

MYSTERY PICTURE

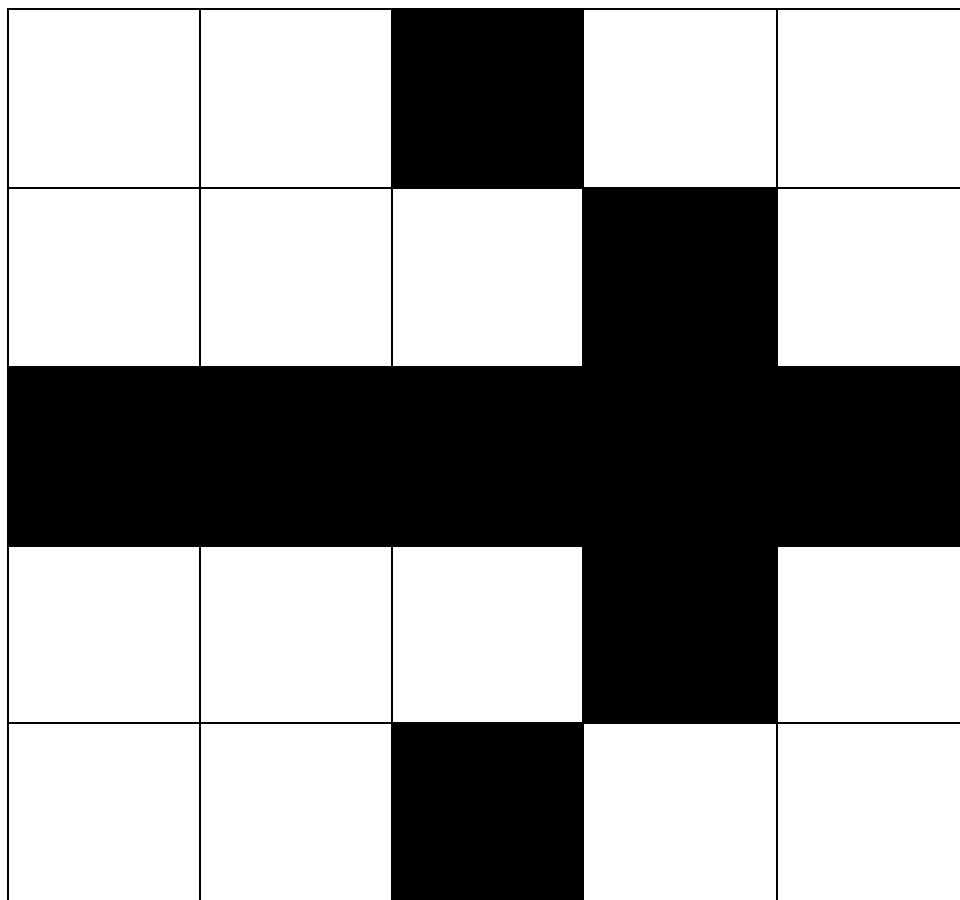


CONGRUENCE AND RIGID MOTIONS

Congruent or Not?

25 pairs of shapes · flips, turns and look-alikes

FREE



1. **Hand out page 3**, one per student. Pencils. Nothing else is needed.
2. **Say this once:** *“Congruent means every side and every angle matches. That is the same as slides, turns and flips moving one shape exactly onto the other. A flip is allowed. If the two shapes in a square are congruent, fill the square with slanted lines. If not, leave it white.”*
3. **When a student finishes, look at the picture.** If it is not a right arrow, a square is wrong. The student finds it and checks it again.

Student sheet	page 3, one per student. It shows a slide, a turn and a flip as small pictures, so every student sees that a flip is one of the moves.
Answers	page 4: the finished picture and the reason for every square.

Nine squares are filled and sixteen are white. The finished picture is a right arrow. Five of the filled squares need a flip. A student who believes a mirror image is not congruent leaves them white, and the arrow has gaps. Each white square tests another common mistake: a bigger copy with the same angles, two rectangles with the same area or the same perimeter, a near miss that only a number shows, or a square and a rhombus with the same sides.

Thirteen squares are drawings with no numbers, and twelve are sentences. The flipped pairs are drawn with no numbers, so a student has to think about the flip and cannot just compare lengths. Every white drawing is clearly different: a side at least a quarter longer, or an angle at least 20° different. The near misses are all sentences, with their numbers.

Your class may have learned either definition of congruent. One says a slide, a turn or a flip, or several of them, moves one shape exactly onto the other. The other says every pair of matching sides and angles is equal. Both give the same answer on every square. No square shows a curved shape, because curves have no sides and angles to match.

Guessing does not work. Every simple guessing rule, such as filling every square that has a drawing, 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

Congruent or not?

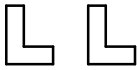
Name _____

Period _____

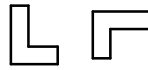
Date _____

Each square shows two shapes, or tells you about two shapes. Are the two shapes congruent? If yes, fill the square with slanted lines. If no, leave it white.

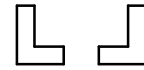
Two shapes are **congruent** when every side and every angle of one matches the other. That is the same as saying slides, turns and flips can move one shape exactly onto the other. A flip is allowed.



slide



turn



flip (turn over)

When a square shows only a drawing, the drawing is exact. You may trace one shape and lay the tracing on the other. You may turn the tracing over. When you finish, look at the picture. If part of it is missing, or one square does not fit, check that square again.

1 Triangle A has sides 6, 8 and 9. Triangle B has sides 6, 8 and 8.6.	2 	3 	4 A is a 2 cm by 6 cm rectangle. B is a 3 cm by 4 cm rectangle. Both have area 12 cm ² .	5
6 Shape B has the same angles as shape A. Each side of B is twice as long.	7 	8 A tracing of shape A fits shape B at every corner but one. That corner misses by 1 mm.	9 Shape B is shape A flipped over a line, then turned 90°.	10
11 	12 Shape B is shape A turned 180°. Now B is upside down.	13 	14 A tracing of shape A is turned face down. Then it fits exactly on shape B.	15
16 Shape B is shape A stretched to twice its width. Its height stays the same.	17 	18 A is a square with 4 cm sides. B is a rhombus with 4 cm sides and a 60° angle.	19 Shape B is shape A slid 5 cm to the right. Then B is flipped over a line.	20
21 Shape B is shape A turned 90°. Then B is shrunk to half its size.	22 	23 	24 A is a 3 cm by 5 cm rectangle. B is a 4 cm by 4 cm square. Both have perimeter 16 cm.	25

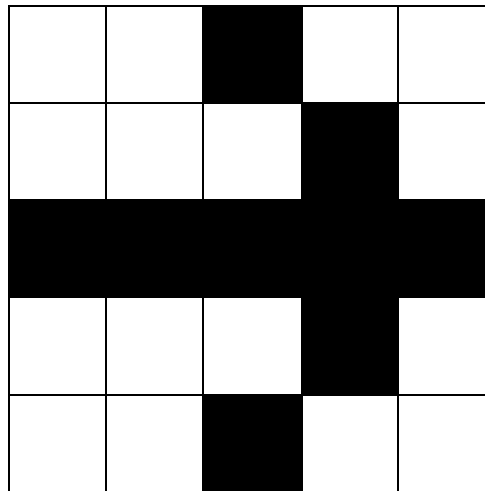


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Mystery Picture — answers

For the teacher

The finished picture is a **right arrow**: a bar across the middle row, and a point at the right end. A square is filled only when its two shapes are congruent. The table gives the reason for every square.



1–5	1 · white The third sides are 9 and 8.6, so the triangles are not the same size.	2 · white One shape is the other made bigger, so a tracing of the small one does not fit the big one.	3 · FILL A tracing of one shape, turned over and then turned, fits exactly on the other.	4 · white The sides are 2 and 6 against 3 and 4. Equal area does not make shapes congruent.	5 · white The sides are all equal, but the square has right angles and the rhombus does not.
6–10	6 · white Each side of B is twice as long, so B is bigger than A.	7 · white One L has wider arms than the other, so a tracing of one does not fit the other.	8 · white The tracing misses at one corner, so the shapes are not exactly the same.	9 · FILL A flip and a turn are both allowed moves, and they do not change the size or shape.	10 · white The sides match, but the rectangle has right angles and the parallelogram does not.
11–15	11 · FILL One shape is a mirror image of the other. A tracing, turned over, fits exactly.	12 · FILL A turn is an allowed move. Being upside down does not change the size or shape.	13 · FILL The “diamond” is the same square turned, and a turn is an allowed move.	14 · FILL The tracing fits exactly after it is turned over, and a flip is allowed.	15 · FILL One L is the other turned a quarter turn. A tracing, turned, fits exactly.
16–20	16 · white Stretching makes B twice as wide, so B is not the same size as A.	17 · white One triangle is turned over, which is allowed, but it is also smaller.	18 · white The sides match, but the square has 90° angles and the rhombus has a 60° angle.	19 · FILL A slide and a flip are both allowed moves, and they do not change the size or shape.	20 · white The bases match, but one triangle is taller, so its other two sides are longer.
21–25	21 · white The turn is allowed, but shrinking makes B smaller than A.	22 · white One shape is turned over, which is allowed, but it is also bigger.	23 · FILL One triangle is the other turned to stand on one of its equal sides. A tracing fits exactly.	24 · white The sides are 3 and 5 against 4 and 4. Equal perimeter does not make shapes congruent.	25 · white The bases and heights match, but one triangle has a right angle and the other does not.