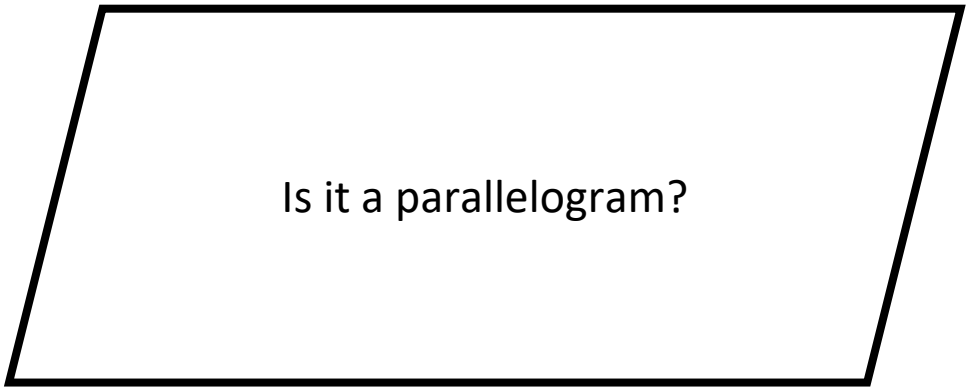
Converse of Parallelogram Properties

Conditional Statement -

Converse –



1.

2.

3.

4.

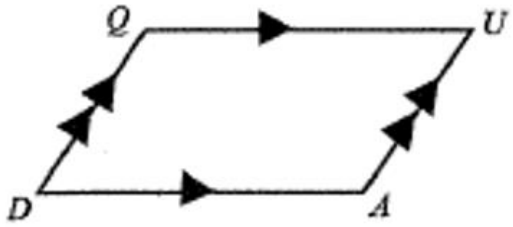
5.

A ***Parallelogram*** is defined as a quadrilateral with ***both pairs*** of opposite sides ***parallel***.

Does the given information make the ***QUADRILATERAL*** a ***PARALLELOGRAM***?
If the information does not ***guarantee*** a parallelogram, sketch a counterexample that demonstrates another possible shape having the same characteristics.

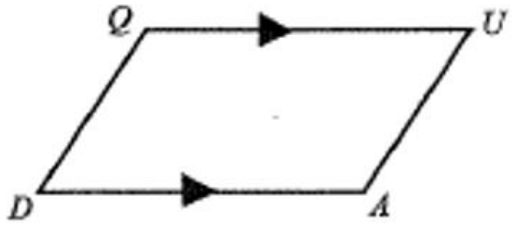
1) Will this always form a parallelogram?

□ **Yes** □ **No (provide a counterexample)**



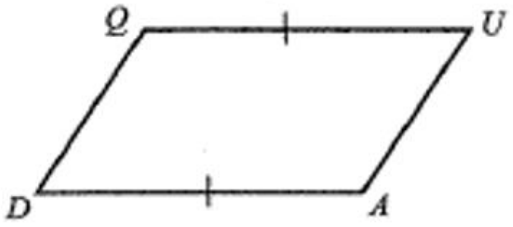
2) Will this always form a parallelogram?

□ **Yes** □ **No (provide a counterexample)**



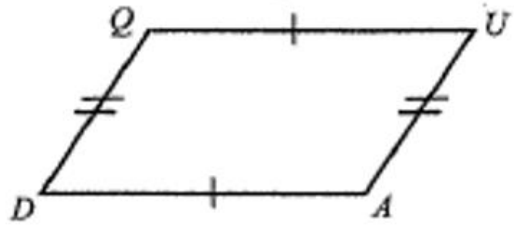
3) Will this always form a parallelogram?

□ **Yes** □ **No (provide a counterexample)**



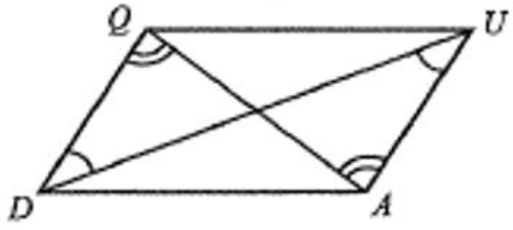
4) Will this always form a parallelogram?

□ **Yes** □ **No (provide a counterexample)**



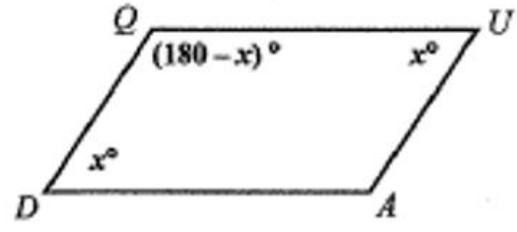
5) Will this always form a parallelogram?

□ **Yes** □ **No (provide a counterexample)**



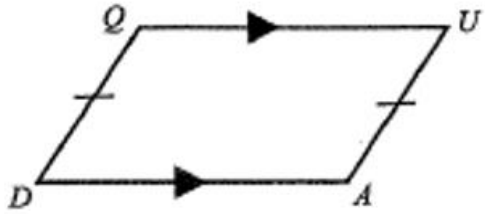
6) Will this always form a parallelogram?

□ **Yes** □ **No (provide a counterexample)**



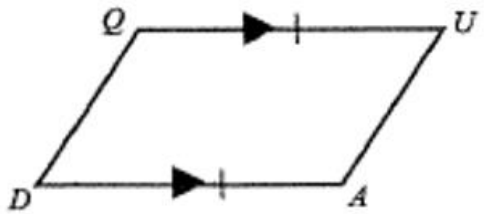
7) Will this always form a parallelogram?

□ **Yes** □ **No (provide a counterexample)**



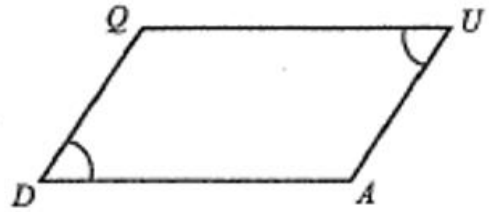
8) Will this always form a parallelogram?

□ **Yes** □ **No (provide a counterexample)**



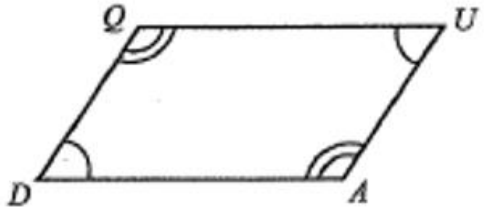
9) Will this always form a parallelogram?

□ **Yes** □ **No (provide a counterexample)**



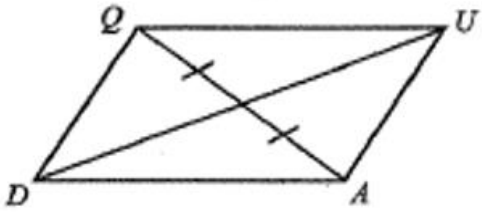
10) Will this always form a parallelogram?

□ **Yes** □ **No (provide a counterexample)**



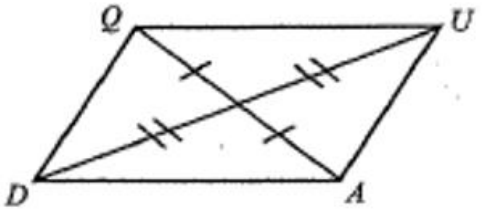
11) Will this always form a parallelogram?

□ **Yes** □ **No (provide a counterexample)**



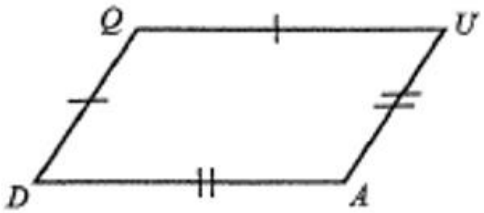
12) Will this always form a parallelogram?

□ **Yes** □ **No (provide a counterexample)**



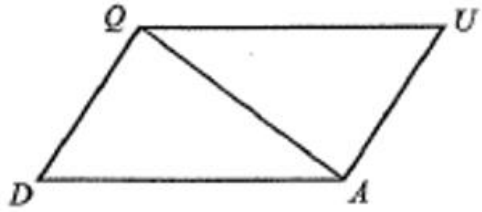
13) Will this always form a parallelogram?

□ **Yes** □ **No (provide a counterexample)**



14) Given: $QUAD$ is a parallelogram

Prove: $\Delta QDA \cong \Delta AUQ$



Converse Properties of Parallelograms

We can use the _____ of each property to prove a quadrilateral is a _____

If both pairs of _____ _____ of a quadrilateral are _____ then it is a parallelogram.

If both pairs of _____ _____ of a quadrilateral are _____, then it is a parallelogram.

If ___ angle of a quadrilateral is _____ to both of its _____ angles, then it is a parallelogram.

If ___ ___ of opposite sides are _____ and _____, then it is a parallelogram.

If _____ of a quadrilateral bisect each other, then it is a parallelogram.

Draw a quadrilateral for each of the following situations then determine if it has to be a parallelogram.

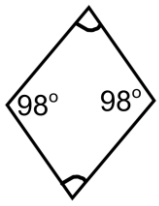
a. Diagonals Bisect each other

b. Both pairs of opposite sides are congruent.

c. Only 1 pair of consecutive angles supplementary.

If you knew one pair of opposite sides of a quadrilateral was congruent and the other pair of opposite sides was parallel, would that be enough to prove it is a parallelogram?

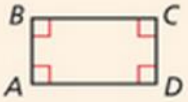
Does the following shape have to be a parallelogram? Explain why.

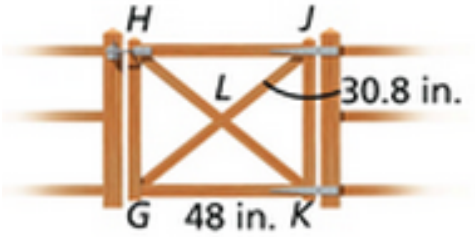


Rectangle Theorem Notes

A type of special _____ is a _____.

A _____ is a quadrilateral with _____ right _____.

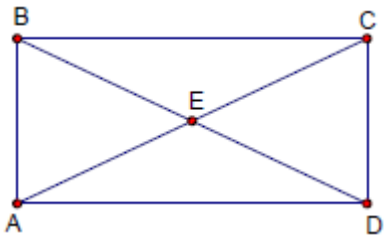
THEOREM	HYPOTHESIS
If a quadrilateral is a rectangle, then it is a parallelogram. (rect. → ▱)	
If a parallelogram is a rectangle, then its diagonals are congruent. (rect. → diags. ≅)	



Carpentry The rectangular gate has diagonal braces. Find each length.

1a. *HJ* **1b.** *HK*

1. In the diagram of rectangle ABCD, diagonals AC and BD intersect at E. If AE = $3x + y$, BE = $4x - 2y$ and CE = 20 , find x and y.



2. In rectangle ABCD, diagonals AC and BD are drawn. If AC = $x^2 + 4x - 23$ and BD = $5x + 33$, find the length of AC.

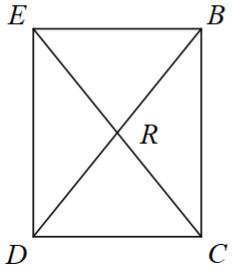
3. In rectangle QRST, diagonals QS and RT intersect at E. If QE = $3x - 10$ and QS = $5x - 8$, find the length of QS.

4. In rectangle ABCD, diagonal AC = 6x-2 and diagonal BD=4x+2. Find the length of AC.

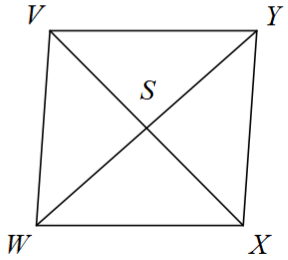
5. Mr. Harmon is building a shelving unit for his bathroom. He wants the frame of the shelf to be a perfect rectangle. How could he verify this if he doesn't have a way to measure the angles?

Solve for x. Each figure is a rectangle.

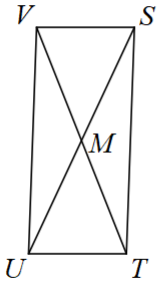
1) $RE = 21$
$CE = 7x + 7$



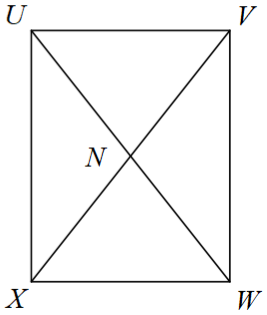
2) $XS = 15$
$SV = 15x$



3) $TV = 22$
$MV = x + 4$



4) $VX = 16$
$NX = 2x - 14$



5. What special feature does a rectangle have that other parallelograms do not have?

6. In square BOXY, diagonal BX is 34 and diagonal OY is 4x+10. What is the value of x?

7. In Rectangle HEAR, the diagonal HA and diagonal ER intersect at point T. If HA is 4x+10, HT is 3y-8, and ET is 3x + 4, what are the values of x and y?