LESSON MAKER PRO

Parallelogram Power Moves

Use side, angle, and diagonal relationships to solve and prove.

HIGH SCHOOL · MA.912.GR.1.4

MA.912.GR.1.4 "Prove relationships and theorems about parallelograms. Solve mathematical and real-world problems involving postulates, relationships and theorems of parallelograms."

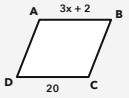
NAME _____ DATE _____

PARALLELOGRAM RULES

In a parallelogram, opposite sides are congruent and parallel, opposite angles are congruent, and consecutive angles are supplementary. The diagonals bisect each other, so each diagonal is split into two equal segments.

WORKED EXAMPLE

In parallelogram ABCD, AB = 3x + 2 and CD = 20. Find x.

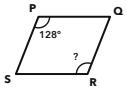


1. AB and CD are opposite sides, so AB = CD.
2. 3x + 2 = 20.
3. 3x = 18.
4. x = 6.

Answer: x = 6

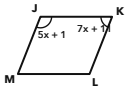
PRACTICE 6 problems

1 In parallelogram PQRS, m∠P = 128°. Find m∠R.



ANSWER _____

2 In parallelogram JKLM, m∠J = 5x + 1 and m∠K = 7x + 11. Find x.



ANSWER _____

3 The diagonals of parallelogram ABCD intersect at O. If AO = 17, find AC.

ANSWER _____

4 Parallelogram ABCD has AB = 47 and perimeter 154. Find BC.

ANSWER _____

5 In parallelogram ABCD, m∠A = x + 27 and m∠C = 5x - 9. Find x and m∠A.

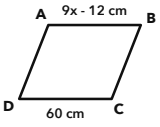
ANSWER _____

6 The diagonals of parallelogram EFGH intersect at T. If ET = 4x - 7 and TG = x + 17, find x and EG.

ANSWER _____

APPLY IT Show your work

1 A student council is ordering a parallelogram-shaped banner. Two opposite edges are labeled 9x - 12 cm and 60 cm. Find x and the length of each of those opposite edges.



ANSWER _____

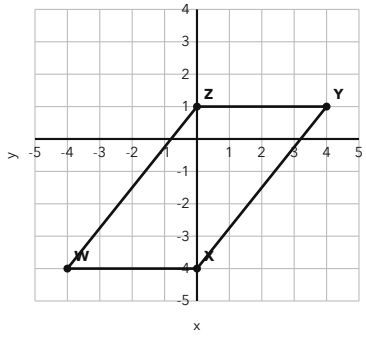
2 A student graphic designer makes a slanted title card shaped like a parallelogram. Two consecutive interior angles measure 4x + 14 degrees and 7x + 12 degrees. Find x and both angle measures.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Quadrilateral WXYZ is shown on the coordinate plane. Prove that WXYZ is a parallelogram by comparing slopes of opposite sides. Then find the point where its diagonals intersect.



WORK SPACE AND ANSWER

ANSWER KEY

Parallelogram Power Moves

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	In parallelogram PQRS, m∠P = 128°. Find m∠R.	**m∠R = 128°**
2	In parallelogram JKLM, m∠J = 5x + 1 and m∠K = 7x + 11. Find x.	**x = 14**
3	The diagonals of parallelogram ABCD intersect at O. If AO = 17, find AC.	**AC = 34**
4	Parallelogram ABCD has AB = 47 and perimeter 154. Find BC.	**BC = 30**
5	In parallelogram ABCD, m∠A = x + 27 and m∠C = 5x - 9. Find x and m∠A.	**x = 9; m∠A = 36°**
6	The diagonals of parallelogram EFGH intersect at T. If ET = 4x - 7 and TG = x + 17, find x and EG.	**x = 8; EG = 50**

PART 2 · APPLY IT

1. **x = 8; each of those opposite edges is 60 cm.** Opposite sides of a parallelogram are congruent, so set 9x - 12 equal to 60. Solving gives x = 8.
2. **x = 14; the angles measure 70° and 110°.** Consecutive angles in a parallelogram are supplementary, so add the expressions and set their sum equal to 180. Solve for x, then substitute to find each angle.

CHALLENGE

slope WX = 0 and slope YZ = 0; slope XY = 5/4 and slope ZW = 5/4. Both pairs of opposite sides are parallel, so WXYZ is a parallelogram. The diagonals intersect at (0, -3/2).

Accept equivalent algebraic work and slope calculations. For the challenge, students may prove the quadrilateral is a parallelogram by showing both pairs of opposite sides have equal slopes or by showing the diagonals share midpoint (0, -3/2).