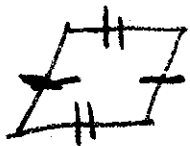


6-3 Proving That a Quadrilateral is a Parallelogram



Thm 6-5: If both pairs of opp. sides of a quadrilateral are \cong , then the quadrilateral is a parallelogram.



Thm 6-6: If both pairs of opp. \angle 's of a quadrilateral are \cong , then the quad. is a parallelogram.



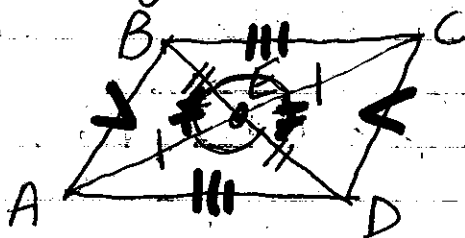
Thm 6-7: If the diagonals of a quadrilateral bisect each other, then the quad. is a parallelogram.

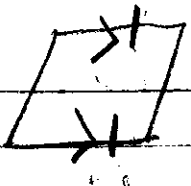
PROOF OF Thm 6-7

Given: \overline{AC} and \overline{BD} bisect each other at E .

Prove: $ABCD$ is a parallelogram.

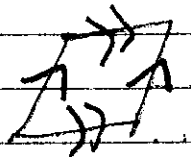
Statements	Reasons
1. \overline{AC} & \overline{BD} bisect each other at E	Given
2. $\overline{AE} \cong \overline{EC}$ $\overline{BE} \cong \overline{ED}$	{ Def. of a segment bisector
3. $\angle BEC \cong \angle AED$ $\angle CED \cong \angle BEA$	{ Vertical \angle Thm
4. $\triangle BAE \cong \triangle CDE$	SAS
5. $\triangle BEC \cong \triangle AED$	SAS
6. $\overline{BC} \cong \overline{AD}$ $\overline{BA} \cong \overline{CD}$	{ CPCTC
7. $ABCD$ is a parallelogram	Both pairs of opp. sides are \cong





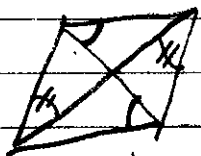
Thm 6-8:

If one pair of opp. sides of a quadrilateral is both \cong and \parallel , then the quadrilateral is a parallelogram.



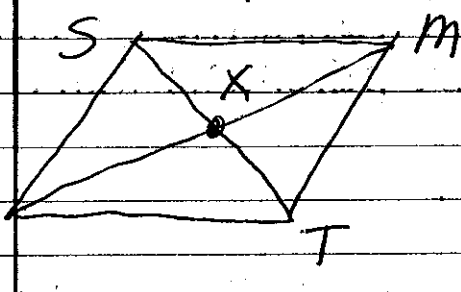
DEF. OF a Parallelogram

If you know opp. sides are \parallel , then it is a parallelogram.



Alt. int. \angle s, lines \parallel

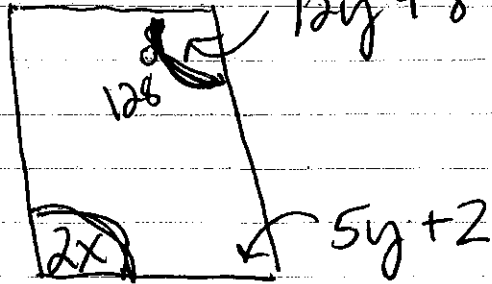
Examples:



State whether there is sufficient info. to prove SMPX is a parallelogram.

- ① $\angle SPT \cong \angle SMT$ NO
- ② $\angle SPX \cong \angle TMX$ and $\angle TPX \cong \angle SMX$ YES by def. \square
- ③ $\overline{SM} \cong \overline{PT}$, $\overline{SP} \cong \overline{MT}$ yes by 6-5
- ④ $\overline{SX} \cong \overline{XT}$, $\overline{SM} \cong \overline{PT}$ NO
- ⑤ $\overline{PX} \cong \overline{MX}$, $\overline{SX} \cong \overline{TX}$ yes thm 6-7
- ⑥ $\overline{SP} \cong \overline{MT}$, $\overline{SP} \parallel \overline{MT}$ yes thm 6-8

ex



$$12(10) + 8 = 128^\circ$$
$$12y + 8$$

$$\frac{2x}{2} = \frac{128}{2}$$

$$x = 64$$

$$12y + 8 + 5y + 2 = 180$$

$$17y + 10 = 180$$

$$\begin{array}{r} 17y + 10 = 180 \\ -10 \quad -10 \\ \hline 17y = 170 \\ 17 \quad 17 \end{array}$$

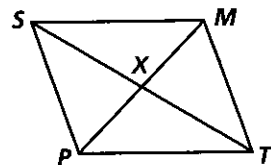
$$y = 10$$

Practice 6-3

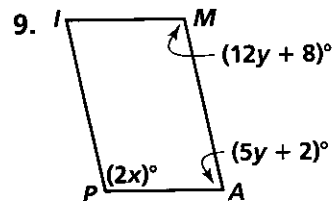
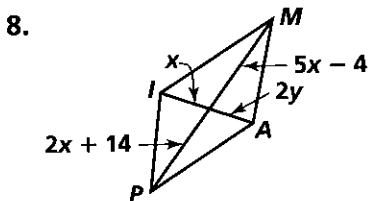
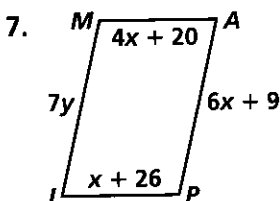
Proving That a Quadrilateral Is a Parallelogram

State whether the information given about quadrilateral $SMTP$ is sufficient to prove that it is a parallelogram.

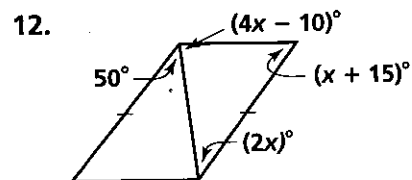
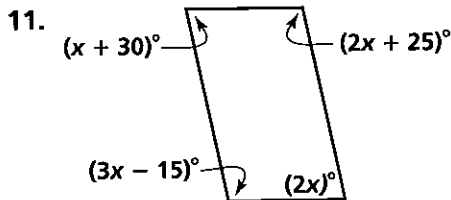
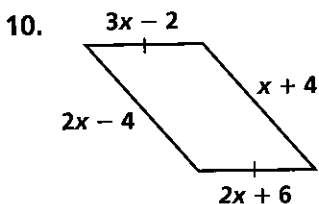
1. $\angle SPT \cong \angle SMT$
2. $\angle SPX \cong \angle TMX, \angle TPX \cong \angle SMX$
3. $\overline{SM} \cong \overline{PT}, \overline{SP} \cong \overline{MT}$
4. $\overline{SX} \cong \overline{XT}, \overline{SM} \cong \overline{PT}$
5. $\overline{PX} \cong \overline{MX}, \overline{SX} \cong \overline{TX}$
6. $\overline{SP} \cong \overline{MT}, \overline{SP} \parallel \overline{MT}$



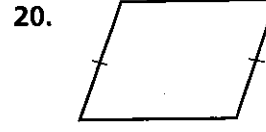
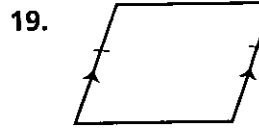
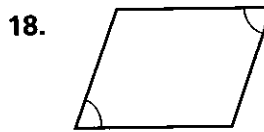
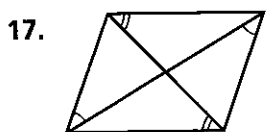
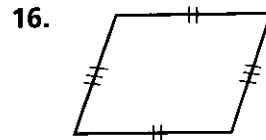
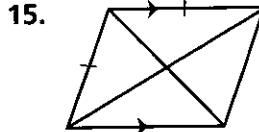
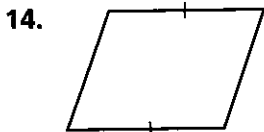
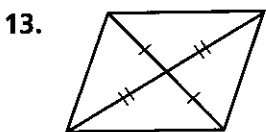
Algebra Find the values of x and y for which the figure must be a parallelogram.



Algebra Find the value of x . Then tell whether the figure must be a parallelogram. Explain your answer.



Decide whether the quadrilateral is a parallelogram. Explain your answer.



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