

Geometry - Parallelograms and Quadrilaterals - Answer Key

Common Core G-CO.C.11 · maths-pdf.fr/en/

Use this answer key to check the 20 problems on parallelograms. Every solution shows the formula or theorem used, each step of the work, and the final answer in bold. If an answer differs from yours, compare the steps line by line to find where the work changed.

Geometry · Common Core State Standards: **G-CO.C.11**

Exercise 1 - Opposite sides

Opposite sides are congruent.

$$CD = AB = 14 \text{ and } AD = BC = 9.$$

$$\mathbf{CD = 14, AD = 9}$$

Exercise 2 - Opposite angles

Opposite angles are congruent: $m\angle Y = 123^\circ$.

Consecutive angles are supplementary: $m\angle X = 180^\circ - 123^\circ = 57^\circ$.

$$\mathbf{m\angle Y = 123^\circ, m\angle X = 57^\circ}$$

Exercise 3 - Consecutive angles with x

Consecutive angles are supplementary.

$$(4x+10)+(2x+20)=180$$

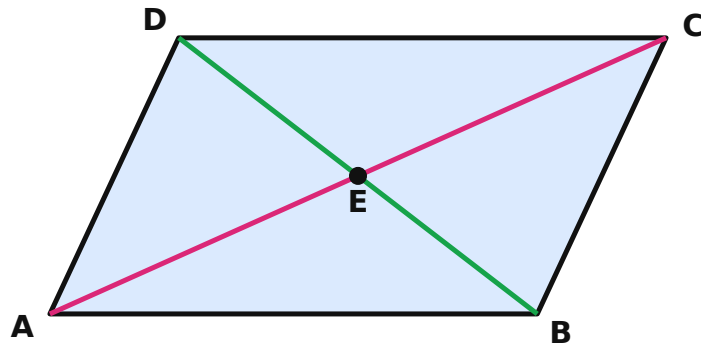
$$6x+30=180$$

$$x=25$$

$$m\angle A = 110^\circ \text{ and } m\angle B = 70^\circ.$$

$$\mathbf{x = 25; 110^\circ \text{ and } 70^\circ}$$

Exercise 4 - Diagonals bisect



$AC = 14$ and $BD = 11$.

The diagonals bisect each other.

$$AC = 2 \cdot 7 = 14 \text{ and } BD = 2 \cdot 5.5 = 11.$$

$AC = 14$, $BD = 11$

Exercise 5 - Diagonals with x

$$3x+1=5x-9$$

$$10=2x$$

$$x=5$$

$$AE=16, \text{ so } AC=32.$$

$x = 5$; $AC = 32$

Exercise 6 - Sides with x

$$4x-3=2x+9$$

$$2x=12$$

$$x=6$$

$$AB=4(6)-3=21$$

$x = 6$; $AB = 21$

Exercise 7 - Perimeter

$$2(8+13)=42$$

42 inches

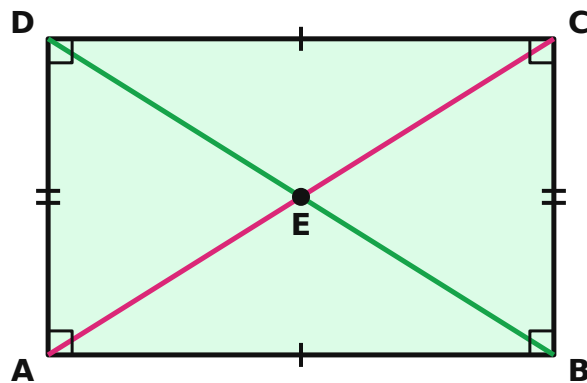
Exercise 8 - Fourth vertex

The diagonals bisect each other: the midpoint of BD is $(3, 2.5)$, and the midpoint of AC must be the same.

$$\frac{0+x}{2}=3 \text{ gives } x=6, \text{ and } \frac{0+y}{2}=2.5 \text{ gives } y=5.$$

C(6, 5)

Exercise 9 - Rectangle diagonals



A rectangle has congruent diagonals.

The diagonals of a rectangle are congruent.

$$2x+6=4x-10$$

$$16=2x$$

$$x=8$$

$$AC=2(8)+6=22$$

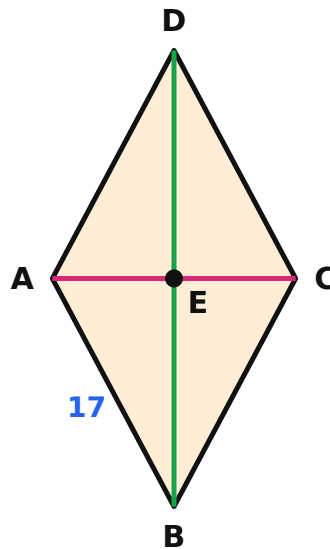
x = 8; AC = 22

Exercise 10 - Rectangle diagonal

$$\sqrt{9^2+12^2}=\sqrt{225}=15$$

15 units

Exercise 11 - Rhombus side



Right triangle with legs 8 and 15 and hypotenuse 17.

The diagonals are perpendicular and bisect each other, so each side is the hypotenuse of a right triangle with legs 8 and 15.

$$\sqrt{8^2+15^2}=17, \text{ and the perimeter is } 4 \cdot 17 = 68.$$

Side 17; perimeter 68

Exercise 12 - Rhombus angles

Consecutive angles are supplementary: $m\angle B = 116^\circ$.

The diagonal bisects angle A: $64^\circ \div 2 = 32^\circ$.

$m\angle B = 116^\circ$; 32°

Exercise 13 - Square diagonal

$10\sqrt{2}$ by the Pythagorean theorem: $\sqrt{10^2+10^2}$.

The diagonal bisects the right angle, giving 45° .

$10\sqrt{2}$; 45°

Exercise 14 - Kite angles

The angles of a quadrilateral add to 360° .

$$360^\circ - 70^\circ - 95^\circ - 95^\circ = 100^\circ$$

100°

Exercise 15 - Isosceles trapezoid

Base angles are congruent: $m\angle C = 72^\circ$.

Each angle at the top base is supplementary to a bottom angle: $180^\circ - 72^\circ = 108^\circ$.

$m\angle C = 72^\circ$; $m\angle A = m\angle B = 108^\circ$

Exercise 16 - Trapezoid midsegment

$$\frac{10+24}{2} = 17$$

17

Exercise 17 - Classify from coordinates

Each side: $\sqrt{4^2+3^2}=5$, so all four sides are congruent and ABCD is a rhombus.

The diagonals are $AC = 8$ and $BD = 6$. They are not congruent, so the angles are not right angles and it is not a square.

Rhombus: all sides 5; diagonals 8 and 6 are unequal

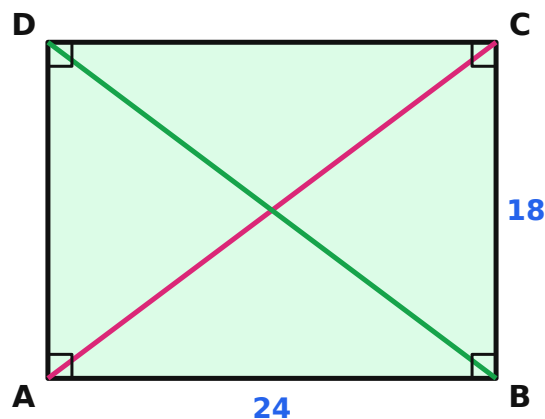
Exercise 18 - Laptop stand

$m\angle C = 72^\circ$, and $m\angle B = m\angle D = 180^\circ - 72^\circ = 108^\circ$.

$2(14+9) = 46$ inches.

72° , 108° , 108° ; perimeter 46 in

Exercise 19 - Picture frame



Both diagonals measure 30 inches.

The diagonals of a rectangle are congruent and given by the Pythagorean theorem.

$$\sqrt{24^2 + 18^2} = \sqrt{900} = 30$$

30 inches

Exercise 20 - Festival kite

The diagonals split the kite into four right triangles. Area $= \frac{1}{2}d_1d_2$.

$$\frac{1}{2} \cdot 60 \cdot 40 = 1200$$

1,200 square centimeters