LESSON MAKER PRO

Frame Check

Use side lengths to test quadrilaterals.

HIGH SCHOOL · MT.CORE.GEOM.ARG.1.c

MT.CORE.GEOM.ARG.1.c "Investigate, conjecture, prove theorems, and communicate the proofs in a variety of ways by: Proving theorems about parallelograms and other quadrilaterals. Theorems include: necessary and sufficient conditions for rectangles..."

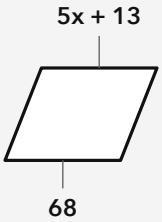
NAME _____ DATE _____

OPPOSITE SIDES MATTER

In a parallelogram, each pair of opposite sides has the same length. The converse is also true: if both pairs of opposite sides in a quadrilateral have the same length, the quadrilateral is a parallelogram. Set opposite-side expressions equal to find x, and check both pairs when deciding whether a quadrilateral is a parallelogram.

WORKED EXAMPLE

The figure is a parallelogram. Find x.

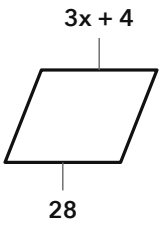


1. Set opposite sides equal: 5x + 13 = 68.
2. Subtract 13: 5x = 55.
3. Divide by 5: x = 11.

Answer: x = 11

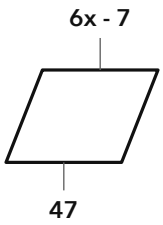
PRACTICE 6 problems

1 The figure is a parallelogram. Find x.



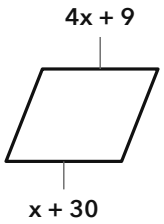
ANSWER _____

2 The figure is a parallelogram. Find x.



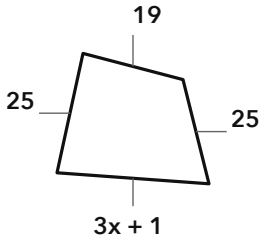
ANSWER _____

3 The figure is a parallelogram. Find x.



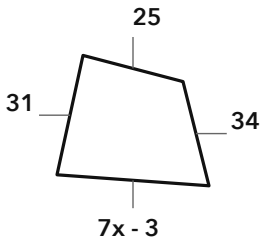
ANSWER _____

4 When x = 6, do the side lengths prove this quadrilateral is a parallelogram? Show both comparisons.



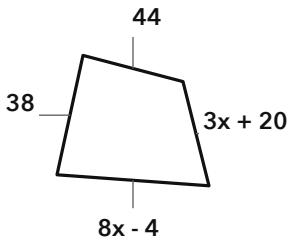
ANSWER _____

5 When x = 4, do the side lengths prove this quadrilateral is a parallelogram? Show both comparisons.



ANSWER _____

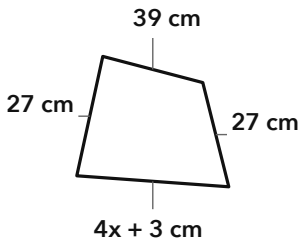
6 Find x so both pairs of opposite sides are equal. Explain what this proves about the quadrilateral.



ANSWER _____

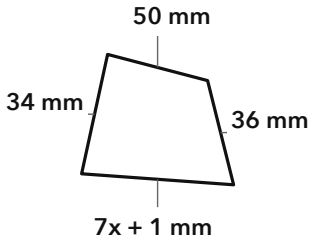
APPLY IT Show your work

1 A student builds a four-sided phone stand frame with the edge lengths shown. Find x so both pairs of opposite edges are equal. Do these measurements prove the frame is a parallelogram?



ANSWER _____

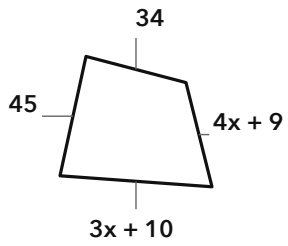
2 A designer plans a four-sided sticker for a game controller. Find x so one pair of opposite edges is equal. Do the shown lengths prove the sticker is a parallelogram?



ANSWER _____

CHALLENGE One step up

Can any value of x make both pairs of opposite sides equal? Find the value required by each pair, then explain your conclusion.



WORK SPACE AND ANSWER

ANSWER KEY

Frame Check

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	The figure is a parallelogram. Find x.	**x = 8**
2	The figure is a parallelogram. Find x.	**x = 9**
3	The figure is a parallelogram. Find x.	**x = 7**
4	When x = 6, do the side lengths prove this quadrilateral is a parallelogram? Show both comparisons.	**Yes. 3(6) + 1 = 19, and 25 = 25. Both pairs of opposite sides are equal.**
5	When x = 4, do the side lengths prove this quadrilateral is a parallelogram? Show both comparisons.	**No. 7(4) - 3 = 25, but 34 ≠ 31. Only one pair of opposite sides is equal.**
6	Find x so both pairs of opposite sides are equal. Explain what this proves about the quadrilateral.	**x = 6. Then 8(6) - 4 = 44 and 3(6) + 20 = 38, so both pairs of opposite sides are equal and the quadrilateral is a parallelogram.**

PART 2 · APPLY IT

1. **x = 9. Yes, both pairs of opposite edges are equal.** Solve 4x + 3 = 39 to get x = 9. The other pair is 27 cm and 27 cm, so the frame meets the parallelogram condition.
2. **x = 7. No, the other pair of opposite edges is 36 mm and 34 mm.** Solve 7x + 1 = 50 to get x = 7. Since 36 ≠ 34, the opposite edges are not equal in both pairs.

CHALLENGE

No. The first pair requires 3x + 10 = 34, so x = 8. The second requires 4x + 9 = 45, so x = 9. One value of x cannot satisfy both.

For written justifications, accept equivalent equations or calculations that check both opposite-side pairs. A single equal pair does not establish that a quadrilateral is a parallelogram.