ALBERT

Name _____ Date _____

Parallelogram Proofs Worksheet

Geometry · Common Core HSG-CO.C.11

> Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.

Practice

Builds the skill step by step.

1. In parallelogram ABCD, AB = 11. What is CD?

2. In parallelogram ABCD, m∠A = 70°. What is m∠C?

3. In parallelogram ABCD, m∠A = 70°. What is m∠B?

4. The diagonals of parallelogram ABCD meet at E, and AE = 6. What is AC?

5. Which is true of every parallelogram?

   A. All sides are congruent.

   B. The diagonals are congruent.

   C. All angles are right angles.

   D. The diagonals bisect each other.

6. In rectangle ABCD, diagonal AC = 10. What is BD?

7. In parallelogram ABCD, AB = 3x + 1 and CD = 2x + 7. What is x?

8. In parallelogram ABCD, m∠A = (2x + 10)° and m∠C = (3x − 20)°. What is x?

9. A parallelogram has congruent diagonals. What must it be?

   A. a rhombus

   B. a kite

   C. a rectangle

   D. a trapezoid

10. In parallelogram ABCD, diagonal BD = 18 and the diagonals meet at E. What is BE?

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On Level

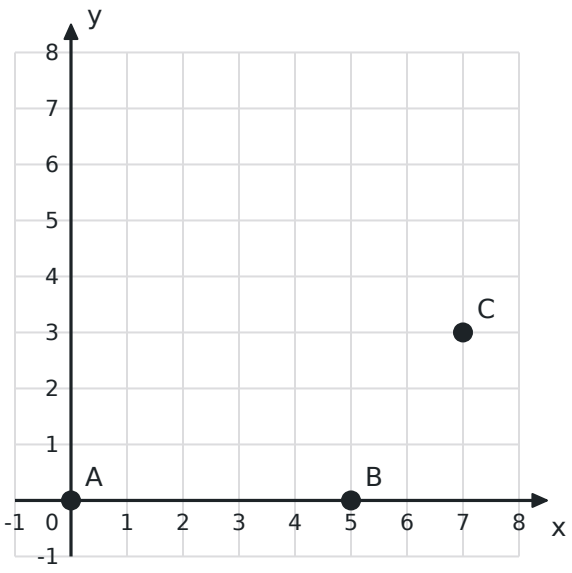
Grade-level practice.

1. In parallelogram ABCD, m∠A = 4x° and m∠B = (2x + 30)°. What is m∠A?

2. The diagonals of parallelogram ABCD meet at E. AE = 2y + 1 and EC = 3y − 4. What is y?

3. Prove that opposite sides of parallelogram ABCD are congruent. Use diagonal AC.

4. ABCD is a parallelogram with A(0, 0), B(5, 0) and C(7, 3). What are the coordinates of D?



5. In rectangle ABCD, AC = 3x + 2 and BD = 5x − 6. What is x?

6. The diagonals of a quadrilateral bisect each other. What must the quadrilateral be?

   A. a square

   B. a parallelogram

   C. a rhombus

   D. a rectangle

7. Parallelogram ABCD has A(1, 1) and C(7, 5). Where do its diagonals intersect?

8. In parallelogram ABCD, AB = 8 and BC = 5. What is the perimeter?

9. A rectangle is 6 by 8. How long is each diagonal?

10. Which is NOT always true of a parallelogram?

    A. The diagonals are congruent.

    B. Opposite sides are congruent.

    C. Opposite angles are congruent.

    D. Consecutive angles are supplementary.

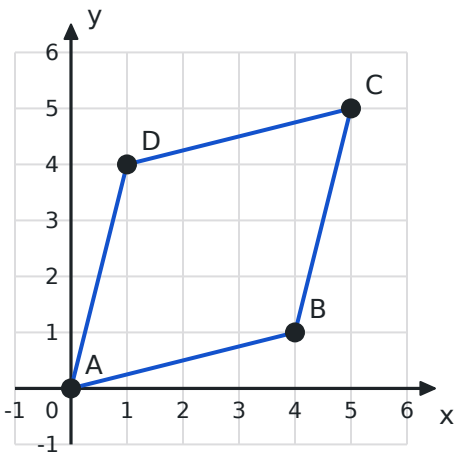
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Challenge

Multi-step and word problems that stretch it.

1. Is ABCD with A(0, 0), B(4, 1), C(5, 5) and D(1, 4) a parallelogram?



   A. No. The diagonals are not congruent.

   B. No. No sides are parallel.

   C. Yes. All sides are equal.

   D. Yes. AB and DC both have slope $\frac{1}{4}$, and BC and AD both have slope 4.

2. For the same quadrilateral A(0, 0), B(4, 1), C(5, 5), D(1, 4), is it a rectangle?

   A. Yes. It is a parallelogram.

   B. No. AB and AD are not perpendicular; their slopes multiply to 1, not −1.

   C. Yes. Opposite sides are equal.

   D. No. It isn't a parallelogram.

3. Prove that the diagonals of parallelogram ABCD bisect each other. Let the diagonals meet at E.

4. In parallelogram ABCD, $m\angle ABD = 30°$ and $m\angle ADB = 45°$. What is $m\angle CDB$?

5. A parallelogram has perpendicular diagonals of lengths 10 and 24. How long is each side?

6. The diagonals of rectangle ABCD meet at E, and $m\angle AEB = 70°$. What is $m\angle EAB$?

7. A quadrilateral has both pairs of opposite angles congruent. What must it be?

   A. a parallelogram

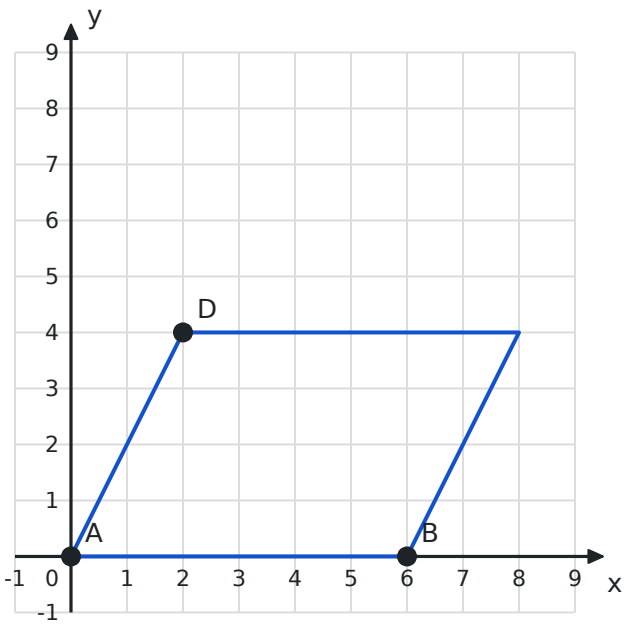
   B. a rectangle

   C. a trapezoid

   D. a kite

8. In parallelogram ABCD, $AB = x + y$, $BC = 2x - y$, $CD = 12$ and $DA = 9$. What is x?

9. Parallelogram ABCD has A(0, 0), B(6, 0) and D(2, 4). What is its area?



10. A rectangle has a diagonal of 13 and one side of 5. How long is the other side?