

ANSWER MAZE



TRAPEZOIDS, ISOSCELES TRAPEZOIDS AND MIDSEGMENTS

Halfway, or Just Subtracted?

One page · 10–15 minutes · nothing to prepare

FREE

5

Trapezoid ABCD has bases $AB = 26$ and $DC = 14$. How long is its midsegment?

40 → **go to 3**

20 → **go to 2**

*The midsegment lies between the two bases.
Compare each answer with both bases.*

2

Trapezoid ABCD is isosceles, with $AB \parallel DC$. $\angle A = 64^\circ$. How big is $\angle B$?

64° → **go to 7**

116° → **go to 8**

Find the base that $\angle A$ sits on. Which other corner is on that base?

1. **Hand out page 3**, one per student. Nothing else is needed.
2. **Say this once:** *“Start at box 5. The midsegment is halfway between the two bases. Two angles that share a base are not the same as two angles on a leg. Write every box number in the row at the bottom as you go.”*
3. **Check a sheet quickly.** A student with no mistakes writes **5 2 7 4 1 6**: six boxes, then out.

Student sheet	page 3, one per student. It shows the midsegment, a pair of base angles and the two angles on a leg as three small drawings.
Answers	page 4.

Every wrong answer comes from one of two mistakes. The first is about the midsegment. It is the average of the two bases, so it lies halfway between them. When both bases are given, many students add them and forget to halve. When the midsegment and one base are given, many students subtract one from the other. That gives the gap between them, not the other base. The right way is to double the midsegment and take away the known base. These wrong answers send the student to box 3.

The second mistake is about angles. In a trapezoid the two angles on each leg add to 180° . In an isosceles trapezoid the two angles that share a base are also congruent. Students mix up the two pairs, often because they take the two angles at the bottom of the drawing. One box has a trapezoid that is not isosceles, where copying the angle is wrong. These wrong answers send the student to box 8. Boxes 3 and 8 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 first answer, goes wrong within the first three boxes.

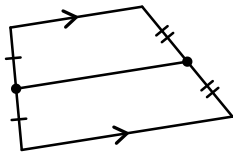


This is the free lesson this activity came from. The worksheet, the full answers and the lesson plan are on it, at three levels of difficulty.
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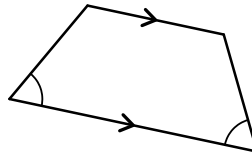
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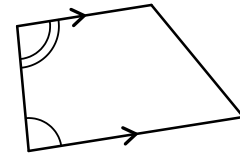
Date _____



The **midsegment** joins the midpoints of the **legs**. It is the **average** of the two **bases**.



An **isosceles trapezoid** has a pair of congruent **base angles**: two angles that share a base.



Two angles on one **leg** add to 180° .

Answer the question in the box. Choose an answer, and go to the box it names. In each trapezoid, the sides marked $\parallel$ are the bases. Write each box number in the row at the bottom as you reach it.

1

A trapezoid has a midsegment of 19. One base is 12. How long is the other base?

26 → **go to 6**

7 → **go to 3**

Put each answer beside the known base. For which pair is the midsegment halfway between?

2

Trapezoid ABCD is isosceles, with $AB \parallel DC$.

$\angle A = 64^\circ$. How big is $\angle B$?

64° → **go to 7**

116° → **go to 8**

Find the base that $\angle A$ sits on. Which other corner is on that base?

3

The midsegment of a trapezoid is 20. One base is 28. How long is the other base?

12 → **go to 2**

8 → **go to 5**

Find the gap from the midsegment to each base. Compare the two gaps.

4

Trapezoid PQRS is isosceles, with $PQ \parallel SR$.

$\angle P = 71^\circ$. How big is $\angle S$?

71° → **go to 8**

109° → **go to 1**

Find the side that joins P and S. Is it a base or a leg?

5

Trapezoid ABCD has bases $AB = 26$ and $DC = 14$. How long is its midsegment?

40 → **go to 3**

20 → **go to 2**

The midsegment lies between the two bases. Compare each answer with both bases.

6

Trapezoid ABCD is not isosceles. $AB \parallel DC$ and $\angle C = 125^\circ$. How big is $\angle B$?

55° → **you are out**

125° → **go to 8**

Find the side that joins B and C. Is it a base or a leg?

7

The midsegment of trapezoid ABCD is 17. Base $AB = 24$. How long is base DC?

7 → **go to 3**

10 → **go to 4**

Find the gap from the midsegment to each base. Compare the two gaps.

8

Trapezoid KLMN is isosceles, with $KL \parallel NM$.

$\angle M = 118^\circ$. How big is $\angle N$?

62° → **go to 2**

118° → **go to 7**

Find the base that $\angle M$ sits on. Which other corner is on that base?

Write each box number as you reach it:

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The route, in order. Boxes 3 and 8 are not on it. A student reaches them only by a wrong answer. They are the last two rows of the table.

5 → 2 → 7 → 4 → 1 → 6 → out

	Box	Right answer, and why	Wrong answer, and why a student picks it
1	Box 5 Trapezoid ABCD has bases $AB = 26$ and $DC = 14$. How long is its midsegment?	20 The midsegment is the average of the bases: $(26 + 14) \div 2 = 20$. It lies between 14 and 26.	40 goes to box 3. 40 is the sum of the bases, with the halving left out. It is longer than both bases, which a midsegment never is.
2	Box 2 Trapezoid ABCD is isosceles, with $AB \parallel DC$. $\angle A = 64^\circ$. How big is $\angle B$?	64° $\angle A$ and $\angle B$ share the base AB. In an isosceles trapezoid, two angles that share a base are congruent, so $\angle B = 64^\circ$.	116° goes to box 8. 116° is the angle on the same leg as $\angle A$ ($180^\circ - 64^\circ$). That is $\angle D$, not $\angle B$.
3	Box 7 The midsegment of trapezoid ABCD is 17. Base $AB = 24$. How long is base DC?	10 The midsegment is halfway between the bases. 24 is 7 above 17, so DC is 7 below it: $2 \times 17 - 24 = 10$.	7 goes to box 3. 7 comes from subtracting: $24 - 17$. That is the gap from AB to the midsegment, not a base.
4	Box 4 Trapezoid PQRS is isosceles, with $PQ \parallel SR$. $\angle P = 71^\circ$. How big is $\angle S$?	109° $\angle P$ and $\angle S$ are on the leg PS, so they add to 180° : $180^\circ - 71^\circ = 109^\circ$.	71° goes to box 8. 71° treats $\angle S$ as if it shared a base with $\angle P$. It does not: they share the leg PS.
5	Box 1 A trapezoid has a midsegment of 19. One base is 12. How long is the other base?	26 The midsegment is halfway between the bases. 12 is 7 below 19, so the other base is 7 above it: $2 \times 19 - 12 = 26$.	7 goes to box 3. 7 comes from subtracting: $19 - 12$. That is a gap, not a base. A base of 7 would put the midsegment outside the two bases.
6	Box 6 Trapezoid ABCD is not isosceles. $AB \parallel DC$ and $\angle C = 125^\circ$. How big is $\angle B$?	55° $\angle B$ and $\angle C$ are on the leg BC, so they add to 180° : $180^\circ - 125^\circ = 55^\circ$.	125° goes to box 8. 125° copies $\angle C$, as if $\angle B$ and $\angle C$ were a pair of congruent base angles. They are on a leg, and this trapezoid is not even isosceles.
	Box 3 The midsegment of a trapezoid is 20. One base is 28. How long is the other base?	12 The midsegment is halfway between the bases. 28 is 8 above 20, so the other base is 8 below it: $2 \times 20 - 28 = 12$.	8 goes to box 5. A student who still subtracts picks 8 ($28 - 20$). That is a gap, not a base.
	Box 8 Trapezoid KLMN is isosceles, with $KL \parallel NM$. $\angle M = 118^\circ$. How big is $\angle N$?	118° $\angle M$ and $\angle N$ share the base NM. In an isosceles trapezoid they are congruent, so $\angle N = 118^\circ$.	62° goes to box 2. A student who still takes the angle on the leg picks 62° ($180^\circ - 118^\circ$). That is $\angle L$, on the leg LM.

How to check any box. For a midsegment: ask “How far is the midsegment from each base?” The two gaps must be the same. For an angle: ask “Which side joins the two corners, a base or a leg?” Two angles that share a base are congruent only in an isosceles trapezoid. Two angles on a leg always add to 180° .

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.