

MYSTERY PICTURE

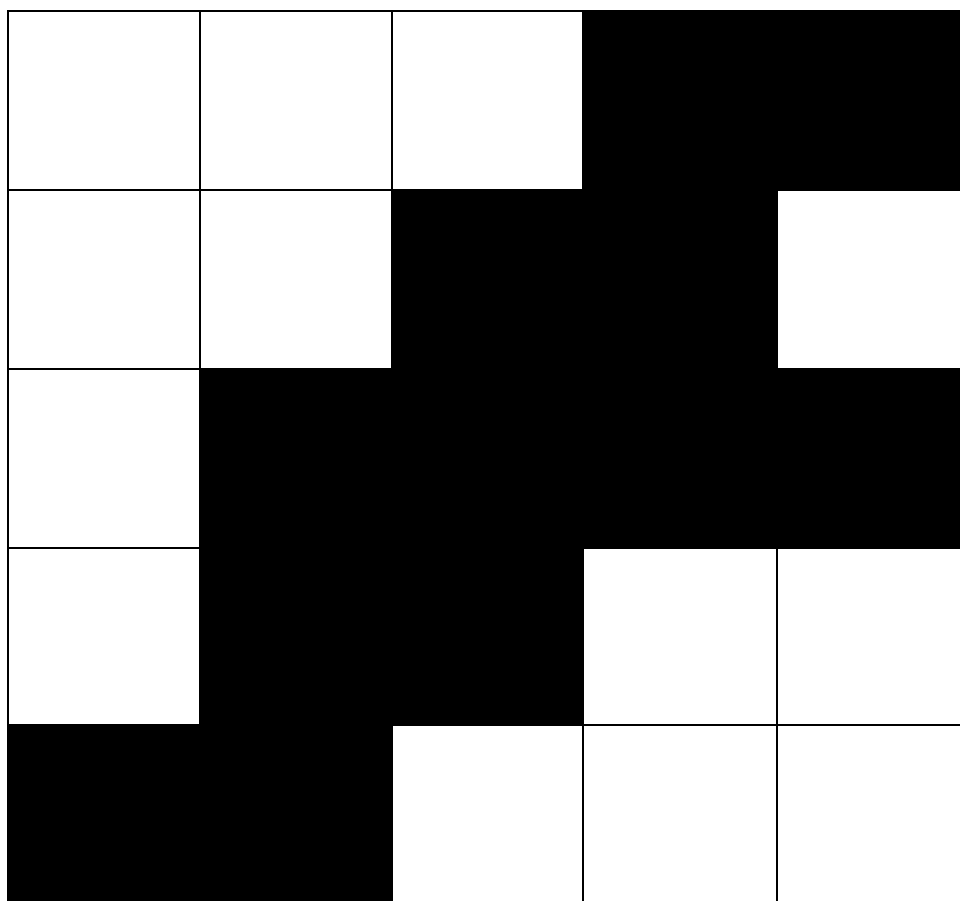


MEASURING SEGMENTS AND SEGMENT ADDITION

Segment Addition: When Do the Pieces Make the Whole?

25 figures · no numbers · the picture checks your answers

FREE



1. **Hand out page 3.** That is the whole preparation.
2. **Say this once:** *“Two pieces make the whole only when the middle point is between the other two. All three points must be on one straight line. Look at the figure before you decide if the equation is true.”*
3. **Fill a square with slanted lines if the figure makes its equation true. Leave it white if it does not.** A picture appears. 12 of the 25 are filled.

Student sheet	page 3, one per student. It shows three cases as pictures: the middle point is between, another point is between, and a bend.
Answers	page 4 — the finished picture and the reason for every square.

There is not one number on the sheet, on purpose. When a figure has numbers on it, students stop looking at the figure. They look for a sum to do instead. Here the only thing to look at is the figure.

The white squares show the common ways segment addition goes wrong. Three put the equation on a path that bends. The points are not on one line, so the equation does not hold. Two put the point that is really in the middle at the end of the equation. For example, B is outside segment AC, but a student still writes $AB + BC = AC$. Six add the wrong pieces on one straight line. Two add pieces from two different lines that cross.

Guessing by the shape of the equation does not work. A student who fills every equation shaped $XY + YZ = XZ$ gets ten squares wrong. Six white squares have exactly that shape. The student can see those holes in the lightning bolt from their own desk.

Where the order of the points comes from. Nothing on the sheet is marked “not to scale”. So the order in which the points are drawn is their real order. These figures give no lengths that could say otherwise. No white square is nearly true: its two sides are drawn at least three millimeters apart. So a student who measures with a ruler will agree with the key.



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

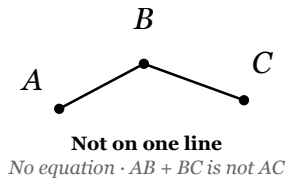
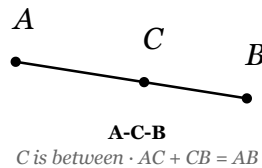
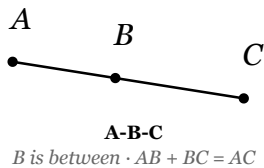
Look at the figure, then the equation

Name _____

Period _____

Date _____

Does the figure make the equation true? If yes, fill the square with slanted lines. If no, leave it white. The pieces make the whole only when the middle point is between the other two. They must all be on one straight line. **A picture appears when you finish.** If it does not look right, check your squares again.



1 $AB + BC = AC$	2 $AB + BC = AC$	3 $AB + CD = AD$	4 $XY + YZ = XZ$	5 $ST + RS = RT$
6 $AI + IC = AC$	7 $PQ + QR = PR$	8 $JL - KL = JK$	9 $AC + CB = AB$	10 $XY + YZ = XZ$
11 $EF + EG = FG$	12 $AB + BD = AD$	13 $KN - KL = LN$	14 $EG + GH = EH$	15 $EG - FG = EF$
16 $PM + MS = PS$	17 $PQ + QR + RS = PS$	18 $BC + CD = BD$	19 $JL - JK = KL$	20 $PR + QS = PS$
21 $BI + IC = BC$	22 $RM + MS = RS$	23 $LM + MN = KM$	24 $AD - BC = AB$	25 $XY + XZ = YZ$

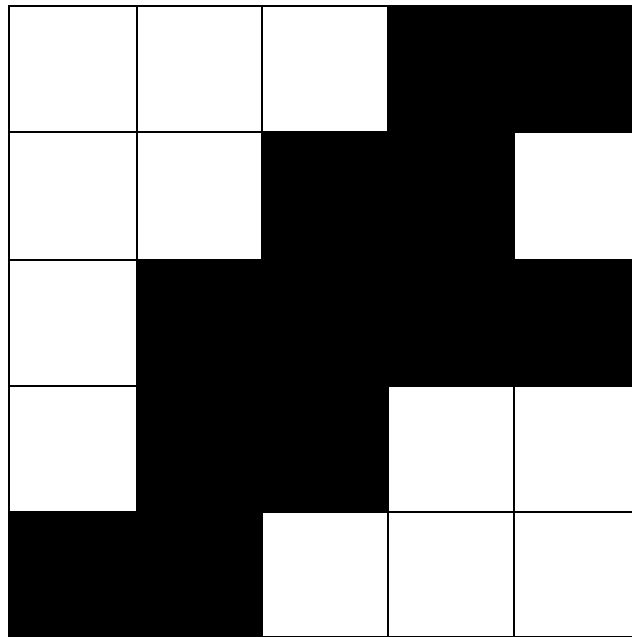


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Mystery Picture — answers

For the teacher

The finished sheet is a **lightning bolt**. It starts at the top right and zigzags down to the bottom left. The table reads left to right, the way the sheet is read. The squares are numbered on the student's sheet.



1–5	white · $AB + BC = AC$ The path bends. It is not one line.	white · $AB + BC = AC$ A different point is in the middle.	white · $AB + CD = AD$ Those pieces do not make that whole.	FILL · $XY + YZ = XZ$ The middle point is between the other two.	FILL · $ST + RS = RT$ The same pieces, in the other order.
6–10	white · $AI + IC = AC$ The pieces are on two different lines.	white · $PQ + QR = PR$ The path bends. It is not one line.	FILL · $JL - KL = JK$ The whole minus a piece.	FILL · $AC + CB = AB$ The middle point is between the other two.	white · $XY + YZ = XZ$ A different point is in the middle.
11–15	white · $EF + EG = FG$ Those pieces do not make that whole.	FILL · $AB + BD = AD$ The middle point is between the other two.	FILL · $KN - KL = LN$ The whole minus a piece.	FILL · $EG + GH = EH$ The middle point is between the other two.	FILL · $EG - FG = EF$ The whole minus a piece.
16–20	white · $PM + MS = PS$ The pieces are on two different lines.	FILL · $PQ + QR + RS = PS$ The middle point is between the other two.	FILL · $BC + CD = BD$ The middle point is between the other two.	white · $JL - JK = KL$ The path bends. It is not one line.	white · $PR + QS = PS$ Those pieces do not make that whole.
21–25	FILL · $BI + IC = BC$ The middle point is between the other two.	FILL · $RM + MS = RS$ The middle point is between the other two.	white · $LM + MN = KM$ Those pieces do not make that whole.	white · $AD - BC = AB$ Those pieces do not make that whole.	white · $XY + XZ = YZ$ Those pieces do not make that whole.