

ANSWER MAZE

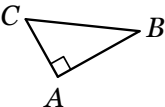
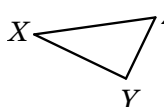


PROVING THE PYTHAGOREAN THEOREM

Which Side Stands Alone?

One page · 10–15 minutes · nothing to prepare

FREE

5  What does the theorem give for triangle ABC? $AB^2 + BC^2 = AC^2 \rightarrow$ go to box 3 $AB^2 + AC^2 = BC^2 \rightarrow$ go to box 2 <i>Hint: Find the right-angle mark. Which side is across from that corner?</i>	2  What does the theorem give for triangle XYZ? $XY^2 + YZ^2 = XZ^2 \rightarrow$ go to box 6 The theorem may not be used here. $\rightarrow$ go to box 7 <i>Hint: Read the marks and the words. What do they say about each angle?</i>
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1. **Hand out page 3**, one per student. Nothing else is needed.
2. **Say this once:** *“Start at box 5. In every box, first find what says an angle is right: a mark or the words. Then find the side across from it. 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 8**: six boxes, then out.

Student sheet page 3, one per student. A box at the top states the theorem with a small drawing.
Answers page 4.

Every box asks the same question: what does the Pythagorean theorem give for this triangle? There are no numbers. Every wrong answer comes from one of two mistakes.

The first mistake is about the letters. The right angle is known, but the student puts the wrong side alone. Of these four wrong answers, one writes the sides in alphabet order, one puts c alone, as if c were always the long side and two start from a corner that is not the right angle. Alphabet order means that the side named by the first and the last letter, here AC , always stands alone, as in $AB^2 + BC^2 = AC^2$ for triangle ABC , wherever the right angle is. The side that stands alone is always the one across from the right angle. The wrong answers in boxes 5, 7 and 1 send the student to box 3. The wrong answer in box 3 sends the student to box 5.

The second mistake is about the right angle itself. In three of the four boxes like this the angle looks right, but no mark and no words say so, and the answer is “The theorem may not be used here.” In box 4 there is no mark, but the words say the angle is right, so the theorem may be used. The wrong answers in boxes 2, 4 and 8 send the student to box 6. The wrong answer in box 6 sends the student to box 2. Boxes 3 and 6 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 maze practises when the theorem may be used. It does not practise the proof itself. The lesson has the proof.



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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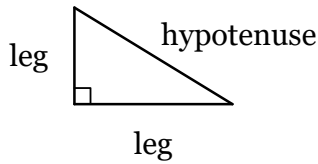
Answer Maze — what does the theorem give?

Start at box 5

Name _____

Period _____

Date _____



The Pythagorean theorem: if an angle of a triangle is **known** to be a right angle, then $\text{leg}^2 + \text{leg}^2 = \text{hypotenuse}^2$. The hypotenuse is the side across from the right angle.
Known means a right-angle mark in that angle, or words that say it. A drawing that only looks right is not enough.

Start at box 5. Pick one answer and go to the box it names. Write each box number at the bottom.

1

KL is perpendicular to LM.
What does the theorem give for triangle KLM?
 $KL^2 + KM^2 = LM^2 \rightarrow$ **go to box 3**
 $KL^2 + LM^2 = KM^2 \rightarrow$ **go to box 8**
Hint: Which angle do the words name? Which side is across from it?

2

What does the theorem give for triangle XYZ?
 $XY^2 + YZ^2 = XZ^2 \rightarrow$ **go to box 6**
 The theorem may not be used here. $\rightarrow$ **go to box 7**
Hint: Read the marks and the words. What do they say about each angle?

3

What does the theorem give for triangle RST?
 $RS^2 + ST^2 = RT^2 \rightarrow$ **go to box 2**
 $RS^2 + RT^2 = ST^2 \rightarrow$ **go to box 5**
Hint: The side across from the marked corner stands by itself. Which side is that?

4

Angle Q is a right angle.
What does the theorem give for triangle PQR?
 $PQ^2 + QR^2 = PR^2 \rightarrow$ **go to box 1**
 The theorem may not be used here. $\rightarrow$ **go to box 6**
Hint: What on the page says that an angle is right? Check the words too.

5

What does the theorem give for triangle ABC?
 $AB^2 + BC^2 = AC^2 \rightarrow$ **go to box 3**
 $AB^2 + AC^2 = BC^2 \rightarrow$ **go to box 2**
Hint: Find the right-angle mark. Which side is across from that corner?

6

What does the theorem give for triangle GHJ?
 $GH^2 + HJ^2 = GJ^2 \rightarrow$ **go to box 2**
 The theorem may not be used here. $\rightarrow$ **go to box 7**
Hint: A drawing can look like anything. What tells us an angle is right?

7

What does the theorem give for triangle ABC?
 $b^2 + c^2 = a^2 \rightarrow$ **go to box 4**
 $a^2 + b^2 = c^2 \rightarrow$ **go to box 3**
Hint: Which corner has the mark? Which small letter names the side across from it?

8

What does the theorem give for triangle DEF?
 The theorem may not be used here. $\rightarrow$ **you are out**
 $DE^2 + EF^2 = DF^2 \rightarrow$ **go to box 6**
Hint: Where is the mark? Which angle is it in, and which triangle?

Write every box number here, in order.

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The route, in order. Boxes 3 and 6 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 → 8 → out

	The box's question	Right answer, and why	Wrong answer, and why a student picks it
1	Box 5 Triangle ABC. What does the theorem give for triangle ABC?	$AB^2 + AC^2 = BC^2$ The right-angle mark at A shows that angle A is right. The side across from A is BC, and it stands alone. So the theorem gives this equation.	" $AB^2 + BC^2 = AC^2$ " goes to box 3. A student who writes the sides in alphabet order picks this. AC is across from B, not from the right angle at A.
2	Box 2 Triangle XYZ. What does the theorem give for triangle XYZ?	The theorem may not be used here. Angle Y looks right, but no mark and no words say so. A drawing that only looks right is not enough, so the theorem may not be used.	" $XY^2 + YZ^2 = XZ^2$ " goes to box 6. A student who trusts the drawing picks this. The angle looks right, but nothing says so.
3	Box 7 Triangle ABC. What does the theorem give for triangle ABC?	$b^2 + c^2 = a^2$ The right-angle mark at A shows that angle A is right. The side across from A is a, and it stands alone. So the theorem gives this equation.	" $a^2 + b^2 = c^2$ " goes to box 3. A student who always puts c alone picks this. Here c is across from C, not from the right angle at A.
4	Box 4 Triangle PQR. Angle Q is a right angle. What does the theorem give for triangle PQR?	$PQ^2 + QR^2 = PR^2$ The words say that angle Q is a right angle. The side across from Q is PR, and it stands alone. So the theorem gives this equation.	"The theorem may not be used here." goes to box 6. A student who looks only for a right-angle mark picks this. The words say the angle is right.
5	Box 1 Triangle KLM. KL is perpendicular to LM. What does the theorem give for triangle KLM?	$KL^2 + LM^2 = KM^2$ The words say that KL is perpendicular to LM, so angle L is right. The side across from L is KM, and it stands alone. So the theorem gives this equation.	" $KL^2 + KM^2 = LM^2$ " goes to box 3. A student who does not start from the right angle picks this. LM is across from K, not from L.
6	Box 8 Triangle DEF. What does the theorem give for triangle DEF?	The theorem may not be used here. The right-angle mark is at G. It shows that angle DGE is right. Nothing says that angle E is right, so the theorem may not be used for triangle DEF.	" $DE^2 + EF^2 = DF^2$ " goes to box 6. A student who trusts the drawing picks this. The angle looks right, but nothing says so.
	Box 3 Triangle RST. What does the theorem give for triangle RST?	$RS^2 + ST^2 = RT^2$ The right-angle mark at S shows that angle S is right. The side across from S is RT, and it stands alone. So the theorem gives this equation.	" $RS^2 + RT^2 = ST^2$ " goes to box 5. A student who does not start from the right angle picks this. ST is across from R, not from S.
	Box 6 Triangle GHJ. What does the theorem give for triangle GHJ?	The theorem may not be used here. The arc only shows which angle is meant. It does not say that angle H is right, so the theorem may not be used.	" $GH^2 + HJ^2 = GJ^2$ " goes to box 2. A student who trusts the drawing picks this. The angle looks right, but nothing says so.

How to check any box. First find what says an angle of the triangle is right: a right-angle mark in that very angle, or words. If nothing does, the theorem may not be used. If something does, the side across from that angle stands alone, and the other two sides are squared and added.

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.