

MYSTERY PICTURE

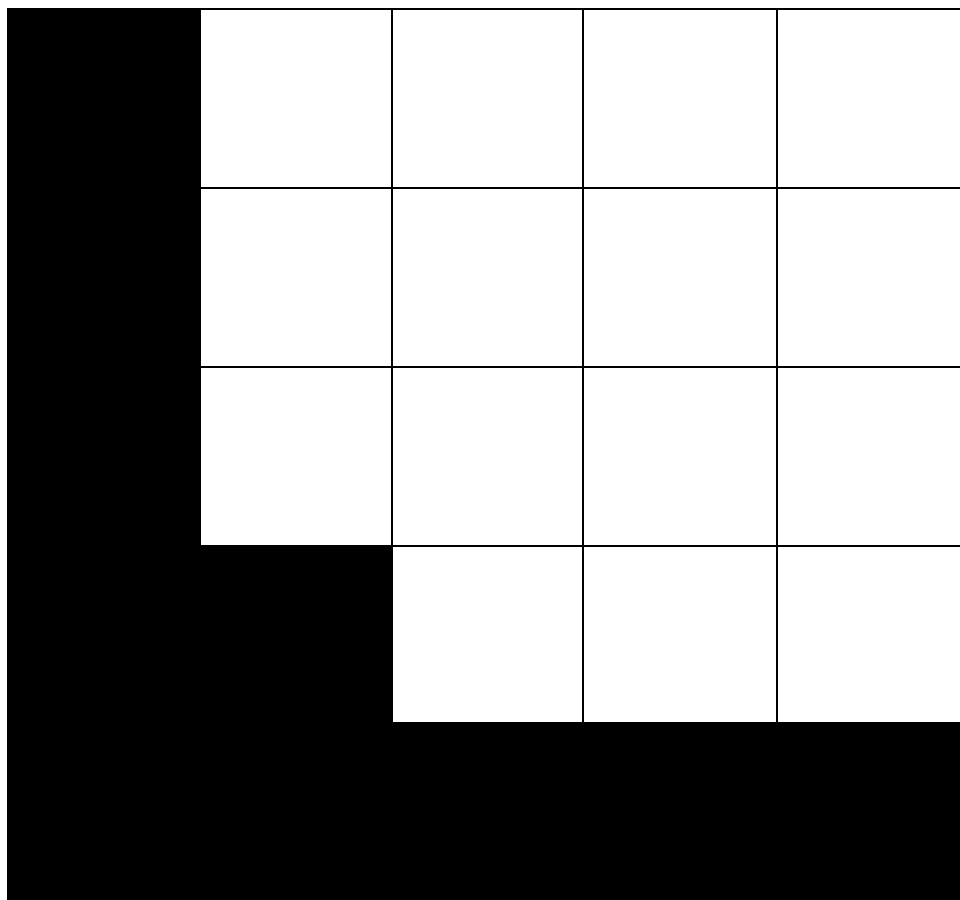


PROPERTIES OF KITES

Which Angles Must Match?

25 kites and near-kites · read the marks

FREE



1. **Hand out page 3**, one per student. Pencils. Nothing else is needed.
2. **Say this once:** *“In a kite, the two angles the main diagonal misses are congruent. The two angles on the main diagonal are congruent only in a rhombus. Fill a square only when the marks prove it.”*
3. **When a student finishes, look at the picture.** If it is not the letter L, a square is wrong. The student finds it and checks it again.

Student sheet page 3, one per student. It shows the kite facts as three small drawings.
Answers page 4: the finished picture and the reason for every square.

This sheet practices one question: which pair of angles? In every square the two angles marked ? are across from each other. In a kite, the *main diagonal* joins the two corners where the equal sides meet. The two angles it misses are always congruent. Many students say “opposite angles of a kite are congruent” and use the other pair, the two angles on the main diagonal. Those are congruent only when the kite is a rhombus.

Two kinds of square stay white. In five squares the ? angles are on the main diagonal, and two printed side lengths show the kite is not a rhombus, so the angles are not congruent. In ten squares the marks are not enough: the kite is drawn almost like a rhombus but not marked as one, only one pair of sides is marked, or nothing is marked. These are drawn so the two angles look equal, because the marks decide and not the drawing. The two rhombus squares are filled: on this sheet a rhombus counts as a kite, and both pairs of its opposite angles are congruent. Some textbooks use other definitions, so tell the class which ones this sheet uses.

A student who fills every square where the angles look equal gets ten squares wrong. Guessing does not work: every simple guessing rule gets at least nine 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

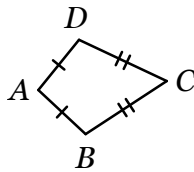
Which angles must match?

Name _____

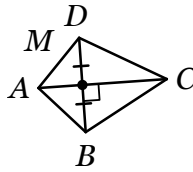
Period _____

Date _____

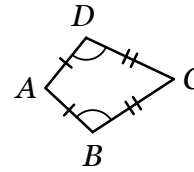
Each square has two angles marked ?. Do the marks prove that the two ? angles are congruent? If yes, fill the square with slanted lines. If no, leave it white.



A **kite** has two pairs of equal sides. The two sides of each pair **meet at a corner**.



The **main diagonal** AC joins the corners where equal sides meet. It cuts BD **in half**, at a right angle. BD does **not** cut AC in half.



$\angle B = \angle D$: the two angles the main diagonal misses. $\angle A$ and $\angle C$ are equal **only in a rhombus**.

Sides with the same ticks are equal. Sides with the same printed number are equal. Leave a square white when the marks are not enough, and also when the marks show the angles are different. Do not measure. When you finish, look at the picture. If part of it is missing, or one square does not fit, check that square again.

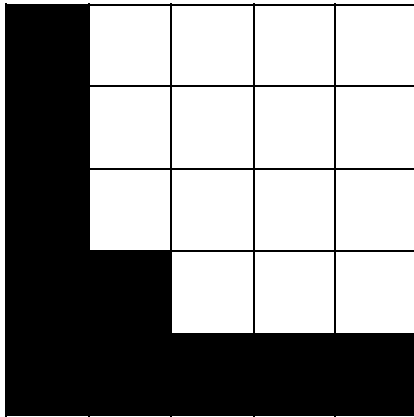
1 	2 	3 	4 	5
6 	7 	8 	9 	10
11 	12 	13 	14 	15
16 	17 	18 	19 	20
21 	22 	23 	24 	25



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Mystery Picture — answers

For the teacher



The finished picture is **the letter L**: a line down the left side and a bar along the bottom.

A square is filled when the marks prove the two ? angles congruent: they are the two angles a kite's main diagonal misses, or the shape is a rhombus.

To check a square with a student, ask: “Where do the equal sides meet? Draw the main diagonal between those two corners. Does it miss both ? angles?”

Squares	Answer	Why
1, 17, 21, 25	FILL	The ticks show two pairs of equal sides that meet at corners, so it is a kite. The ? angles are the two angles its main diagonal misses, so they are congruent.
6, 16, 22, 24	FILL	The two ticked sides are equal, and the two sides with the same printed length are equal. So it is a kite, and the ? angles are the two its main diagonal misses. They are congruent.
11, 23	FILL	All four sides have the same tick, so it is a rhombus. A rhombus is a kite both ways, so both pairs of opposite angles are congruent.
2	white	It is a kite, and the ? angles are at the two ends of its main diagonal. Those two angles are congruent only in a rhombus. The printed sides 7 and 5 show that it is not a rhombus.
5	white	It is a kite, and the ? angles are at the two ends of its main diagonal. Those two angles are congruent only in a rhombus. The printed sides 8 and 6 show that it is not a rhombus.
9	white	It is a kite, and the ? angles are at the two ends of its main diagonal. Those two angles are congruent only in a rhombus. The printed sides 6 and 9 show that it is not a rhombus.
14	white	It is a kite, and the ? angles are at the two ends of its main diagonal. Those two angles are congruent only in a rhombus. The printed sides 5 and 3 show that it is not a rhombus.
19	white	It is a kite, and the ? angles are at the two ends of its main diagonal. Those two angles are congruent only in a rhombus. The printed sides 7 and 5 show that it is not a rhombus.
3, 8, 12, 18, 20	white	It is a kite, and the ? angles are at the two ends of its main diagonal. They are congruent only in a rhombus. One tick and two ticks do not show four equal sides, so nothing proves it, even though the angles look equal.
4, 10, 13	white	Only one pair of sides is shown equal, so the marks do not prove a kite. The ? angles look equal, but nothing proves it.
7, 15	white	Nothing is marked. The shape looks like a kite, but a drawing proves nothing.