

MYSTERY PICTURE

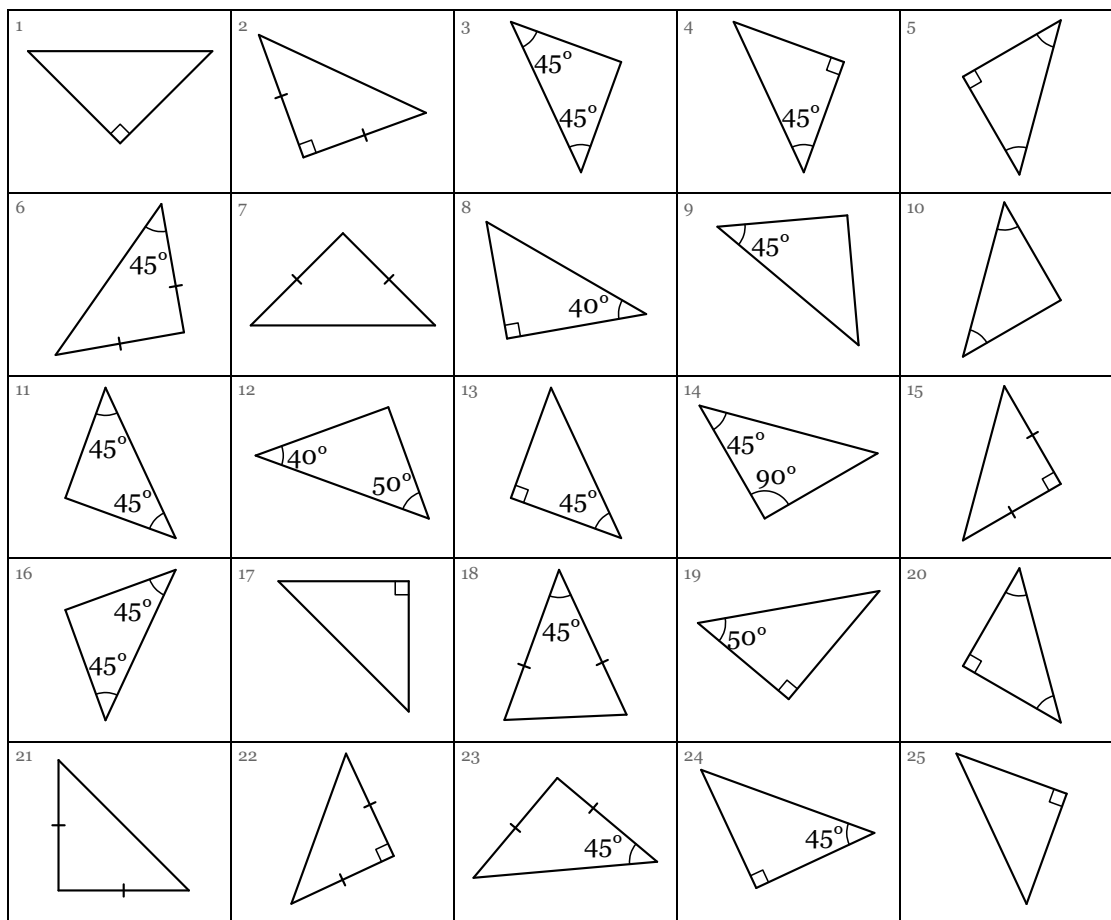


45-45-90 SPECIAL RIGHT TRIANGLES

Do the Marks Show a 45-45-90 Triangle?

25 marked triangles · no lengths · a picture appears

FREE



1. **Give each student page 3** and a pencil.
2. **Say this once:** *“Each square shows a triangle with marks. Do the marks show a 45-45-90 triangle? If yes, fill the square with slanted lines. If no, or if the marks do not say, leave it white. Use the marks, not the look of the drawing.”*
3. **Let them work.** The picture shows when they are right. Nothing else is needed.

Student sheet	page 3, one per student. A strip at the top shows a fully marked 45-45-90 triangle and says what each mark means.
Answers	pages 4–5, for you.

No square has a length. Each square is a triangle with some marks: a small square for a right angle, tick marks for equal sides, matching arcs for equal angles, or printed degrees. The student decides from the marks alone whether the triangle must be a 45-45-90 triangle.

There are two ways in. A right angle with two equal legs is one: equal legs give equal angles, so the two other angles are 45° each. Two 45° angles is the other: the third angle is then 90° . A right angle with one 45° angle also works, because the third angle is 45° . Fourteen squares are filled.

The white squares test the common mistake: judging by the look. In seven white squares the triangle is drawn exactly like a 45-45-90 triangle, but the marks do not prove it. For example, only the right angle is marked, or two sides have ticks but no angle is marked. In the other four white squares the marks rule it out, such as a right angle with a 40° angle.

If part of a student’s picture looks wrong, the mistake is in that square. Ask: *“Which marks are on this triangle? What do they tell you about the angles?”* Guessing does not work. Every simple guessing rule, such as filling every square that has a right-angle mark, gets at least seven squares wrong.



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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Mystery Picture — do the marks show a 45-45-90 triangle?

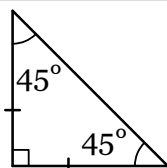
45-45-90
triangles

Name _____

Period _____

Date _____

Each square shows a triangle with marks. **Do the marks show a 45-45-90 triangle? If yes, fill the square with slanted lines. If no, or if the marks do not say, leave it white.** A picture appears. If part of it is missing, or one square does not fit, check that square again.



A 45-45-90 triangle has a right angle and two 45° angles. Its two legs are equal. The small square marks a right angle. Tick marks show equal sides. Matching arcs show equal angles. Use only the marks. A drawing can look right when the marks do not say so.

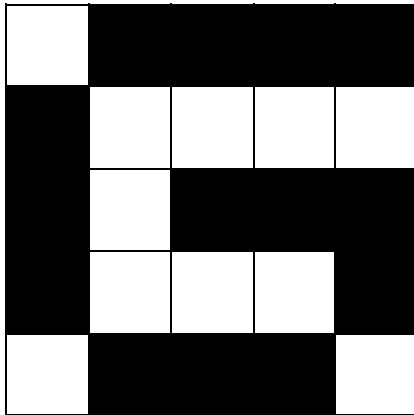
1 	2 	3 	4 	5
6 	7 	8 	9 	10
11 	12 	13 	14 	15
16 	17 	18 	19 	20
21 	22 	23 	24 	25



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Mystery Picture — answers

For the teacher



The finished picture is **the letter G**. Fourteen squares are filled.

To check a square, list its marks and ask what they force. A right angle with equal legs, two 45° angles, or a right angle with one 45° angle makes a 45-45-90 triangle. Anything less, or any other angle, leaves the square white. The table gives the reason for every square. It goes on over the page.

	The marks in the square	Answer	Why
1	A right-angle mark.	white (the marks do not say)	Only the right angle is marked. Nothing shows the other two angles are equal, even though they look equal.
2	A right-angle mark, ticks on two sides.	fill	The square mark shows a right angle. The ticks show two equal legs, so the other two angles are equal: 45° each.
3	Angles marked 45° and 45° .	fill	Two angles are 45° . The third is $180^\circ - 45^\circ - 45^\circ = 90^\circ$.
4	A right-angle mark, an angle marked 45° .	fill	A right angle and a 45° angle leave $180^\circ - 90^\circ - 45^\circ = 45^\circ$ for the third angle.
5	A right-angle mark, matching arcs on two angles.	fill	The square mark shows a right angle. The matching arcs show the other two angles are equal, so each is 45° .
6	Ticks on two sides, an angle marked 45° at the end of one ticked side, not between them.	fill	The ticks show two equal sides, so the angles across from them are equal. One is 45° , so the other is 45° , and the third is 90° .
7	Ticks on two sides.	white (the marks do not say)	The ticks show two equal sides, but no angle is marked. The angle between them could be any size.
8	A right-angle mark, an angle marked 40° .	white (no)	There is a right angle, but the marked angle is 40° , not 45° .
9	An angle marked 45° .	white (the marks do not say)	Only one 45° angle is marked. Nothing shows a right angle or a second 45° angle.
10	Matching arcs on two angles.	white (the marks do not say)	The arcs show two equal angles, but nothing gives their size. The third angle may not be 90° .
11	Angles marked 45° and 45° .	fill	Two angles are 45° . The third is $180^\circ - 45^\circ - 45^\circ = 90^\circ$.
12	Angles marked 40° and 50° .	white (no)	The angles are 40° and 50° . The third is 90° , but the other two are not 45° .

Mystery Picture — answers, squares 13 to 25

For the teacher

	The marks in the square	Answer	Why
13	A right-angle mark, an angle marked 45° .	fill	A right angle and a 45° angle leave $180^\circ - 90^\circ - 45^\circ = 45^\circ$ for the third angle.
14	Angles marked 90° and 45° .	fill	The angles are 90° and 45° , so the third is 45° .
15	A right-angle mark, ticks on two sides.	fill	The square mark shows a right angle. The ticks show two equal legs, so the other two angles are equal: 45° each.
16	Angles marked 45° and 45° .	fill	Two angles are 45° . The third is $180^\circ - 45^\circ - 45^\circ = 90^\circ$.
17	A right-angle mark.	white (the marks do not say)	Only the right angle is marked. Nothing shows the other two angles are equal, even though they look equal.
18	Ticks on two sides, an angle marked 45° between the two ticked sides.	white (no)	The 45° angle is between the two equal sides. The other two angles are equal, so each is $(180^\circ - 45^\circ) \div 2 = 67.5^\circ$.
19	A right-angle mark, an angle marked 50° .	white (no)	There is a right angle, but the marked angle is 50° , not 45° .
20	A right-angle mark, matching arcs on two angles.	fill	The square mark shows a right angle. The matching arcs show the other two angles are equal, so each is 45° .
21	Ticks on two sides.	white (the marks do not say)	The ticks show two equal sides, but no angle is marked. The angle between them could be any size.
22	A right-angle mark, ticks on two sides.	fill	The square mark shows a right angle. The ticks show two equal legs, so the other two angles are equal: 45° each.
23	Ticks on two sides, an angle marked 45° at the end of one ticked side, not between them.	fill	The ticks show two equal sides, so the angles across from them are equal. One is 45° , so the other is 45° , and the third is 90° .
24	A right-angle mark, an angle marked 45° .	fill	A right angle and a 45° angle leave $180^\circ - 90^\circ - 45^\circ = 45^\circ$ for the third angle.
25	A right-angle mark.	white (the marks do not say)	Only the right angle is marked. Nothing shows the other two angles are equal, even though they look equal.