

SCAVENGER HUNT



ALGEBRAIC PROOF

Algebraic Proof: A Reason for Every Line

The algebra is done · find the line each reason names · the cards check the answers

FREE

ANSWER

14

Which line uses the **Division Property of Equality**? The number after the equals sign in that line is your answer.

Line 1	$\frac{2x}{3} + 7 = 59$	Given
Line 2	$\frac{2x}{3} = 52$	?
Line 3	$\frac{x}{3} = 26$	?
Line 4	$x = 78$	?

Line 1 is always Given. Every other line has a reason from the list.

D

chooseyourlesson.com

1. **Tape the 16 cards around the room** in any order. Each card has a large letter in its bottom left corner. Start each group on a different one of these eight cards: *A B C D E K P R*.
2. **Say this once:** *“Each card names one reason. Find the line that uses it. The number after the equals sign in that line is your answer. Then find the card with that number at the top.”*
3. **Give each student a record sheet.** Nothing else is needed.

16 cards	pages 3–10, one copy. There are two cards on each sheet. Cut the stack once through the middle.
Record sheet	page 11, one per student. It carries the list of reasons.
Answers	pages 12–13 — yours. They do not go in the room.

No card asks the students to do any algebra. Every card prints a finished chain of four lines. Line 1 is Given, and the reasons for lines 2 to 4 are missing. The card names one reason. The group finds the line that this reason allows and reads the number after its equals sign. The algebra is already done, so the only task is naming the reason.

The eight starting cards form a loop. Each chain holds two lines that are easy to mix up: an Addition line and a Subtraction line, or a Multiplication line and a Division line. The common mistake is naming a step for the sign that goes away. For example, $x - 8 = 7$ becoming $x = 15$ is called “Subtraction” because the minus sign goes away, but 8 is added to both sides. The number on that wrong line is at the top of one of the eight cards that are not on the loop. The group solves that card like any other, and its right answer is the number at the top of the card they got wrong, so they go back and try it again. Any other wrong line gives a number that is on no card, so the group knows at once to check again.

The length of a group's row shows how they did. A clean run is **eight lines**. Each wrong answer adds two more. If a group keeps going around in circles, ask: *“What does this line do to both sides?”*



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.
chooseyourlesson.com — 135 free geometry lessons.

ANSWER

21

Which line uses the **Multiplication Property of Equality**? The number after the equals sign in that line is your answer.

Line 1	$\frac{2x}{3} + 10 = 16$	Given
Line 2	$\frac{2x}{3} = 6$	?
Line 3	$\frac{x}{3} = 3$	?
Line 4	$x = 9$	?

The Division Property never divides by zero. Check the number we divide by.

A

chooseyourlesson.com

ANSWER

56

Which line uses the **Addition Property of Equality**? The number after the equals sign in that line is your answer.

Line 1	$2(x - 5) + 15 = 83$	Given
Line 2	$2(x - 5) = 68$	?
Line 3	$x - 5 = 34$	?
Line 4	$x = 39$	?

Say the step in your own words first. Then find its name in the list. Which reason does the card ask for?

B

chooseyourlesson.com

ANSWER

9

Which line uses the **Addition Property of Equality**? The number after the equals sign in that line is your answer.

Line 1	$3(x + 2) - 2 = 10$	Given
Line 2	$3(x + 2) = 12$	?
Line 3	$x + 2 = 4$	?
Line 4	$x = 2$	?

A fraction bar goes away when we multiply both sides by its bottom number.

C

chooseyourlesson.com

ANSWER

14

Which line uses the **Division Property of Equality**? The number after the equals sign in that line is your answer.

Line 1	$\frac{2x}{3} + 7 = 59$	Given
Line 2	$\frac{2x}{3} = 52$	?
Line 3	$\frac{x}{3} = 26$	?
Line 4	$x = 78$	?

Line 1 is always Given. Every other line has a reason from the list.

D

chooseyourlesson.com

ANSWER

12

Which line uses the **Multiplication Property of Equality**? The number after the equals sign in that line is your answer.

Line 1	$\frac{7x}{2} + 4 = 32$	Given
Line 2	$\frac{7x}{2} = 28$	?
Line 3	$7x = 56$	?
Line 4	$x = 8$	?

A minus sign goes away when we add the same number to both sides.

E

chooseyourlesson.com

ANSWER

2

Which line uses the **Division Property of Equality**? The number after the equals sign in that line is your answer.

Line 1	$\frac{5x}{4} + 7 = 52$	Given
Line 2	$\frac{5x}{4} = 45$	?
Line 3	$\frac{x}{4} = 9$	?
Line 4	$x = 36$	?

A plus sign goes away when we subtract from both sides. Taking away is the Subtraction Property.

F

chooseyourlesson.com

ANSWER

48

Which line uses the **Addition Property of Equality**? The number after the equals sign in that line is your answer.

Line 1	$2(x - 8) + 11 = 73$	Given
Line 2	$2(x - 8) = 62$	?
Line 3	$x - 8 = 31$	?
Line 4	$x = 39$	?

Subtracting the same number from both sides is the Subtraction Property. The sign that goes away does not matter.

G

chooseyourlesson.com

ANSWER

3

Which line uses the **Division Property of Equality**? The number after the equals sign in that line is your answer.

Line 1	$\frac{2x}{7} + 7 = 13$	Given
Line 2	$\frac{2x}{7} = 6$	?
Line 3	$2x = 42$	?
Line 4	$x = 21$	?

The number in front of x goes away when we divide both sides. Check which reason the card asks for.

H

chooseyourlesson.com

ANSWER

78

Which line uses the **Subtraction Property of Equality**? The number after the equals sign in that line is your answer.

Line 1	$2(x - 9) + 9 = 23$	Given
Line 2	$2(x - 9) = 14$	?
Line 3	$x - 9 = 7$	?
Line 4	$x = 16$	?

When a fraction bar goes away, we multiply both sides. Check which reason the card asks for.

J

chooseyourlesson.com

ANSWER

26

Which line uses the **Subtraction Property of Equality**? The number after the equals sign in that line is your answer.

Line 1	$3(x - 8) + 11 = 32$	Given
Line 2	$3(x - 8) = 21$	?
Line 3	$x - 8 = 7$	?
Line 4	$x = 15$	?

Check what happens to both sides. The left side alone does not tell the reason.

K

chooseyourlesson.com

ANSWER

15

Which line uses the **Multiplication Property of Equality**? The number after the equals sign in that line is your answer.

Line 1	$\frac{5x}{2} + 6 = 71$	Given
Line 2	$\frac{5x}{2} = 65$	?
Line 3	$\frac{x}{2} = 13$	?
Line 4	$x = 26$	?

A minus sign goes away when we add to both sides. Adding is the Addition Property.

L

chooseyourlesson.com

ANSWER

68

Which line uses the **Addition Property of Equality**? The number after the equals sign in that line is your answer.

Line 1	$2(x + 4) - 15 = 41$	Given
Line 2	$2(x + 4) = 56$	?
Line 3	$x + 4 = 28$	?
Line 4	$x = 24$	?

Name a step for what we do to both sides, not for the sign that goes away.

M

chooseyourlesson.com

ANSWER

8

Which line uses the **Division Property of Equality**? The number after the equals sign in that line is your answer.

Line 1	$\frac{5x}{2} - 11 = 49$	Given
Line 2	$\frac{5x}{2} = 60$	?
Line 3	$\frac{x}{2} = 12$	?
Line 4	$x = 24$	?

Dividing both sides makes the number in front of x go away. Is that the reason on the card?

N

chooseyourlesson.com

ANSWER

39

Which line uses the **Subtraction Property of Equality**? The number after the equals sign in that line is your answer.

Line 1	$2(x + 4) - 8 = 40$	Given
Line 2	$2(x + 4) = 48$	?
Line 3	$x + 4 = 24$	?
Line 4	$x = 20$	?

The number in front of x goes away when we divide both sides by it.

P

chooseyourlesson.com

ANSWER

70

Which line uses the **Addition Property of Equality**? The number after the equals sign in that line is your answer.

Line 1	$2(x + 6) - 3 = 17$	Given
Line 2	$2(x + 6) = 20$	?
Line 3	$x + 6 = 10$	?
Line 4	$x = 4$	?

Multiplying both sides makes a fraction bar go away. Is that the reason on the card?

Q

chooseyourlesson.com

ANSWER

20

Which line uses the **Division Property of Equality**? The number after the equals sign in that line is your answer.

Line 1	$\frac{5x}{2} + 8 = 43$	Given
Line 2	$\frac{5x}{2} = 35$	?
Line 3	$5x = 70$	?
Line 4	$x = 14$	?

A plus sign goes away when we subtract the same number from both sides.

R

chooseyourlesson.com

Scavenger Hunt — where I went

A reason for every line

Name _____

Period _____

Date _____

Read your card. It names one reason. Find the line in the chain that uses that reason. A line uses a reason when that reason turns the line above it into this line. Write the card letter, the line number and your answer. Then find the card with your answer at the top. A clean run is eight lines. **Each card has a tip in italics under its table of lines. If you are on a card because you went wrong, its tip says what to check. If you were right, skip it.**

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 $5x - 2x = 3x$.

Card letter	The line that uses the reason	My answer
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		

A student wrote only the answer, with no reasons. What did the teacher write next to it?

Every number stands for a letter. Write the letter for each answer in the box under that number. Leave the other boxes empty. Then read the boxes you filled from left to right. **If it does not spell two words, one answer was wrong.**

2 = H 3 = O 8 = S 9 = S 12 = H 14 = O 15 = R 20 = W 21 = W 26 = O 39 = R 48 = O 56 = K 68 = W 70 = K
78 = W

2	3	8	9	12	14	15	20	21	26	39	48	56	68	70	78	



135 free geometry lessons — worksheets, worked answers and lesson plans.
chooseyourlesson.com

Scavenger Hunt — answers

For the teacher

The eight cards of the loop, in order. A group may begin at any of them. Wherever it begins, eight right answers bring it back to that card.

D → K → A → C → E → B → P → R → D

A student wrote only the answer, with no reasons. What did the teacher write next to it?
SHOW WORK. The letters are read from the smallest answer to the largest. That is the order of the boxes on the record sheet.

The answers on the loop, smallest first: 9 = S, 12 = H, 14 = O, 20 = W, 21 = W, 26 = O, 39 = R, 56 = K. That spells SHOW WORK.

Card	The reason asked for	The line	Answer	The common wrong line gives	Letter for the number at its top
1 D	Division Property of Equality	line 3: $\frac{x}{3} = 26$	26	line 4: 78	O
2 K	Subtraction Property of Equality	line 2: $3(x - 8) = 21$	21	line 4: 15	O
3 A	Multiplication Property of Equality	line 4: $x = 9$	9	line 3: 3	W
4 C	Addition Property of Equality	line 2: $3(x + 2) = 12$	12	line 4: 2	S
5 E	Multiplication Property of Equality	line 3: $7x = 56$	56	line 4: 8	H
6 B	Addition Property of Equality	line 4: $x = 39$	39	line 2: 68	K
7 P	Subtraction Property of Equality	line 4: $x = 20$	20	line 2: 48	R
8 R	Division Property of Equality	line 4: $x = 14$	14	line 3: 70	W

The column “the common wrong line gives” shows the number a group gets when it names a step for the sign that goes away. The group takes the Subtraction line for Addition, or the Division line for Multiplication, or the other way around. That number is at the top of a card on the next page. Every other line of every chain ends in a number that is on no card.

Scavenger Hunt — the cards off the loop

For the teacher

These eight cards are where a wrong answer goes. At the top of each one is the number a group gets from the common wrong line at one card of the loop. Its own answer is the number at the top of that loop card. So the group goes back to the card it got wrong, and its row comes out two lines longer. **A group cannot reach one of these cards by being right.** A wrong answer on one of these cards gives a number that is on no card at all.

Card	The reason asked for	The line	Answer	The common wrong line gives	Letter for the number at its top
J	Subtraction Property of Equality	line 2: $2(x - 9) = 14$	14	line 4: 16	W
L	Multiplication Property of Equality	line 4: $x = 26$	26	line 3: 13	R
H	Division Property of Equality	line 4: $x = 21$	21	line 3: 42	O
F	Division Property of Equality	line 3: $\frac{x}{4} = 9$	9	line 4: 36	H
N	Division Property of Equality	line 3: $\frac{x}{2} = 12$	12	line 4: 24	S
M	Addition Property of Equality	line 2: $2(x + 4) = 56$	56	line 4: 24	W
G	Addition Property of Equality	line 4: $x = 39$	39	line 2: 62	O
Q	Addition Property of Equality	line 2: $2(x + 6) = 20$	20	line 4: 4	K

Every card has a tip in italics under its table of lines. The tip gives a good habit, not an answer. On a card off the loop, the tip names the mistake that sent the group there.