



ALGEBRAIC PROOF

Algebraic Proof: Which Reason Fits?

8 boxes · two reasons each · the wrong one is always the look-alike

FREE

1

If $AB = CD$ and $CD = EF$, then $AB = EF$.

Which reason fits?

- Transitive Property of Equality. **Go to box 5.**
- Symmetric Property of Equality. **Go to box 6.**

Hint: Count the lines the step starts from.

2

If $12 = 3y$, then $3y = 12$. Which reason fits?

- Reflexive Property of Equality. **Go to box 5.**
- Symmetric Property of Equality. **Go to OUT.**

Hint: Look at where each side of the first line goes.

3

If $x - 7 = 12$, then $x = 19$. Which reason fits?

- Subtraction Property of Equality. **Go to box 6.**
- Addition Property of Equality. **Go to box 7.**

Hint: Look at what is done to both sides, not at the sign that goes away.

4

If $m\angle 1 = m\angle 2$, then $m\angle 2 = m\angle 1$. Which reason fits?

- Symmetric Property of Equality. **Go to box 1.**
- Transitive Property of Equality. **Go to box 7.**

Hint: Count the lines the step starts from.

1. **Give each student page 3.**
2. **Say this once:** *“Start at box 3. Pick the reason that fits the step. Go where it says. Write every box number in the row at the bottom.”*
3. **Let them work.** Nothing else is needed.

Maze page 3, one per student. It carries the list of reasons.
Answers page 4 — yours.

A clean run is six boxes and OUT: $3 \rightarrow 7 \rightarrow 1 \rightarrow 5 \rightarrow 8 \rightarrow 2 \rightarrow \text{OUT}$. A longer row means a wrong reason, and the row shows where.

Every wrong answer is a common mistake. The most common one is naming a step for the sign that goes away. For example, a student calls a step “Subtraction” because a minus sign goes away, when in fact the same number is added to both sides. The other wrong answers mix up two names that students often confuse: the Multiplication Property and the Distributive Property, the Subtraction Property and Simplify, Symmetric and Transitive, and Reflexive and Symmetric.

Boxes 6 and 4 are not on the route. A student reaches them only by a wrong answer. They look like every other box, with a step and two reasons. The right answer there leads back onto the route.



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Maze — which reason fits?

A reason for every line

Name _____

Period _____

Date _____

Start at box 3. Read the step. Pick the reason that fits it, and go to the box that reason names. Write every box number in the row at the bottom as you go. Stop when a box sends you OUT.

Properties of equality that do the same thing to both sides
Addition Property of Equality: If $a = b$, then $a + c = b + c$.
Subtraction Property of Equality: If $a = b$, then $a - c = b - c$.
Multiplication Property of Equality: If $a = b$, then $a \cdot c = b \cdot c$.
Division Property of Equality: If $a = b$ and c is not 0, then $a \div c = b \div c$.

Other properties of equality

Reflexive Property of Equality: $a = a$.

Symmetric Property of Equality: If $a = b$, then $b = a$.

Transitive Property of Equality: If $a = b$ and $b = c$, then $a = c$.

Substitution: If $a = b$, then b can take the place of a in a line.

Not properties of equality (they change only how one side is written)

Distributive Property: $a(b + c) = ab + ac$.

Simplify: put like terms together, as in $5x - 2x = 3x$.

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- Symmetric Property of Equality. **Go to box 1.**
- Transitive Property of Equality. **Go to box 7.**

Hint: Count the lines the step starts from.

5

If $\frac{x}{5} = 3$, then $x = 15$. Which reason fits?

- Division Property of Equality. **Go to box 7.**
- Multiplication Property of Equality. **Go to box 8.**

Hint: Look at what is done to both sides, not at the sign that goes away.

6

If $y + 8 = 15$, then $y = 7$. Which reason fits?

- Addition Property of Equality. **Go to box 3.**
- Subtraction Property of Equality. **Go to box 7.**

Hint: A step is named for what is done to both sides. The sign that goes away does not name it.

7

If $4(x + 2) = 20$, then $4x + 8 = 20$. Which reason fits?

- Distributive Property. **Go to box 1.**
- Multiplication Property of Equality. **Go to box 4.**

Hint: Check whether the right side changes.

8

If $9x - 4x = 30$, then $5x = 30$. Which reason fits?

- Simplify. **Go to box 2.**
- Subtraction Property of Equality. **Go to box 4.**

Hint: Check whether the right side changes.

Write each box number here, in order, as you go. Start with 3.

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Maze — answers

For the teacher

3 → 7 → 1 → 5 → 8 → 2 → OUT

Box	The step	Right reason goes to	Wrong reason goes to
1 on the route	If $AB = CD$ and $CD = EF$, then $AB = EF$.	Transitive Property of Equality → 5	Symmetric Property of Equality → 6
2 on the route	If $12 = 3y$, then $3y = 12$.	Symmetric Property of Equality → OUT	Reflexive Property of Equality → 5
3 on the route	If $x - 7 = 12$, then $x = 19$.	Addition Property of Equality → 7	Subtraction Property of Equality → 6
4 off the route	If $m\angle 1 = m\angle 2$, then $m\angle 2 = m\angle 1$.	Symmetric Property of Equality → 1	Transitive Property of Equality → 7
5 on the route	If $\frac{x}{5} = 3$, then $x = 15$.	Multiplication Property of Equality → 8	Division Property of Equality → 7
6 off the route	If $y + 8 = 15$, then $y = 7$.	Subtraction Property of Equality → 7	Addition Property of Equality → 3
7 on the route	If $4(x + 2) = 20$, then $4x + 8 = 20$.	Distributive Property → 1	Multiplication Property of Equality → 4
8 on the route	If $9x - 4x = 30$, then $5x = 30$.	Simplify → 2	Subtraction Property of Equality → 4