6-5

PROVING RHOMBUSES, RECTANGLES, AND SQUARES

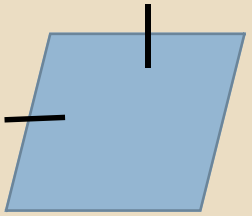
OBJECTIVE

TO CLASSIFY AND USE THE PROPERTIES OF SPECIAL TYPES OF PARALLELOGRAMS

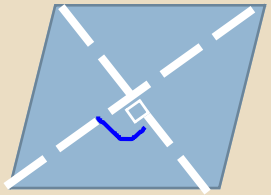
KEY CONCEPTS

To prove a parallelogram is a rhombus:

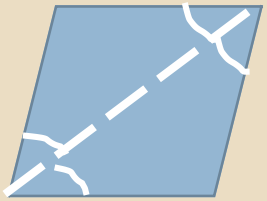
Prove that one pair of consecutive sides are congruent. (Thm 6-5-3)



Prove the diagonals are perpendicular.
(Thm 6-5-4)



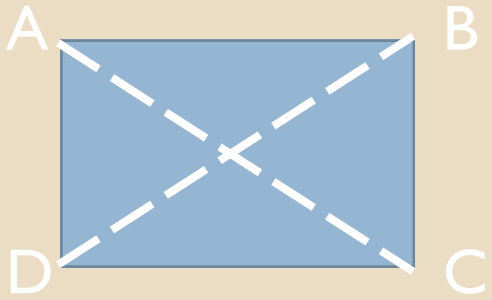
Prove one diagonal bisects a pair of opposite angles.
(Thm 6-5-5)



KEY CONCEPTS

To prove a parallelogram is a rectangle:

Prove that one of the angles is a right angle. (Thm 6-5-1)



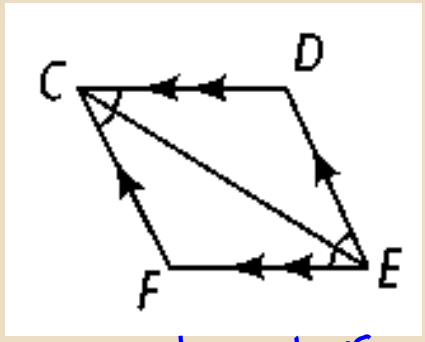
Prove the diagonals are congruent.
$\overline{AC} \cong \overline{BD}$. (Thm 6-5-2)

To prove a square, you must be able to prove parallelogram, rectangle, and rhombus.

CLASSWORK

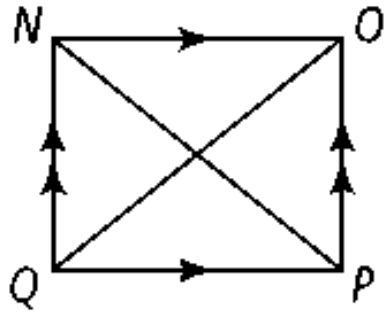
Can you conclude that the parallelogram is a *rhombus*, a *rectangle*, or a *square*? Explain.

1.



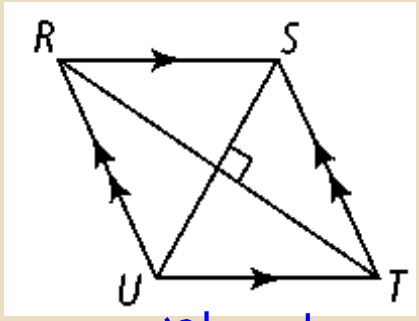
rhombus

2. $\overline{NP} \cong \overline{OQ}$



rectangle

3.

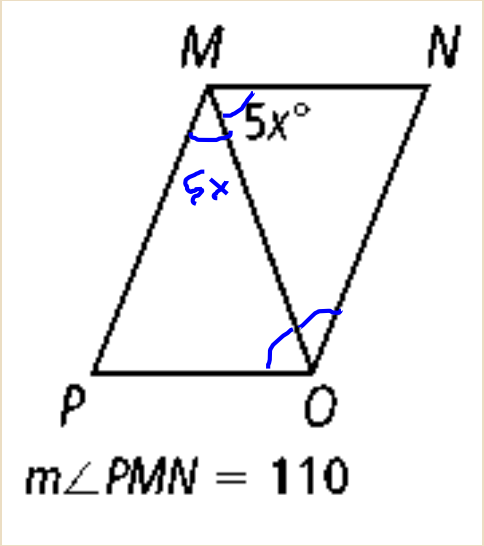


rhombus

CLASS WORK

For what value of *x* is the parallelogram a rhombus?

4.



$10x = 110$

$x = 11$

5.

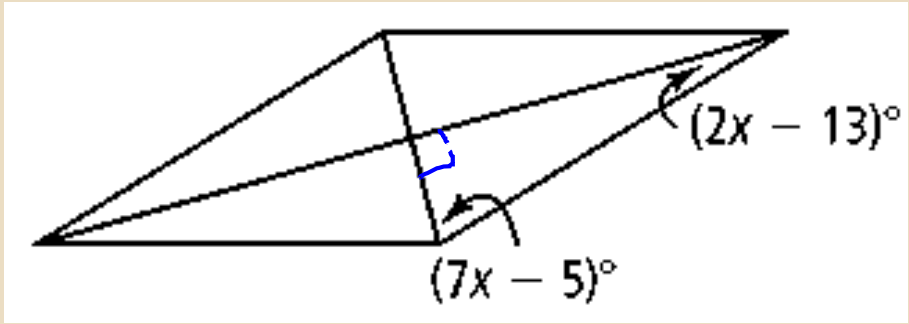
$7x - 5 + 2x - 13 + 90 = 180$

$7x - 5 + 2x - 13 = 90$

$9x - 18 = 90$

$9x = 108$

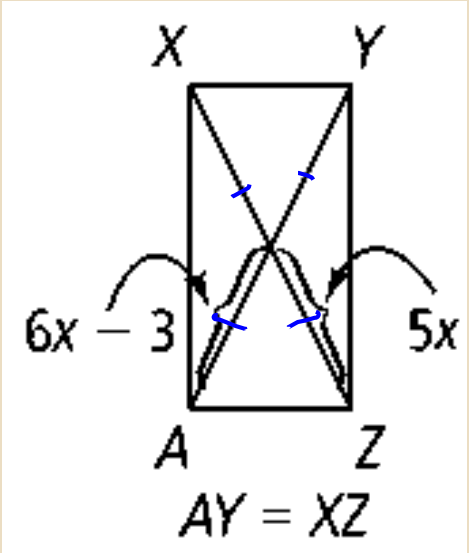
$x = 12$



CLASS WORK

For what value of *x* is the parallelogram a rectangle?

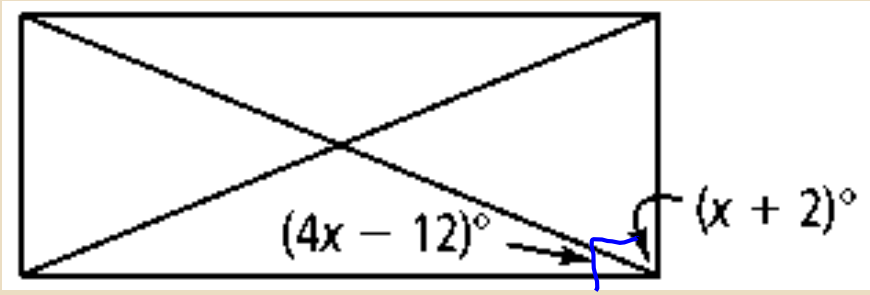
6.



$6x - 3 = 5x$

$x = 3$

7.



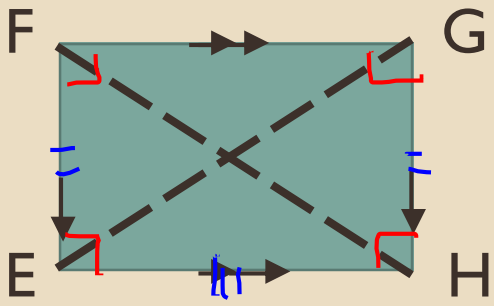
$4x - 12 + x + 2 = 90$

$5x - 10 = 90$

$5x = 100$

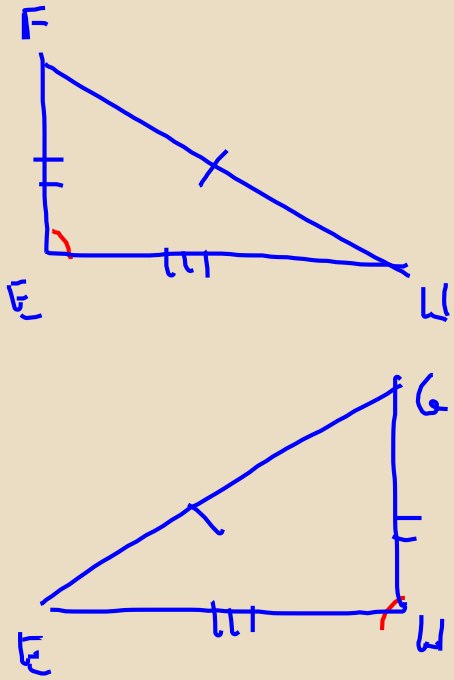
$x = 20$

PROOF OF THEOREM 6-5-2



Given: $EFGH$ is a parallelogram. $\overline{EG} \cong \overline{HF}$.
Prove: $EFGH$ is a rectangle.

Statements	Reasons
$EFGH$ is a parallelogram.; $\overline{EG} \cong \overline{HF}$	Given
$\overline{EF} \cong \overline{HG}$	In a parallelogram, opposite sides congruent
$\overline{EH} \cong \overline{EH}$	Reflexive Property of Congruence
$\Delta FEH \cong \Delta GHE$	SSS Postulate
$\angle FEH \cong \angle GHE$	CPCTC
$\angle FEH$ *and* $\angle GHE$ are supplementary	In a parallelogram, consecutive angles are suppl.
$\angle FEH$ *and* $\angle GHE$ are right angles	Angles that are congruent and supplementary are right angles
$\angle FEH \cong \angle FGH; \angle GFE \cong \angle GHE$	In a parallelogram, opposite angles are congruent
$\angle FGH$ *and* $\angle GFE$ are right angles	If an angle is congruent to a right angle it is a right angle
EFGH is a rectangle	Definition of Rectangle



EXIT PROBLEMS

Determine whether the parallelogram is a *rhombus*, a *rectangle*, or a *square*. Give the most precise description in each case.

8. A parallelogram has perpendicular diagonals and angle measures of 45, 135, 45, and 135. rhombus

9. A parallelogram has perpendicular diagonals and angle measures that are all 90. square

10. A parallelogram has congruent diagonals.

rectangle

LEARNING RUBRIC

Got It: Completes general proofs and uses proof to prove special parallelograms

Almost There: Uses formulas to prove special parallelograms on the coordinate plane

Moving Forward: Applies the properties of special parallelograms to find or check given values of variables that prove special parallelograms

Getting Started: Identifies correctly marked diagrams that prove special parallelograms

HOMEWORK

Pages 434 – 437

6 – 32 even

40