

Parallelograms Extra Practice

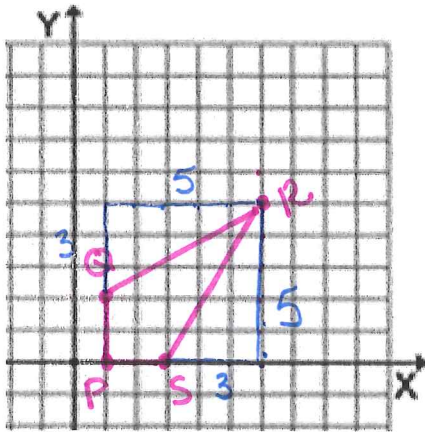
Topic/Assignment	I CAN statement	Turned in?
Properties of Parallelograms	1) I can find the missing angle measurements	Yes No
Properties of Parallelograms	1) I can find angle and side measures in parallelograms.	Yes No
Properties of Parallelograms	1) I can use properties to prove quadrilaterals are parallelograms.	Yes No

Properties of Parallelograms

Objective: To use relationships to find sides and angles in parallelograms.

1: Points $P, Q, R,$ and S are the vertices of a quadrilateral. Determine if the quadrilateral is a parallelogram. Show all work.

a) $P(1,0), Q(1,2), R(6,5), S(3,0)$



$$\text{Slope } PS = \frac{0}{2} = 0$$

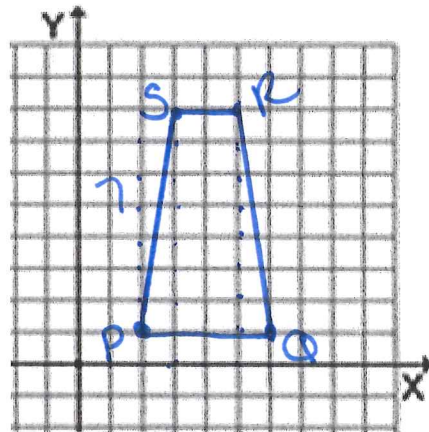
$$\text{Slope } PQ = \frac{2}{0} = \text{undefined}$$

$$\text{Slope } QR = \frac{3}{5}$$

$$\text{Slope } SR = \frac{5}{3}$$

Not a parallelogram because op. sides are not \parallel .

b) $P(2,1), Q(6,1), R(5,8), S(3,8)$



$$\text{Slope } PQ = \frac{0}{4} = 0$$

$$\text{Slope } SR = \frac{0}{4} = 0 > \parallel$$

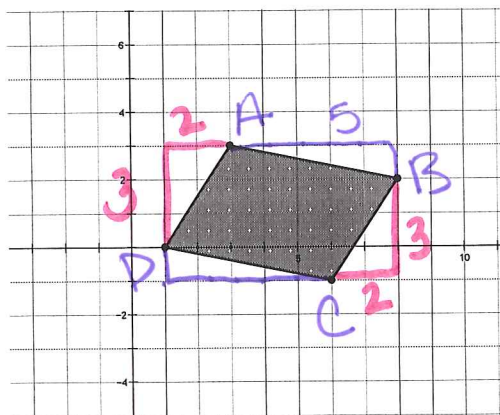
$$\text{Slope } PS = \frac{7}{1} = 7 > \text{not } \parallel$$

$$\text{Slope } RQ = -\frac{7}{1} = -7$$

\therefore not a parallelogram because only one pair of op. sides are parallel.

C. Determine whether the figure with vertices $A(3,3)$, $B(8,2)$, $C(6,-1)$, $D(1,0)$ is a parallelogram.

To be a parallelogram, you must test for op. sides // (same slopes)



$$\text{Slope } AB = -\frac{1}{5} \quad \rangle \quad AB \parallel DC$$

$$\text{Slope } DC = -\frac{1}{5}$$

$$\text{Slope } DA = \frac{3}{2} \quad \rangle \quad DA \parallel CB$$

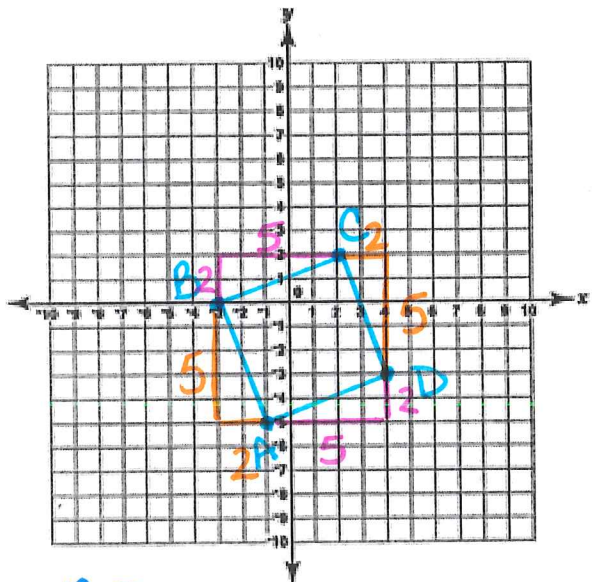
$$\text{Slope } CB = \frac{3}{2}$$

ABCD is a parallelogram because op. sides have the SAME slope!

D. Determine whether the figure below is a parallelogram.

To be a parallelogram, you must test for op. sides // (same slope)

$A(-1, -5)$, $B(-3, 0)$, $C(2, 2)$, $D(4, -3)$



$$\text{Slope } AB = -\frac{5}{2} \quad \rangle \quad AB \parallel CD$$

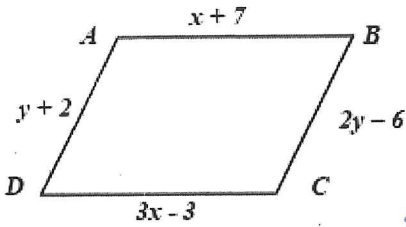
$$\text{Slope } CD = -\frac{5}{2}$$

$$\text{Slope } BC = \frac{2}{5} \quad \rangle \quad BC \parallel AD$$

$$\text{Slope } AD = \frac{2}{5}$$

ABCD is a parallelogram because op. sides have the same slope!

2. ABCD is a parallelogram. Find x, y and the perimeter. Show your geometry and justifications for all steps.



Find x

$AB = DC$

$x + 7 = 3x - 3$

$7 = 2x - 3$

$10 = 2x$

$5 = x$

same Find y

op. sides of a para are \cong $BC = AD$

$2y - 6 = y + 2$

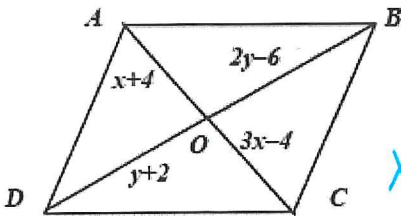
$y - 6 = 2$

$y = 8$

Perimeter = $5 + 7 + 2(8) - 6 + 3(5) - 3 + 8 + 2$

Perimeter = 44 units

3. ABCD is a parallelogram. Find x, y, BD and AC. Show your geometry and justifications for all steps.



Find x

$AO \cong OC$

$x + 4 = 3x - 4$

$4 = 2x - 4$

$8 = 2x$

$4 = x$

diags of a para bisect each other

Find y

diags of a Para bisect each other
 $DO \cong BO$
 $y + 2 = 2y - 6$

$2 = y - 6$

$8 = y$

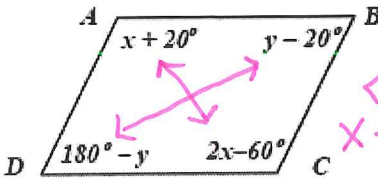
$BD = 8 + 2 + 2(8) - 6$

$BD = 20$ units

$AC = 4 + 4 + 3(4) - 4$

$AC = 16$ units

4. ABCD is a parallelogram. Find x, y and $\angle C$. Show your geometry and justifications for all steps.



Find x

$\angle A = \angle C$

$x + 20 = 2x - 60$

$20 = x - 60$

$80 = x$

op. \angle s of a para are \cong

Find y

$\angle B \cong \angle D$

$y - 20 = 180 - y$

$2y - 20 = 180$

$2y = 200$

$y = 100$

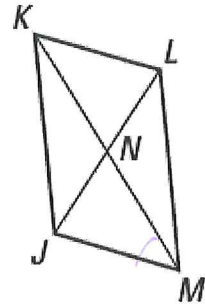
op. \angle s of a Parallelogram are \cong

$\angle C = 2(100) - 60$

$\angle C = 140^\circ$

5. Complete the statement and justify your reasoning.

- a. $JK = LM$ because op. sides of a para are \cong
- b. $MN = NK$ because diags of a para bisect each other
- c. $\angle MLK = \angle KJM$ because op. \angle s of a para are \cong
- d. $\angle JKL = \angle LMJ$ because op. \angle s of a para are \cong
- e. $JN = LN$ because diags of a para bisect each other
- f. $KL = JM$ because op. sides of a para are \cong
- g. $\angle MNL = \angle KNJ$ because vertical \angle s are \cong
- h. $\angle MKL = \angle KMJ$ because // lines form \cong alt. int. \angle s.

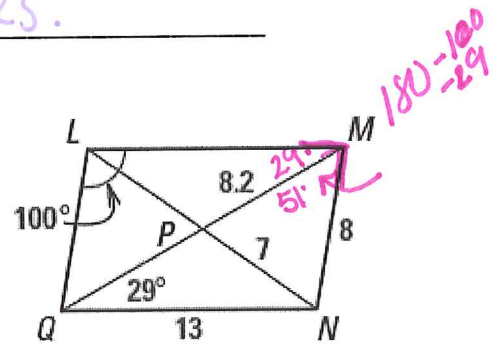


6. LMNQ is a parallelogram. Find the measures and explain your reasoning.

- a. $LM = 13$
because:
- b. $LP = 7$
because:

op. sides of a Para. are \cong
 $\therefore LM = QN$

diags of a para bisect each other



c. $LQ = 8$
because:
op. sides of a Para are \cong

d. $QP = 8.2$
because:
diags of a Para bisect each other.

e. $\angle LMN = 80^\circ$
because: $29 + 51$
con. int. \angle s of Paras are suppl.

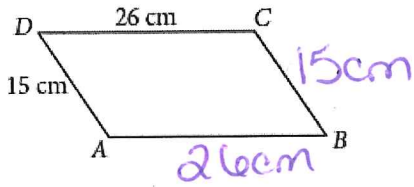
f. $\angle NQL = 80^\circ$
because:
con. int. \angle s of a para are Suppl.

g. $\angle MNQ = 100^\circ$
because:
op. \angle s of a Para are \cong

h. $\angle LMQ = 29^\circ$
because:
// lines form \cong alt int. \angle s.

Directions: ABCD is a parallelogram. Show your geometry and what property or properties you used to help you answer the question.

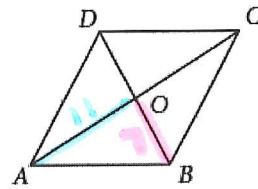
7. Perimeter ABCD = 82cm



$AD = CB$ op. sides
 $CD = AB$ of a para
 are \cong

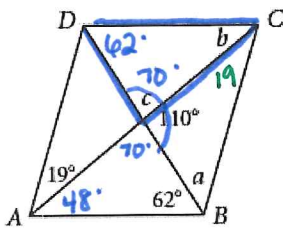
8. $AO = 11$, and $BO = 7$.

$AC = \underline{22}$, $BD = \underline{14}$



$AC = 2 \cdot AO$
 $BD = 2 \cdot OB$ diags of a Para bisect each other

9. $a = \underline{51^\circ}$, $b = \underline{48^\circ}$,
 $c = \underline{70^\circ}$

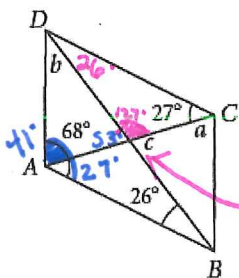


Find c: $c = 70^\circ$
 linear pairs are suppl.

Find b: $b = 48^\circ$
 // lines form \cong alt. int. \angle s AND Δ sum.

Find a: $a = 51^\circ$
 // lines form \cong alt. int. \angle s and Δ sum.

11. $a = \underline{41^\circ}$, $b = \underline{86^\circ}$,
 $c = \underline{53^\circ}$



Find a
 // lines form \cong alt int \angle s.
 $a = 41^\circ$

Find c: linear pairs are suppl.

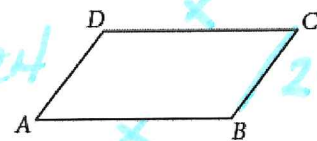
$$127 + c = 180$$

$$\boxed{c = 53^\circ}$$

Find b
 Δ sum.
 $b = 86^\circ$

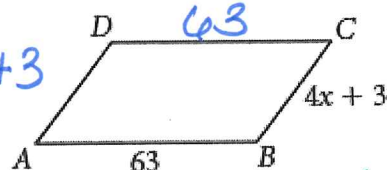
10. Perimeter ABCD = 119, and

$BC = 24$. $AB = \underline{\hspace{2cm}}$



$P = 24 + x + 24 + x$
 CLT
 $P = 2x + 48$
 $119 = 2x + 48$
 $71 = 2x$
 $x = 35.5$
 op. sides of a Para are \cong
 $AD = CB$
 $DC = AB$

12. Perimeter ABCD = $16x - 12$. Find AD.



$$P = 4x + 3 + 63 + 4x + 3 + 63$$

$$16x - 12 = 8x + 132$$

$$-8x \quad -8x$$

$$8x - 12 = 132$$

$$8x = 144$$

$$\boxed{x = 18}$$

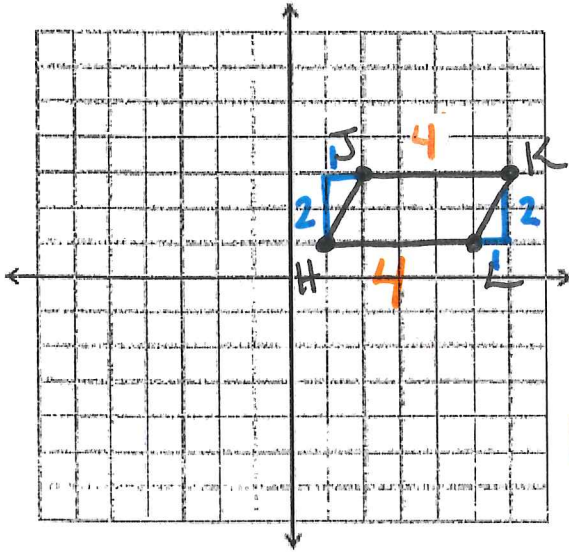
$$\boxed{AD = 75}$$

$$AD = 4(18) + 3$$

Determine whether the figure below is a parallelogram.

To be a parallelogram, you must test for op. sides // (same slope)

13. $H(1, 1), J(2, 3), K(6, 3), L(5, 1)$



slope $JK = \frac{0}{4} = 0$
 slope $HL = \frac{0}{4} = 0$ } $JK // HL$

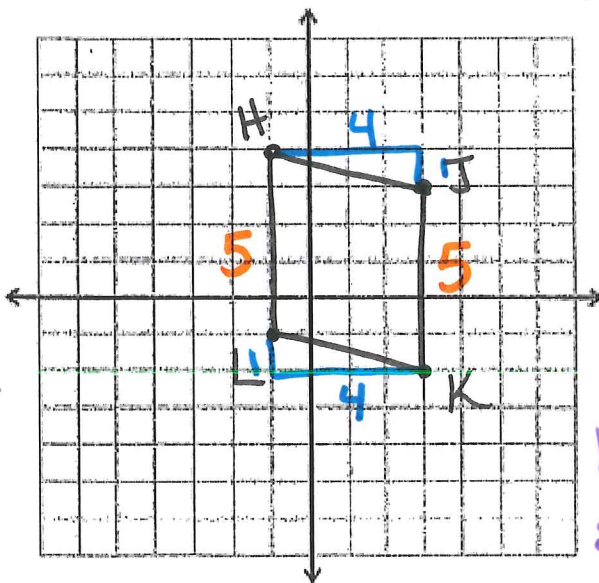
slope $HJ = \frac{2}{1} = 2$
 slope $KL = \frac{2}{1} = 2$ } $HJ // KL$

$HJKL$ is a parallelogram because op. sides have the same slope.

Determine whether the figure below is a parallelogram.

To be a parallelogram, you must test for op. sides // (same slope)

14. $H(-1, 4), J(3, 3), K(3, -2), L(-1, -1)$



slope $HL = \frac{5}{0} = \text{undefined}$
 slope $JK = \frac{5}{0} = \text{undefined}$ } $HL // JK$

slope $HJ = \frac{1}{4}$
 slope $LK = \frac{1}{4}$ } $HJ // LK$

$HJKL$ is a parallelogram because op. sides have the same slope.