

ANSWER MAZE



PYTHAGOREAN THEOREM APPLICATIONS AND TRIPLES

Add the Squares or Subtract Them?

One page · 10–15 minutes · nothing to prepare

FREE

3

A ladder leans on a wall. It is 25 ft long. Its foot is 7 ft from the wall.

How high up the wall does it reach?

26.0 ft → **go to box 4**

24.0 ft → **go to box 6**

*Hint: Where does the wall meet the ground?
Which length does not touch that corner?*

6

Jada walks east, then north. Jada walks 24 ft east. Jada walks 25 ft north.

How far from the start is Jada?

34.7 ft → **go to box 1**

7.0 ft → **go to box 7**

Hint: The turn from east to north is a corner. Do both walks touch it?

1. **Hand out page 3**, one per student, with a calculator. Nothing else is needed.
2. **Say this once:** *“Start at box 3. In every box, draw the right triangle first and mark the right angle. The side across from it is the hypotenuse. 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 2 5**: six boxes, then out.

Student sheet page 3, one per student, and scrap paper for the drawings. No box has a drawing.
Answers page 4.

Every wrong answer comes from one of two mistakes. In four of the eight boxes the hypotenuse is given and a leg is asked. A student who adds the squares instead of subtracting them gets an answer longer than the hypotenuse. These wrong answers send the student to box 4.

In the other boxes both given lengths are legs, and the two numbers look like part of a known triple. Box 6 gives 24 ft and 25 ft. A student who takes the bigger number as the hypotenuse and subtracts gets 7.0 ft, a whole number, and it looks right. The right answer is 34.7 ft. These wrong answers send the student to box 7. Boxes 4 and 7 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 whole 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 — add or subtract?

Start at box 3

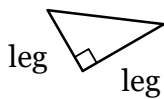
Name _____

Period _____

Date _____

Start at box 3. Draw the right triangle on scrap paper. Find the length to the nearest tenth of a foot. Pick that answer and go to the box it names. Write each box number in the row at the bottom as you go. In every box, the ground is level. Walls, poles and trees stand straight up. Every walk goes due east, then due north. Every lawn is a rectangle.

hypotenuse



The **hypotenuse** is across from the right angle. It is the longest side. The other two sides are the **legs**. To find the hypotenuse, **add** the squares: $c^2 = a^2 + b^2$. To find a leg, **subtract** them: $b^2 = c^2 - a^2$.

1

A wire runs from the top of a pole to the ground. The wire is 17 ft long. The wire meets the ground 8 ft from the pole.

How tall is the pole?

15.0 ft → **go to box 8**

18.8 ft → **go to box 4**

Hint: Find the corner at the foot of the pole. Which side is across from it?

2

Eli flies a kite. Eli holds the string at the ground. The string is 13 ft long. The kite is 5 ft high.

How far is Eli from the point under the kite?

13.9 ft → **go to box 4**

12.0 ft → **go to box 5**

Hint: The string runs from the hand to the kite. Which corner is across from it?

3

A ladder leans on a wall. It is 25 ft long. Its foot is 7 ft from the wall.

How high up the wall does it reach?

26.0 ft → **go to box 4**

24.0 ft → **go to box 6**

Hint: Where does the wall meet the ground? Which length does not touch that corner?

4

A path crosses a lawn from corner to corner. The path is 20 ft long. The lawn is 12 ft wide.

How long is the lawn?

16.0 ft → **go to box 6**

23.3 ft → **go to box 3**

Hint: Which length cuts across the lawn from corner to corner?

5

A ramp goes up to a platform. The platform is 8 ft high. The ramp covers 17 ft of ground.

How long is the ramp?

18.8 ft → **you are out**

15.0 ft → **go to box 7**

Hint: Which two lengths meet at the point under the edge of the platform?

6

Jada walks east, then north. Jada walks 24 ft east. Jada walks 25 ft north.

How far from the start is Jada?

34.7 ft → **go to box 1**

7.0 ft → **go to box 7**

Hint: The turn from east to north is a corner. Do both walks touch it?

7

A ladder leans on a wall. It reaches 15 ft up the wall. Its foot is 9 ft from the wall.

How long is the ladder?

12.0 ft → **go to box 6**

17.5 ft → **go to box 1**

Hint: Where does the wall meet the ground? Do both given lengths touch that corner?

8

A tree casts a shadow. The tree is 15 ft tall. The shadow is 17 ft long.

How far is it from the treetop to the tip of the shadow?

8.0 ft → **go to box 7**

22.7 ft → **go to box 2**

Hint: Do the tree and its shadow meet at the corner of the triangle?

Write every box number here, in order.

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The route, in order. Boxes 4 and 7 are not on it. A student reaches them only by a wrong answer. They are the last two rows of the table. Every answer is rounded to the nearest tenth of a foot.

3 → 6 → 1 → 8 → 2 → 5 → out

	The box's question	Right answer, and why	Wrong answer, and why a student picks it
1	Box 3 A ladder leans on a wall. It is 25 ft long. Its foot is 7 ft from the wall. How high up the wall does it reach?	24.0 ft. The ladder is across from the right angle, so it is the hypotenuse. So subtract: $25^2 - 7^2 = 576$, and the square root is 24.	"26.0 ft" goes to box 4. A student who adds the squares gets $25^2 + 7^2 = 674$, and the square root is 25.96. That is longer than the hypotenuse, so it cannot be a leg.
2	Box 6 Jada walks east, then north. Jada walks 24 ft east. Jada walks 25 ft north. How far from the start is Jada?	34.7 ft. Both given lengths are legs, because they meet at the right angle. So add: $25^2 + 24^2 = 1201$, and the square root is 34.66.	"7.0 ft" goes to box 7. A student who takes 25 as the hypotenuse subtracts: $25^2 - 24^2 = 49$, and the square root is 7. The numbers look like a known triple, but here both are legs.
3	Box 1 A wire runs from the top of a pole to the ground. The wire is 17 ft long. The wire meets the ground 8 ft from the pole. How tall is the pole?	15.0 ft. The wire is across from the right angle, so it is the hypotenuse. So subtract: $17^2 - 8^2 = 225$, and the square root is 15.	"18.8 ft" goes to box 4. A student who adds the squares gets $17^2 + 8^2 = 353$, and the square root is 18.79. That is longer than the hypotenuse, so it cannot be a leg.
4	Box 8 A tree casts a shadow. The tree is 15 ft tall. The shadow is 17 ft long. How far is it from the treetop to the tip of the shadow?	22.7 ft. Both given lengths are legs, because they meet at the right angle. So add: $17^2 + 15^2 = 514$, and the square root is 22.67.	"8.0 ft" goes to box 7. A student who takes 17 as the hypotenuse subtracts: $17^2 - 15^2 = 64$, and the square root is 8. The numbers look like a known triple, but here both are legs.
5	Box 2 Eli flies a kite. Eli holds the string at the ground. The string is 13 ft long. The kite is 5 ft high. How far is Eli from the point under the kite?	12.0 ft. The string is across from the right angle, so it is the hypotenuse. So subtract: $13^2 - 5^2 = 144$, and the square root is 12.	"13.9 ft" goes to box 4. A student who adds the squares gets $13^2 + 5^2 = 194$, and the square root is 13.93. That is longer than the hypotenuse, so it cannot be a leg.
6	Box 5 A ramp goes up to a platform. The platform is 8 ft high. The ramp covers 17 ft of ground. How long is the ramp?	18.8 ft. Both given lengths are legs, because they meet at the right angle. So add: $17^2 + 8^2 = 353$, and the square root is 18.79.	"15.0 ft" goes to box 7. A student who takes 17 as the hypotenuse subtracts: $17^2 - 8^2 = 225$, and the square root is 15. The numbers look like a known triple, but here both are legs.
	Box 4 A path crosses a lawn from corner to corner. The path is 20 ft long. The lawn is 12 ft wide. How long is the lawn?	16.0 ft. The path is across from the right angle, so it is the hypotenuse. So subtract: $20^2 - 12^2 = 256$, and the square root is 16.	"23.3 ft" goes to box 3. A student who adds the squares gets $20^2 + 12^2 = 544$, and the square root is 23.32. That is longer than the hypotenuse, so it cannot be a leg.
	Box 7 A ladder leans on a wall. It reaches 15 ft up the wall. Its foot is 9 ft from the wall. How long is the ladder?	17.5 ft. Both given lengths are legs, because they meet at the right angle. So add: $15^2 + 9^2 = 306$, and the square root is 17.49.	"12.0 ft" goes to box 6. A student who takes 15 as the hypotenuse subtracts: $15^2 - 9^2 = 144$, and the square root is 12. The numbers look like a known triple, but here both are legs.

How to check any box. Find the right angle in the situation: where a wall or pole meets level ground, where a walk turns from east to north, or a corner of a rectangle. The side across from that corner is the hypotenuse. If the hypotenuse is asked for, add the squares of the other two. If it is given, subtract. The hypotenuse is always the longest 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.