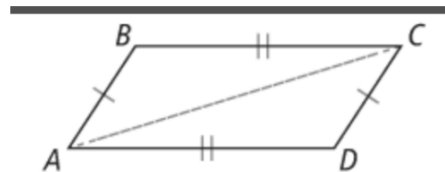


## Ways to Prove a Quadrilateral is a Parallelogram

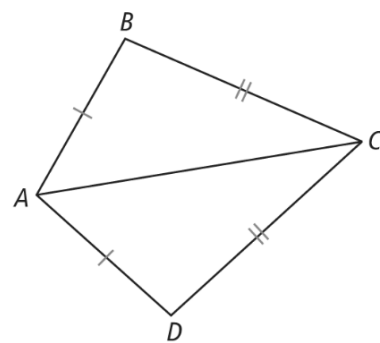
- Both pairs of opposite sides parallel
- Both pairs of opposite sides congruent
- One pair of opposite sides BOTH congruent and parallel
- Both pairs of opposite angles congruent
- An angle is supplementary to both consecutive angles
- The diagonals bisect each other

In quadrilateral  $ABCD$ ,  $\overline{AC}$  is a diagonal,  $\overline{AB} \cong \overline{CD}$ , and  $\overline{AD} \cong \overline{BC}$ . Is  $ABCD$  a parallelogram? Explain.



**SOLUTION**

Is ABCD a parallelogram? Justify your reasoning.



A. Teo sketches a design of a quadrilateral-shaped building. If  $\angle 1$  is supplementary to  $\angle 2$  and  $\angle 4$ , is his design a parallelogram?



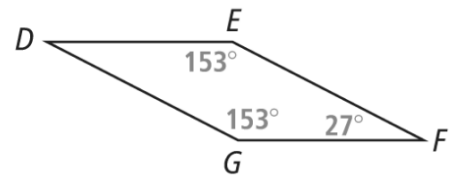
B. Teo sketches a second design in which  $\angle 1$  is congruent to  $\angle 3$ , and  $\angle 2$  is congruent to  $\angle 4$ . Is that design a parallelogram?



**SOLUTION**

Is  $DEFG$  a parallelogram? Explain.

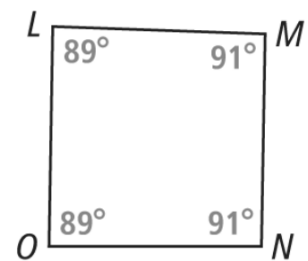
Enter your answer.



$$360 = 153 + 153 + 27 + x$$

Is  $LMNO$  a parallelogram? Explain.

Enter your answer.



For what values of  $r$  and  $s$  is  $WXYZ$  a parallelogram?

**SOLUTION**

$$4r + 7 = 7r + 1$$

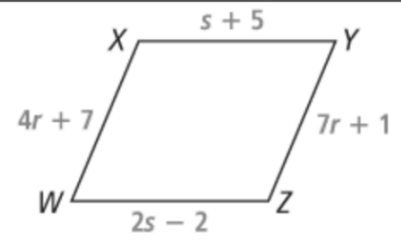
$$6 = 3r$$

$$r = 2$$

$$2s - 2 = s + 5$$

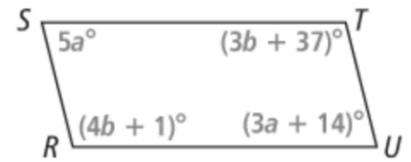
$$s - 2 = 5$$

$$s = 7$$





For what values of  $a$  and  $b$  is  $RSTU$  a parallelogram?



**SOLUTION**

$$5a = 3a + 14$$

$$2a = 14$$

$$a = 7$$

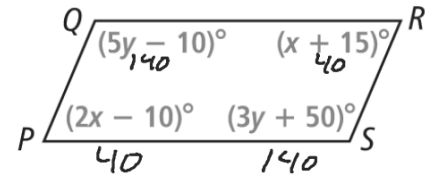
$$4(b + 1) = 3b + 37$$

$$b + 1 = 37$$

$$b = 36$$

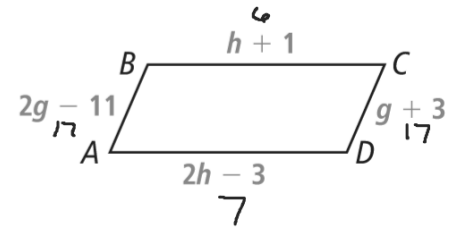
3. a. If  $x = 25$  and  $y = 30$ , is  $PQRS$  a parallelogram?

Enter your answer.



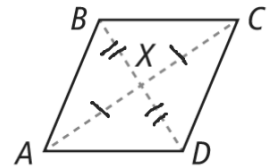
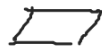
3. b. If  $g = 14$  and  $h = 5$ , is  $ABCD$  a parallelogram?

Enter your answer.




Given:  $\overline{AX} \cong \overline{CX}$  and  $\overline{BX} \cong \overline{DX}$

Prove:  $ABCD$  is a parallelogram



Proof:

Statements	Reasons
1) $\overline{AX} \cong \overline{CX}$ $\overline{BX} \cong \overline{DX}$	1) Given
2) $X$ is midpt of $\overline{AC}$	2) Def of midpt
3) $X$ is midpt of $\overline{BD}$	3) Def of midpt
4) $ABDC$ 	4) Diagonals bisect each other
5) $\square$	5) $\square$

4. For what values of  $p$  and  $q$  is  $ABCD$  a parallelogram?

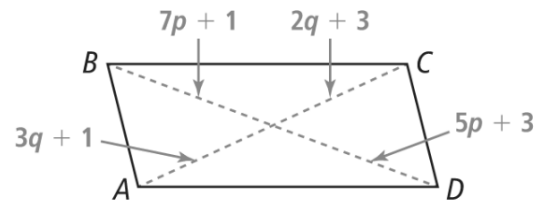
$$7p + 1 = 5p + 3$$

$$2p = 4$$

$$p = 2$$

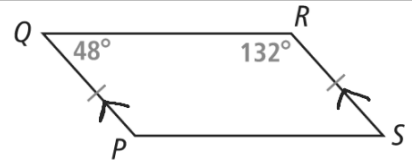
$$3q + 1 = 2q + 3$$

$$q = 2$$



Is  $PQRS$  a parallelogram? Explain.

**SOLUTION**



Is  $WXYZ$  a parallelogram? Explain.

**SOLUTION**

