

Geometry · Parallelograms and Special Quadrilaterals · Worksheet

Common Core G-CO.C.11 · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

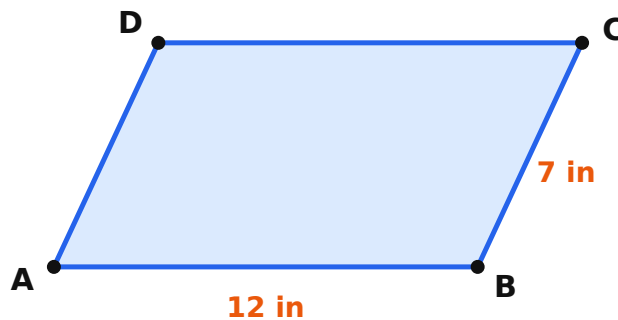
These 24 problems practice the properties of parallelograms and special quadrilaterals from Common Core standard G-CO.C.11. They start with opposite sides, opposite angles and diagonals, then move to rectangles, rhombuses, squares, trapezoids and kites.

The last six problems are word problems and multi-step reasoning, including a two-column proof. Draw a sketch whenever a figure is not given, and write a reason for each step.

Geometry Common Core: G-CO.C.11

Problem 1: Opposite sides

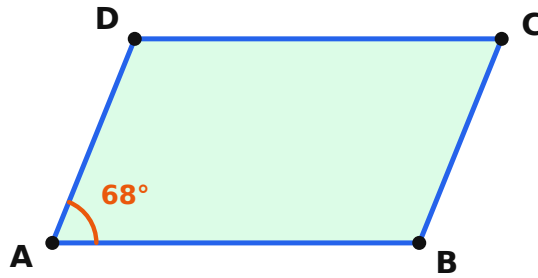
In parallelogram $ABCD$, $AB = 12$ in and $BC = 7$ in. Find CD and DA .



Parallelogram $ABCD$ with $AB = 12$ in and $BC = 7$ in.

Problem 2: Opposite and consecutive angles

In parallelogram $ABCD$, $m\angle A = 68^\circ$. Find $m\angle B$, $m\angle C$ and $m\angle D$.

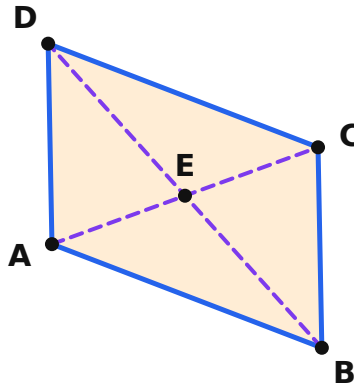


Parallelogram $ABCD$ with angle A equal to 68 degrees.

Problem 3: Diagonals bisect each other

The diagonals of parallelogram $ABCD$ meet at E . If $AC = 18$ and $BD = 26$, find AE and BE .

$AC = 18, BD = 26$



Parallelogram $ABCD$ with diagonals $AC = 18$ and $BD = 26$ meeting at E .

Problem 4: Sides with a variable

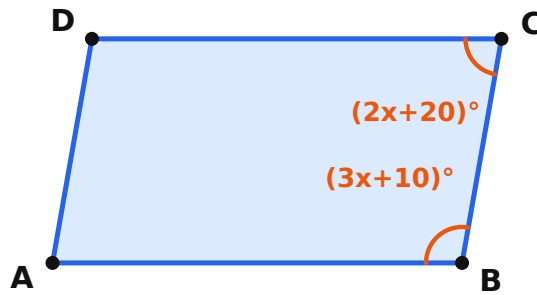
In parallelogram $ABCD$, $AB = (3x+5)$ in and $CD = (5x-9)$ in. Find x and AB .

Problem 5: Opposite angles with a variable

In parallelogram $ABCD$, $m\angle A = (4x+8)^\circ$ and $m\angle C = (6x-12)^\circ$. Find x and $m\angle B$.

Problem 6: Consecutive angles with a variable

In parallelogram $ABCD$, $m\angle B = (3x+10)^\circ$ and $m\angle C = (2x+20)^\circ$. Find x , $m\angle B$ and $m\angle C$.



Parallelogram $ABCD$ with consecutive angles B and C marked $(3x + 10)$ and $(2x + 20)$ degrees.

Problem 7: Pieces of the diagonals

The diagonals of parallelogram $ABCD$ meet at E . Given $AE = 2x + 3$, $EC = 4x - 7$, $BE = 3y + 1$ and $ED = y + 13$, find AC and BD .

Problem 8: Parallelogram or not?

Decide whether each quadrilateral must be a parallelogram. Give a reason, or name a figure that shows it is not.

- Side lengths in order around the figure: 9 cm, 5 cm, 9 cm, 5 cm.
- Side lengths in order around the figure: 9 cm, 9 cm, 5 cm, 5 cm.
- The diagonals bisect each other.
- Exactly one pair of opposite sides is parallel.
- One pair of opposite sides is parallel and congruent.

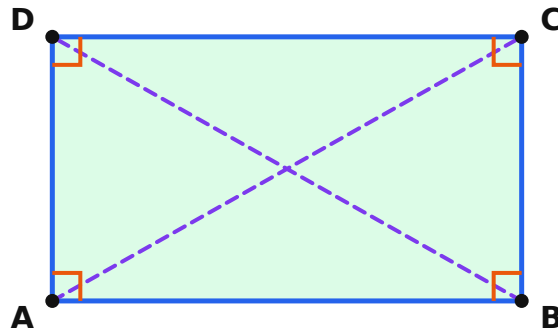
Problem 9: Perimeter with two variables

In parallelogram $ABCD$, $AB = 2x + 3$, $CD = 3x - 2$, $BC = 4y - 1$ and $DA = 2y + 7$ (all in inches). Find the perimeter.

Problem 10: Diagonals of a rectangle

Rectangle $ABCD$ has diagonals $AC = 5x - 4$ and $BD = 3x + 14$. Find x and AC .

$$AC = 5x - 4, BD = 3x + 14$$



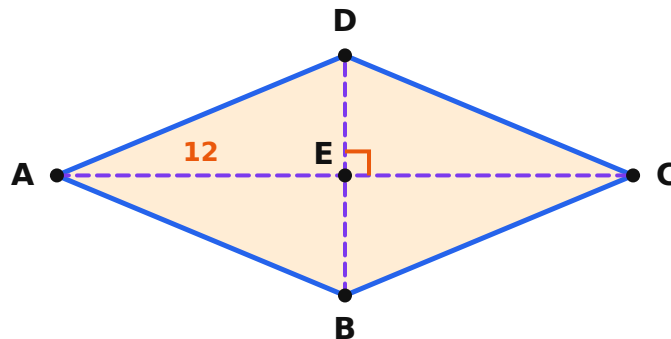
Rectangle ABCD with diagonals $AC = 5x - 4$ and $BD = 3x + 14$.

Problem 11: Length of a rectangle diagonal

A rectangle is 8 cm wide and 15 cm long. Find the length of each diagonal.

Problem 12: Rhombus perimeter and diagonals

Rhombus $ABCD$ has perimeter 52 cm and diagonal $AC = 24$ cm. The diagonals meet at E . Find BD .



Rhombus ABCD with diagonals meeting at E and $AC = 24$ cm.

Problem 13: Diagonal bisects an angle of a rhombus

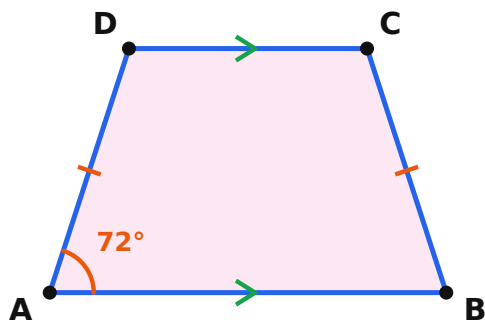
In rhombus $ABCD$, diagonal $\overline{AC}$ bisects $\angle DAB$. If $m\angle BAC = (3x+4)^\circ$ and $m\angle CAD = (5x-12)^\circ$, find $m\angle DAB$ and $m\angle ABC$.

Problem 14: Diagonals of a square

The diagonals of square $PQRS$ meet at E , and $PR = 18$ cm. Find SE , $m\angle PEQ$ and $m\angle RPQ$.

Problem 15: Base angles of an isosceles trapezoid

In isosceles trapezoid $ABCD$ with $\overline{AB}$ parallel to $\overline{DC}$, $m\angle A = 72^\circ$. Find the other three angles.



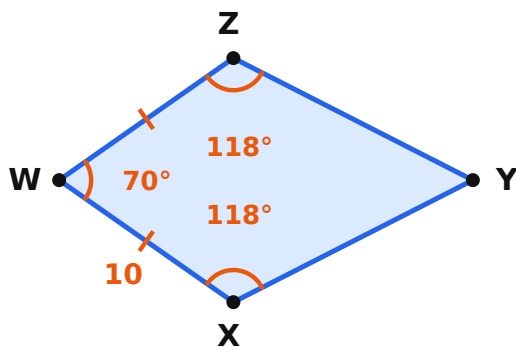
Isosceles trapezoid $ABCD$ with bases AB and DC and angle A equal to 72 degrees.

Problem 16: Diagonals of an isosceles trapezoid

Isosceles trapezoid $ABCD$ has diagonals $AC = 4x - 3$ and $BD = 2x + 13$. Find x and AC .

Problem 17: Angles of a kite

In kite $WXYZ$, $WX = WZ = 10$, $m\angle W = 70^\circ$ and $m\angle X = m\angle Z = 118^\circ$. Find $m\angle Y$.



Kite $WXYZ$ with $WX = WZ = 10$, angle $W = 70$ degrees and angles X and $Z = 118$ degrees.

Problem 18: Name every quadrilateral

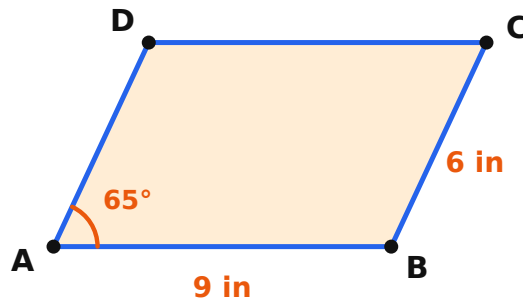
List every name from this set that must describe each figure: quadrilateral, parallelogram, rectangle, rhombus, square, trapezoid, kite.

- Four congruent sides and four right angles.
- The diagonals are perpendicular and bisect each other, but they are not congruent.

- c. Exactly one pair of parallel sides and congruent legs.

Problem 19: Quilt patch

Maya cuts a quilt patch shaped like parallelogram $ABCD$ with $AB = 9$ in, $BC = 6$ in and $m\angle A = 65^\circ$. She sews ribbon around the whole edge. Find the length of ribbon and the other three angles.



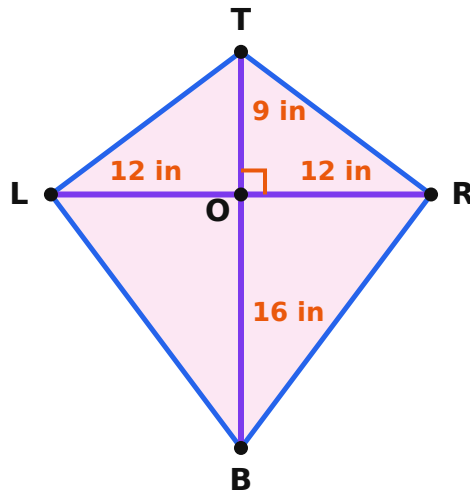
Quilt patch $ABCD$ with $AB = 9$ in, $BC = 6$ in and angle $A = 65$ degrees.

Problem 20: Is the frame a rectangle?

Jamal builds a picture frame from two 24-inch boards and two 18-inch boards. He measures both diagonals and gets 30 inches each. (a) Explain why the frame is a parallelogram. (b) What does the matching diagonal length tell him about the corners? (c) Show that the numbers fit with the Pythagorean Theorem.

Problem 21: Flying kite frame

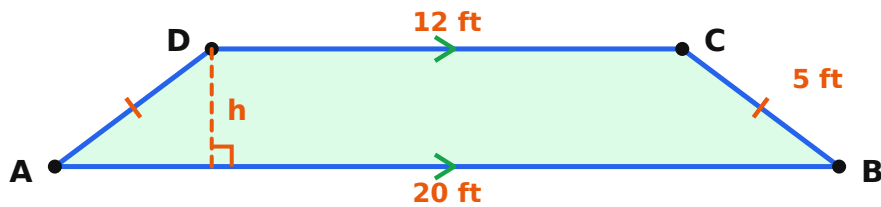
Aisha builds a kite from two spars that cross at a right angle. The vertical spar is 25 inches long. The 24-inch horizontal spar is bisected by the vertical spar, and the crossing point is 9 inches below the top. Find the length of edging tape needed to go around the kite.



Kite frame with a 25-inch vertical spar and a 24-inch horizontal spar crossing 9 inches below the top.

Problem 22: Trapezoid garden bed

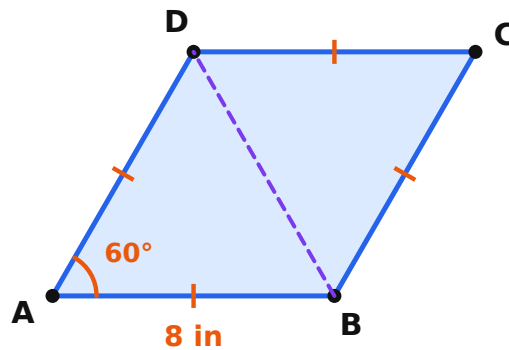
A garden bed is an isosceles trapezoid with bases 20 ft and 12 ft and two legs of 5 ft each. Find the perimeter of the bed and the distance between the two bases.



Isosceles trapezoid garden bed with bases 20 ft and 12 ft and legs 5 ft.

Problem 23: Rhombus floor tile

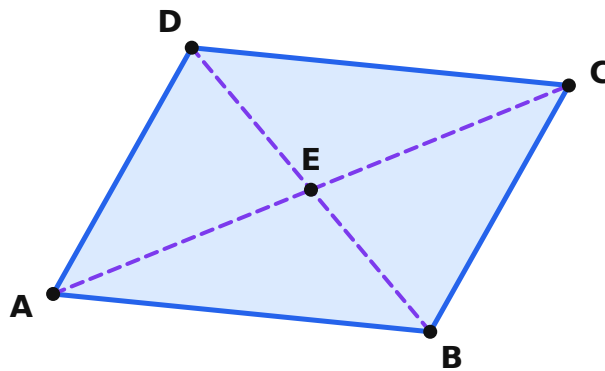
Sofia designs a rhombus-shaped floor tile with side 8 in and $m\angle A = 60^\circ$. She draws the short diagonal $\overline{BD}$. Find BD and the measure of each angle of triangle ABD .



Rhombus tile ABCD with side 8 inches, angle A = 60 degrees and dashed diagonal BD.

Problem 24: Proof: diagonals bisect each other

Complete the reasons in this proof. *Given:* parallelogram $ABCD$ with diagonals meeting at E .
Prove: $AE = CE$ and $BE = DE$.



Parallelogram ABCD with diagonals AC and BD meeting at E.

Statements	Reasons
1. $ABCD$ is a parallelogram	1. _____
2. $\overline{AB}$ is parallel to $\overline{DC}$	2. _____
3. $m\angle BAE = m\angle DCE$ and $m\angle ABE = m\angle CDE$	3. _____
4. $AB = CD$	4. _____
5. Triangle ABE is congruent to triangle CDE	5. _____
6. $AE = CE$ and $BE = DE$	6. _____