
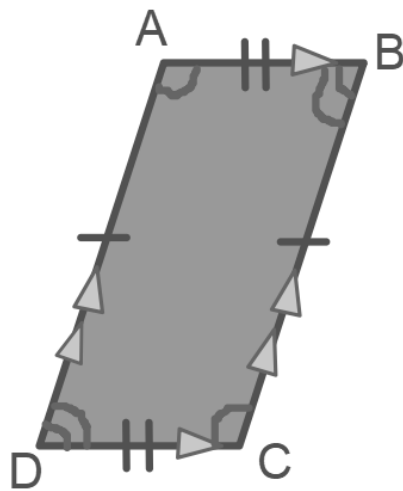






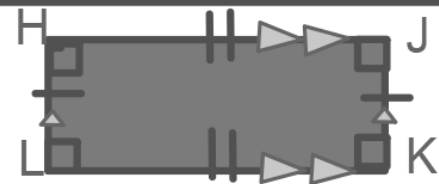
# Unit 6 Lesson 3: Parallelograms (section 6-2)

OBJECTIVES" Recognize and apply properties of the sides, angles, and diagonals of parallelograms.

**Parallelogram:** A quadrilateral with <sup>4 sides</sup> both pairs of opposite sides\* parallel (Definition)  (symbol)

## 4 PROPERTIES OF PARALLELOGRAMS

<p>Opposite sides of a parallelogram are congruent. <i>Opp. sides of</i>  <i>are</i> <math>\cong</math>.</p>	$\begin{array}{l} \overline{AB} \cong \overline{DC} \\ \overline{AD} \cong \overline{BC} \end{array} *$	
<p><i>Opp. <math>\angle</math>s of a</i>  <i>are</i> <math>\cong</math>.</p>	$\begin{array}{l} \angle A \cong \angle C \\ \angle B \cong \angle D \end{array} *$	
<p><u>Consecutive angles</u> in a <sup>D</sup>  parallelogram are <u>supplementary</u>. <i>Cons. <math>\angle</math>s in</i>  <i>are suppl.</i></p>	$\begin{array}{l} m\angle A + m\angle B = 180 \\ m\angle B + m\angle C = 180 \\ m\angle C + m\angle D = 180 \\ m\angle D + m\angle A = 180 \end{array} *$	
<p>If  has 1 rt. <math>\angle</math>, it has 4 rt. <math>\angle</math>s.</p>	$\begin{array}{l} m\angle G = 90 \\ m\angle H = 90 \\ m\angle J = 90 \\ m\angle K = 90 \end{array}$	



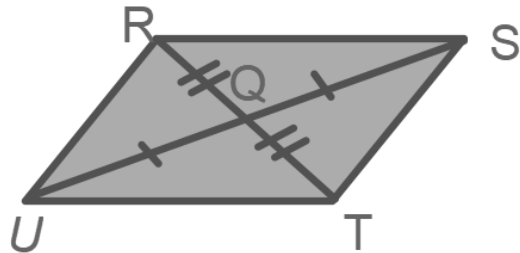
# Unit 6 Lesson 3: Parallelograms (section 6-2)

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## 2 Properties of the Diagonals of a Parallelogram

The diagonals of a parallelogram bisect each other.

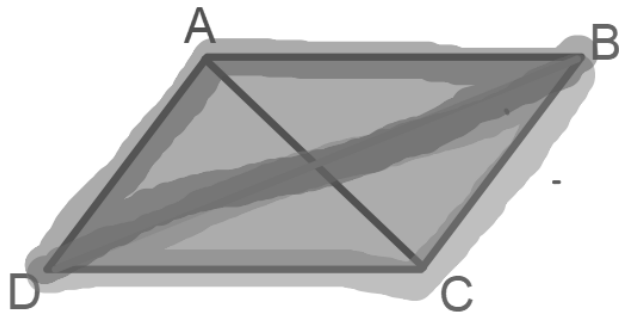
Diag. of  bisect each other.



$$\overline{RQ} \cong \overline{QT} \text{ and } \overline{SQ} \cong \overline{QU}$$

Each diagonal of a parallelogram separates the parallelogram into two congruent triangles.

Diag. separates  into  $2 \cong \Delta$ s.



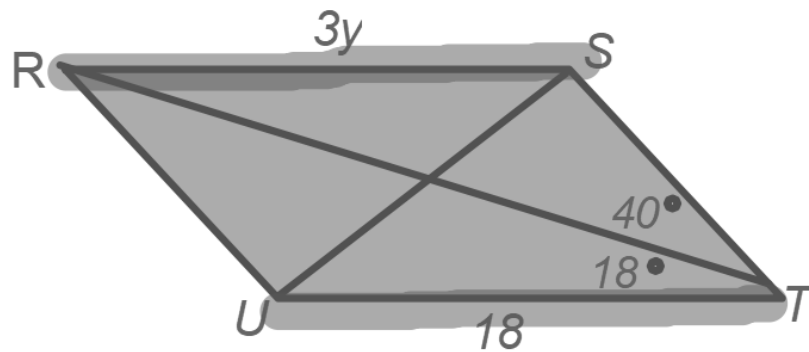
$$\begin{aligned} \triangle ACD &\cong \triangle CAB \\ \triangle DBC &\cong \triangle BDA \end{aligned}$$

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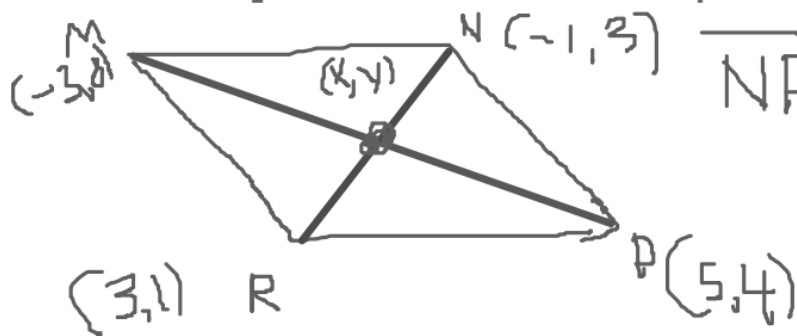
EXAMPLE 1:  $RSTU$  is a parallelogram. Find

$m\angle URT$ ,  $m\angle RST$ , and  $y$ .



$40^\circ$        $122^\circ$        $6$   
 $\downarrow$                        $\downarrow$   
 alt int  $\angle$       supp  
 $\angle RTS$        $\angle STU$   
 $\cong 40^\circ$        $m\angle STU = 58^\circ$        $3y = 18$   
     $180 - 55$        $y = 6$

Example 2: What are the coordinates of the intersection of the diagonals of parallelogram MNPR with vertices  $M(-3, 0)$ ,  $N(-1, 3)$ ,  $P(5, 4)$ , and  $R(3, 1)$ ? [Hint: Use the midpoint formula....why?]

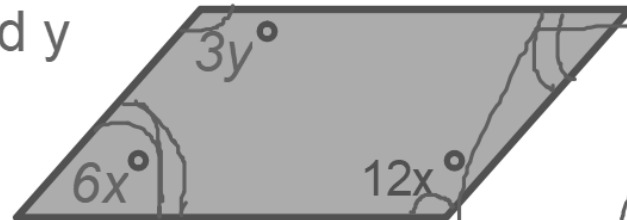


$\overline{NP} \Rightarrow$  midpoint  $\rightarrow \left( \frac{3 + (-1)}{2}, \frac{1 + 3}{2} \right)$   
 $\downarrow$   
 $\left( \frac{2}{2}, \frac{4}{2} \right) \rightarrow \boxed{(1, 2)}$   
 Did  $g$  bisect each other

# Unit 6 Lesson 3: Parallelograms (section 6-2)

OBJECTIVES" Recognize and apply properties of the sides, angles, and diagonals of parallelograms.

EXAMPLES 3 & 4: Find  $x$  and  $y$  in each parallelogram.



$$3y = 12x$$

$$3y + 6x = 180$$

$$6x + 12x = 180$$

$$\frac{18x}{18} = \frac{180}{18}$$

$$x = 10$$

$$3y = 12 \cdot 10$$

$$3y = 120$$

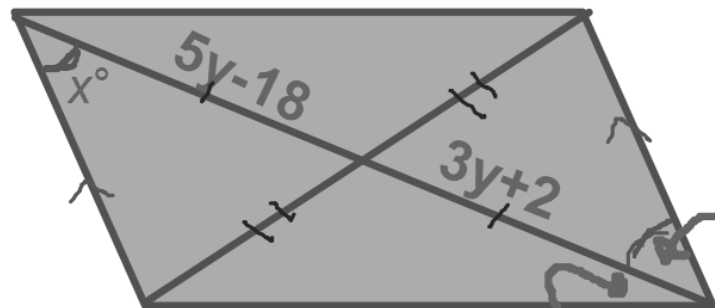
$$y = 40$$

$$5y - 18 = 3y + 2$$

$$2y - 18 = 2$$

$$2y = 20$$

$$y = 10$$



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$$(5x - 120)^\circ$$

$$x = 5x - 120 \text{ (alt int)}$$

$$-4x = -120$$

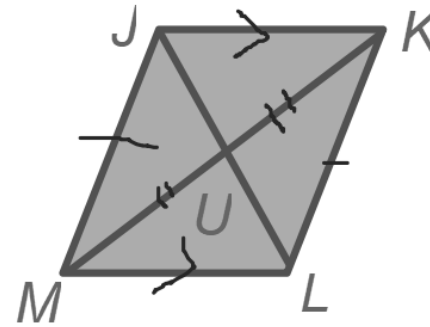
$$x = 30$$

# Unit 6 Lesson 3: Parallelograms (section 6-2)

OBJECTIVES" Recognize and apply properties of the sides, angles, and diagonals of parallelograms.

COMPLETE EACH STATEMENT ABOUT THE PARALLELOGRAM AND JUSTIFY YOUR ANSWER.

$\overline{JM} \cong \overline{KL}$   
Opp. sides of  $\square$  are  $\cong$



$\overline{JK} \parallel \overline{ML}$   
opp sides of  $\square$  are  $\parallel$ .

$\overline{KU} \cong \overline{MU}$   
Diag. of  $\square$  bisect each other