

Content Objective: I will be able to apply properties of parallelograms to determine the measures of sides, diagonals, and/or angles.

TERM	DESCRIPTION	EXAMPLE
QUADRILATERAL	A closed figure formed by segments intersecting at their endpoints.	
PARALLELOGRAM	A quadrilateral in which opposite sides are <u>parallel & congruent</u> .	
DIAGONAL	Segment joining opposite vertices in a polygon.	

EXAMPLE 1: Refer to the figure on the right to identify or name each of the following:

a. The four vertices are N, M, P, Q.

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EXAMPLE 1: Refer to the figure on the right to identify or name each of the following:

a. The four vertices are M, N, P, Q.

b. The name of the parallelogram is MNPQ.

c. The opposite sides are NP & MQ, NM & PQ.

d. The opposite angles are $\angle N + \angle Q$, $\angle M + \angle P$.

e. The consecutive angles are $\angle M + \angle N$, $\angle Q + \angle P$.

f. The diagonals are NQ & MP.

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PROPERTIES OF PARALLELOGRAMS

- Opposite sides are parallel, therefore they have the same slope.
- Opposite sides are congruent.
- Opposite angles are congruent.
- Consecutive angles are supplementary.
- Diagonals bisect each other.

For Example #2, draw and label each parallelogram described then determine the value of x.

EXAMPLE 2: If ABCD is a parallelogram, $m\angle A = x^\circ$ and $m\angle D = (2x - 3)^\circ$.

$x = 61$

QUICK CHECK: If ABCD is a parallelogram, $m\angle D = x^\circ$ and $m\angle A = (3x + 4)^\circ$.

$x = 44$

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EXAMPLE 3: Use the parallelogram to find the indicated values.

$x = 4$
 $y = 116$

QUICK CHECK: Use the parallelogram to find the indicated values.

$f = 78$
 $g = 35$

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For Example #4, draw and label each parallelogram described then determine the value of x.

EXAMPLE 4: XYZW is a parallelogram with diagonals \overline{XZ} and \overline{YW} that intersect at point A. If $XA = 3m$ and $ZA = 5m - 4$, find m.

$m = 2$

QUICK CHECK: XYZW is a parallelogram with diagonals \overline{XZ} and \overline{YW} that intersect at point A. If $YA = 2t$ and $WA = 3t - 4$, find t.

$t = 4$

EXAMPLE 5: Use parallelogram ABCD to find the indicated values.

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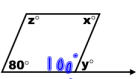
EXAMPLE 5: Use parallelogram ABCD to find the indicated values.

$m\angle AEB = 117^\circ$
 $m\angle BAE = 42^\circ$
 $m\angle AED = 63^\circ$
 $m\angle ECB = 80^\circ$

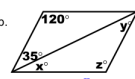
$m\angle BAD = 120^\circ$
 $m\angle DCE = 40^\circ$
 $m\angle ADC = 60^\circ$
 $m\angle DCB = 120^\circ$

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EXAMPLE 6: For each parallelogram, find the values of x , y , and z .

a. 

$x = 80^\circ$
 $y = 80^\circ$
 $z = 100^\circ$

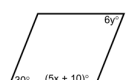
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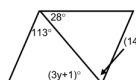
$x = 25^\circ$
 $y = 35^\circ$
 $z = 120^\circ$

c. 

$x = 30^\circ$
 $y = 40^\circ$
 $z = 110^\circ$

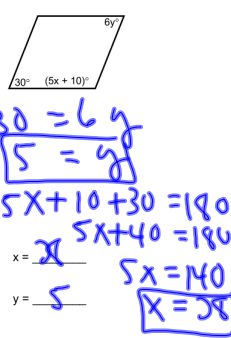
QUICK CHECK: Find the values of x and y to ensure that each quadrilateral is a parallelogram.

a. 

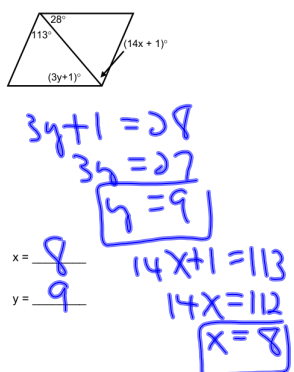
b. 

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QUICK CHECK: Find the values of x and y to ensure that each quadrilateral is a parallelogram.

a. 

$x = 28$
 $y = 5$

b. 

$x = 8$
 $y = 9$

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