

ANSWER MAZE



THE TRIANGLE PROPORTIONALITY THEOREM

A Piece, a Whole Side, or the Segment Across?

One page · 10–15 minutes · nothing to prepare

FREE

3

AD = 6, DB = 9, AE = 8. How long is EC?

EC = 20 → go to 2

EC = 12 → go to 6

Which two pieces lie on AB? Which two lie on AC?

6

AD = 4, DB = 6, AE = 6. How long is AC?

AC = 15 → go to 1

AC = 9 → go to 5

Does the question ask for a piece or for the whole of AC?

1. **Hand out page 3**, one per student. Nothing else is needed.
2. **Say this once:** *“Start at box 3. Before any arithmetic, say which lengths go together, and whether the question asks for a piece or a whole side. Write every box number in the row at the bottom as you go.”*
3. **Check a sheet quickly.** A student with no mistakes writes **3 6 1 8 4 7**: six boxes, then out.

Student sheet	page 3, one per student. One triangle at the top, with DE parallel to BC, is used by every box.
Answers	page 4.

The theorem. DE is parallel to BC, so it cuts AB and AC into pieces that are in proportion: $AD/DB = AE/EC$, and also $AD/AB = AE/AC$. DE itself is not one of the four pieces. It goes with BC and with a piece over its whole side: $DE/BC = AD/AB$.

Every wrong answer comes from one of two mistakes. The first is putting the wrong lengths together: a piece over a piece on one side of the equals sign and a piece over a whole side on the other, or DE in a proportion with two pieces. These wrong answers send the student to box 2. The second is mixing up a piece and a whole side: finding the missing piece and handing it in when the question asks for the whole side, or handing in the whole side when it asks for a piece. These send the student to box 5. Boxes 2 and 5 ask the same kind of question again, and both of their answers lead back to the route.

The row at the bottom is the check. A clean run is six numbers. Each wrong answer adds at least one more. Guessing does not get a student out: every simple guessing rule, such as always taking the smaller number, goes wrong within the first four boxes.



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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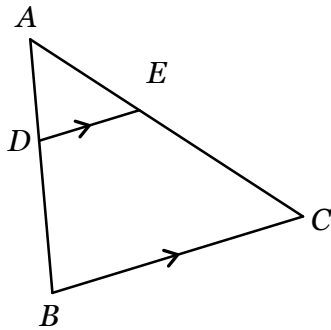
Answer Maze

Start at box 3 · triangle proportionality

Name _____

Period _____

Date _____



$DE \parallel BC$. AD, DB, AE and EC are the four **pieces**. AB and AC are **whole sides**.

$$\frac{AD}{DB} = \frac{AE}{EC} \quad \frac{AD}{AB} = \frac{AE}{AC} \quad \frac{DE}{BC} = \frac{AD}{AB}$$

Every box uses this triangle. The drawing is not to scale. Choose an answer, and go to the box it names.

1

AD = 3, DB = 9, DE = 5. How long is BC?

BC = 20 → go to 8

BC = 15 → go to 2

DE is not one of the four pieces. Which fraction belongs beside DE over BC?

2

AD = 6, AB = 15, DE = 8. How long is BC?

BC = 12 → go to 3

BC = 20 → go to 6

Put a finger on DE. Which side runs beside it, and which whole side goes with them?

3

AD = 6, DB = 9, AE = 8. How long is EC?

EC = 20 → go to 2

EC = 12 → go to 6

Which two pieces lie on AB? Which two lie on AC?

4

AE = 10, EC = 15, AD = 8. How long is DB?

DB = 20 → go to 2

DB = 12 → go to 7

Build both fractions the same way, from pieces only.

5

AD = 3, DB = 5, EC = 10. How long is AC?

AC = 16 → go to 1

AC = 6 → go to 6

Find the missing piece first. Then check what the question asks for.

6

AD = 4, DB = 6, AE = 6. How long is AC?

AC = 15 → go to 1

AC = 9 → go to 5

Does the question ask for a piece or for the whole of AC?

7

AD = 10, DB = 4, EC = 6. How long is AC?

AC = 21 → you are out

AC = 15 → go to 5

Read the question again. Which segment does it name?

8

AD = 9, AB = 24, AE = 12. How long is EC?

EC = 32 → go to 5

EC = 20 → go to 4

The question names EC. Is EC a piece or a whole side?

Write each box number as you reach it:

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The route, in order. Boxes 2 and 5 are not on it. A student reaches them only by a wrong answer. They are the last two rows of the table.

3 → 6 → 1 → 8 → 4 → 7 → out

	Box and its question	Right answer, and why	Wrong answer, and why a student picks it
1	Box 3 AD = 6, DB = 9, AE = 8. How long is EC?	EC = 12. Piece over piece on both sides: $AD/DB = AE/EC$, so $6/9 = 8/EC$ and $EC = 8 \times 9 \div 6 = 12$.	"EC = 20" goes to box 2. A student who writes a piece over a whole side on one side and a piece over a piece on the other picks this.
2	Box 6 AD = 4, DB = 6, AE = 6. How long is AC?	AC = 15. First the missing piece: $AD/DB = AE/EC$ gives $EC = 6 \times 6 \div 4 = 9$. Then $AC = AE + EC = 6 + 9 = 15$.	"AC = 9" goes to box 5. A student who finds the missing piece and stops there picks this.
3	Box 1 AD = 3, DB = 9, DE = 5. How long is BC?	BC = 20. DE goes with BC and a piece over its whole side: $DE/BC = AD/AB$, with $AB = 3 + 9 = 12$. So $BC = 5 \times 12 \div 3 = 20$.	"BC = 15" goes to box 2. A student who puts DE in a proportion with two pieces ($DE/BC = AD/DB$) picks this.
4	Box 8 AD = 9, AB = 24, AE = 12. How long is EC?	EC = 20. Piece over whole side on both sides: $AD/AB = AE/AC$, so $AC = 12 \times 24 \div 9 = 32$. Then $EC = AC - AE = 32 - 12 = 20$.	"EC = 32" goes to box 5. A student who finds the whole side AC and does not take AE away picks this.
5	Box 4 AE = 10, EC = 15, AD = 8. How long is DB?	DB = 12. Piece over piece on both sides: $AE/EC = AD/DB$, so $10/15 = 8/DB$ and $DB = 8 \times 15 \div 10 = 12$.	"DB = 20" goes to box 2. A student who writes a piece over a whole side on one side and a piece over a piece on the other picks this.
6	Box 7 AD = 10, DB = 4, EC = 6. How long is AC?	AC = 21. First the missing piece: $AD/DB = AE/EC$ gives $AE = 6 \times 10 \div 4 = 15$. Then $AC = AE + EC = 15 + 6 = 21$.	"AC = 15" goes to box 5. A student who finds the missing piece and stops there picks this.
	Box 2 AD = 6, AB = 15, DE = 8. How long is BC?	BC = 20. DE goes with BC and a piece over its whole side: $DE/BC = AD/AB$. So $BC = 8 \times 15 \div 6 = 20$.	"BC = 12" goes to box 3. A student who puts DE in a proportion with two pieces ($DE/BC = AD/DB$) picks this.
	Box 5 AD = 3, DB = 5, EC = 10. How long is AC?	AC = 16. First the missing piece: $AD/DB = AE/EC$ gives $AE = 10 \times 3 \div 5 = 6$. Then $AC = AE + EC = 6 + 10 = 16$.	"AC = 6" goes to box 6. A student who finds the missing piece and stops there picks this.

How to check any box. Name the three given lengths and the asked one: piece, whole side, DE or BC. Pieces go with pieces ($AD/DB = AE/EC$). A piece goes with its whole side ($AD/AB = AE/AC$). DE goes with BC and a piece over its whole side ($DE/BC = AD/AB$). Then check whether the question asks for a piece or a whole side.

A student can find the last four boxes of the route by following the arrows backward from "you are out." So ask a student with a clean row to explain one box.