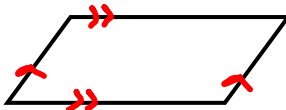


6.2 Properties of Parallelograms

Objective: To use relationships among sides and angles of parallelograms

To use relationships among diagonals of parallelograms

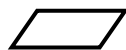
A parallelogram is a quadrilateral with both pairs of opposite sides parallel.



In a quadrilateral, opposite sides do not share a vertex and opposite angles do not share a side.

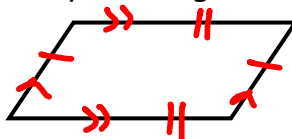


Abbreviation symbol for parallelogram and parallelograms.



$\triangle ABC$

Theorem 6.3: If a quadrilateral is a parallelogram, then its opposite sides are congruent.

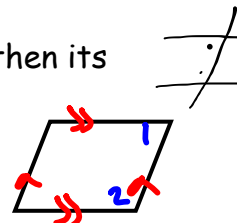


Angles of a polygon that share a side are consecutive angles.

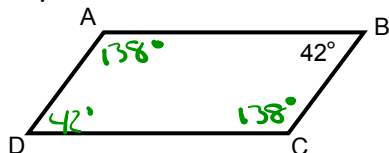


Theorem 6.4: If a quadrilateral is a parallelogram, then its consecutive angles are supplementary.

$$\angle 1 + \angle 2 = 180$$



Example 1: Find the measures of the angles in the parallelogram.



$$138 + m\angle D = 180$$

$$m\angle D = 42^\circ$$

$$42 + m\angle C = 180$$

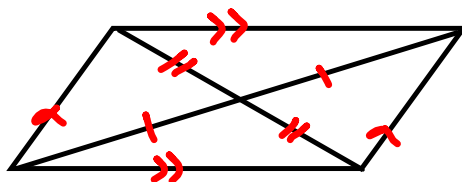
$$m\angle C = 138^\circ$$

$$42 + m\angle A = 180$$

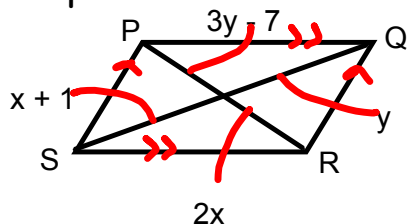
$$m\angle A = 138^\circ$$

Theorem 6.5: If a quadrilateral is a parallelogram, then its opposite angles are congruent.

Theorem 6.6: If a quadrilateral is a parallelogram, then its diagonals bisect each other.



Example 2: Find the values of the variables. What are PR and SQ?



$$3y - 7 = 2x$$

$$3(x + 1) - 7 = 2x$$

$$3x + 3 - 7 = 2x$$

$$3x - 4 = 2x$$

$$-4 = -x$$

$$4 = x$$

$$y = x + 1$$

$$y = 4 + 1$$

$$y = 5$$

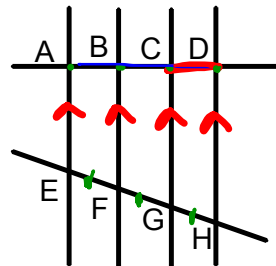
$$\begin{aligned} PR &= 3y - 7 + 2x \\ &= 3(5) - 7 + 2(4) \\ &= 15 - 7 + 8 \\ &= 16 \end{aligned}$$

$$\begin{aligned} SQ &= x + 1 + y \\ &= 4 + 1 + 5 \\ &= 10 \end{aligned}$$

Theorem 6.7: If three (or more) parallel lines cut off congruent segments on one transversal, then they cut off congruent segments on every transversal.

Example 3: If $EF=FG=GH=6$ and $AD=15$, what is CD ?

$$\frac{15}{3} = 5 = AD$$



Name

6.2

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Notes 6.3