

ANSWER MAZE



MEDIANS AND THE CENTROID

Long Piece or Short Piece?

One page · 10–15 minutes · nothing to prepare

FREE

2

GL = 6. How long is AG?

AG = 3 → go to 4

AG = 12 → go to 5

Which end of AL is the corner? Name the long piece first.

5

AG = $x + 2$ and GL = $x - 5$. How long is GL?

GL = 7 → go to 8

GL = 12 → go to 7

Solve for x first. Then put x into the expression the question names.

1. **Hand out page 3**, one per student. Nothing else is needed.
2. **Say this once:** *“Start at box 2. Before any arithmetic, say which length is the long piece, which is the short piece, and which is the whole median. Every question asks for a length, not for x . Write every box number in the row at the bottom as you go.”*
3. **Check a sheet quickly.** A student with no mistakes writes **2 5 8 3 6 1**: six boxes, then out.

Student sheet	page 3, one per student. One triangle at the top, with its three medians and the centroid, is used by every box.
Answers	page 4.

Every wrong answer comes from one of two mistakes. The first is turning the ratio upside down. The centroid G cuts each median into a long piece at the corner and a short piece at the midpoint, and the long piece is twice the short one. So the long piece is two thirds of the whole median and the short piece is one third. Many students halve when they should double, or take one third where they need two thirds. These wrong answers send the student to box 4.

The second mistake is stopping at x . In the algebra boxes, two lengths on one median are given as expressions. The student writes long piece = $2 \times$ short piece (or whole = $3 \times$ short piece), solves for x , and then puts x back in to get the length. The value of x is always the wrong answer offered. These wrong answers send the student to box 7. Boxes 4 and 7 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 larger number, goes wrong within the first four boxes.



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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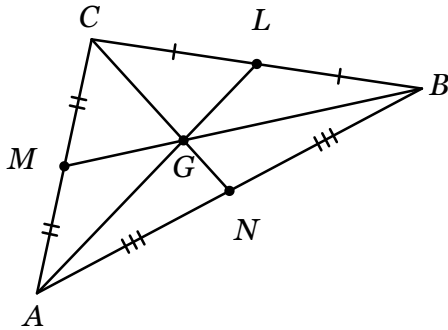
Answer Maze

Start at box 2 · medians and the centroid

Name _____

Period _____

Date _____



L, M and N are the midpoints of the sides. AL, BM and CN are **medians**. They meet at the **centroid G**.

On every median, the piece at the corner is the **long** piece. It is twice the **short** piece at the midpoint: $AG = 2 \times GL$.

Every box uses this triangle. Every question asks for a **length**. Choose an answer, and go to the box it names.

1

CN = $x + 9$ and $GN = x - 3$. How long is GN?
GN = 6 → you are out
GN = 9 → go to 7

The value of x is a step on the way. Put it into the expression for GN.

2

GL = 6. How long is AG?
AG = 3 → go to 4
AG = 12 → go to 5

Which end of AL is the corner? Name the long piece first.

3

BG = $4x - 2$ and $GM = x + 4$. How long is BG?
BG = 5 → go to 7
BG = 18 → go to 6

Read the question again. Which segment does it ask for?

4

GM = 5. How long is BM?
BM = 7.5 → go to 2
BM = 15 → go to 5

BM is the whole median. How many short pieces make it?

5

AG = $x + 2$ and $GL = x - 5$. How long is GL?
GL = 7 → go to 8
GL = 12 → go to 7

Solve for x first. Then put x into the expression the question names.

6

CG = 16. How long is GN?
GN = 32 → go to 4
GN = 8 → go to 1

Put a finger on C and on N. Which piece touches the corner?

7

AG = $5x - 3$ and $GL = x + 3$. How long is AG?
AG = 12 → go to 8
AG = 3 → go to 5

Solve for x . Then find the length the question asks for, not x .

8

BM = 21. How long is BG?
BG = 14 → go to 3
BG = 7 → go to 4

BG runs from a corner to G. Is it the long piece or the short piece?

Write each box number as you reach it:

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Answer Maze — answers

For the teacher

The route, in order. Boxes 4 and 7 are not on it. A student reaches them only by a wrong answer. They are the last two rows of the table.

2 → 5 → 8 → 3 → 6 → 1 → out

	Box	Right answer, and why	Wrong answer, and why a student picks it
1	Box 2 GL = 6. How long is AG?	AG = 12. AL is the median from corner A. GL is the short piece and AG is the long piece, so $2 \times 6 = 12$.	"AG = 3" goes to box 4. A student who halves the short piece instead of doubling it picks this.
2	Box 5 AG = $x + 2$ and GL = $x - 5$. How long is GL?	GL = 7. AG is the long piece and GL is the short piece, so AG = $2 \times$ GL: $x + 2 = 2(x - 5)$, which gives $x = 12$. Then GL = 7.	"GL = 12" goes to box 7. A student who solves for x and stops there picks this. 12 is x, not GL.
3	Box 8 BM = 21. How long is BG?	BG = 14. BM is the median from corner B. BM is the whole median and BG is the long piece, so $21 \div 3 \times 2 = 14$.	"BG = 7" goes to box 4. A student who takes one third of the whole instead of two thirds picks this.
4	Box 3 BG = $4x - 2$ and GM = $x + 4$. How long is BG?	BG = 18. BG is the long piece and GM is the short piece, so BG = $2 \times$ GM: $4x - 2 = 2(x + 4)$, which gives $x = 5$. Then BG = 18.	"BG = 5" goes to box 7. A student who solves for x and stops there picks this. 5 is x, not BG.
5	Box 6 CG = 16. How long is GN?	GN = 8. CN is the median from corner C. CG is the long piece and GN is the short piece, so $16 \div 2 = 8$.	"GN = 32" goes to box 4. A student who doubles the long piece instead of halving it picks this.
6	Box 1 CN = $x + 9$ and GN = $x - 3$. How long is GN?	GN = 6. CN is the whole median and GN is the short piece, so CN = $3 \times$ GN: $x + 9 = 3(x - 3)$, which gives $x = 9$. Then GN = 6.	"GN = 9" goes to box 7. A student who solves for x and stops there picks this. 9 is x, not GN.
	Box 4 GM = 5. How long is BM?	BM = 15. BM is the median from corner B. GM is the short piece and BM is the whole median, so $3 \times 5 = 15$.	"BM = 7.5" goes to box 2. A student who takes the short piece for the long one picks this. That student adds half of it for the other piece, so the whole median comes out one and a half times the short piece instead of three times.
	Box 7 AG = $5x - 3$ and GL = $x + 3$. How long is AG?	AG = 12. AG is the long piece and GL is the short piece, so AG = $2 \times$ GL: $5x - 3 = 2(x + 3)$, which gives $x = 3$. Then AG = 12.	"AG = 3" goes to box 5. A student who solves for x and stops there picks this. 3 is x, not AG.

How to check any box. Find the median the question is about: AL, BM or CN. The piece from the corner to G is the long piece, and the piece from G to the midpoint is the short piece. The long piece is twice the short piece, and the whole median is three short pieces. In an algebra box, write that equation, solve for x, and then put x into the expression for the length the question asks for.

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.