $S'T' = 3.2$ cm. How long is ST ?	8. The factor from the drawing to the original is $10 \div 4 = 2.5$, so $ST = 3.2 \times 2.5 = 8$ cm.	9.2, from adding the difference: $3.2 + 6$	N
F	$EF = 3.6$ cm, $FG = 2.4$ cm, $E'F' = 9$ cm, $F'G' = 6$ cm. Find the scale factor from the ORIGINAL to the DRAWING.	2.5. From the original to the drawing: $9 \div 3.6 = 2.5$, and the other pair gives $6 \div 2.4 = 2.5$.	0.4, from dividing the other way round: $3.6 \div 9$	T
K	$UV = 6$ cm, $U'V' = 10.5$ cm, $VW = 4$ cm. How long is $V'W'$?	7. The factor from the original to the drawing is $10.5 \div 6 = 1.75$, so $V'W' = 4 \times 1.75 = 7$ cm.	8.5, from adding the difference: $4 + 4.5$	W
B	$JK = 10$ cm, $KL = 7.4$ cm, $J'K' = 5$ cm, $K'L' = 3.7$ cm. Find the scale factor from the ORIGINAL to the DRAWING.	0.5. From the original to the drawing: $5 \div 10 = 0.5$, and the other pair gives $3.7 \div 7.4 = 0.5$.	2, from dividing the other way round: $10 \div 5$	I
R	$BC = 12$ cm, $B'C' = 9$ cm, $CD = 6.4$ cm. How long is $C'D'$?	4.8. The factor from the original to the drawing is $9 \div 12 = 0.75$, so $C'D' = 6.4 \times 0.75 = 4.8$ cm.	3.4, from taking the difference away: $6.4 - 3$	T
H	$HJ = 5.5$ cm, $JK = 4$ cm, $H'J' = 8.8$ cm, $J'K' = 6.4$ cm. Find the scale factor from the DRAWING to the ORIGINAL.	0.625. From the drawing to the original: $5.5 \div 8.8 = 0.625$, and the other pair gives $4 \div 6.4 = 0.625$.	1.6, from dividing the other way round: $8.8 \div 5.5$	N
D	$Q'R' = 7.5$ cm, $QR = 5$ cm, $R'S' = 6$ cm. How long is RS ?	4. The factor from the drawing to the original is $5 \div 7.5$, so $RS = 6 \times 5 \div 7.5 = 4$ cm.	3.5, from taking the difference away: $6 - 2.5$	O
M	$WX = 11$ cm, $XY = 9$ cm, $W'X' = 8.8$ cm, $X'Y' = 7.2$ cm. Find the scale factor from the DRAWING to the ORIGINAL.	1.25. From the drawing to the original: $11 \div 8.8 = 1.25$, and the other pair gives $9 \div 7.2 = 1.25$.	0.8, from dividing the other way round: $8.8 \div 11$	Y

Other mistakes lead to no card at all. A group might give the difference of two matching sides as the factor, or use the factor the wrong way round on a 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 always dividing the larger number by the smaller, answers at most four of the sixteen cards correctly.