



6-2
PROPERTIES OF
PARALLELOGRAMS



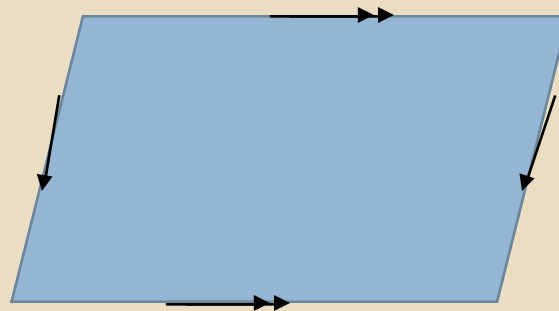
OBJECTIVES

- ❖ TO PROVE AND APPLY PROPERTIES OF PARALLELOGRAMS

KEY CONCEPT

If a quadrilateral is a parallelogram, then:

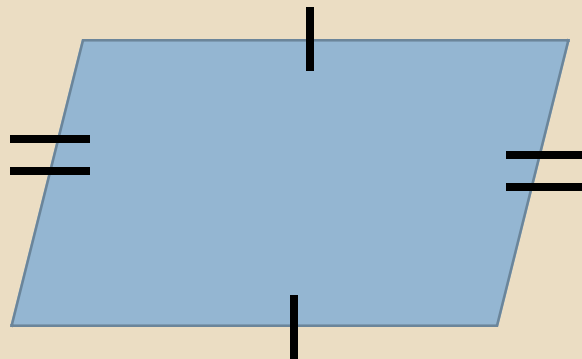
Definition of Parallelogram	its opposite sides are parallel.
Theorem 6-2-1	
Theorem 6-2-2	
Theorem 6-2-3	
Theorem 6-2-4	



KEY CONCEPT

If a quadrilateral is a parallelogram, then:

Definition of Parallelogram	its opposite sides are parallel.
Theorem 6-2-1	its opposite sides are congruent.
Theorem 6-2-2	
Theorem 6-2-3	
Theorem 6-2-4	



KEY CONCEPT

If a quadrilateral is a parallelogram, then:

Definition of Parallelogram	its opposite sides are parallel.
Theorem 6-2-1	its opposite sides are congruent.
Theorem 6-2-2	its opposite angles are congruent.
Theorem 6-2-3	
Theorem 6-2-4	

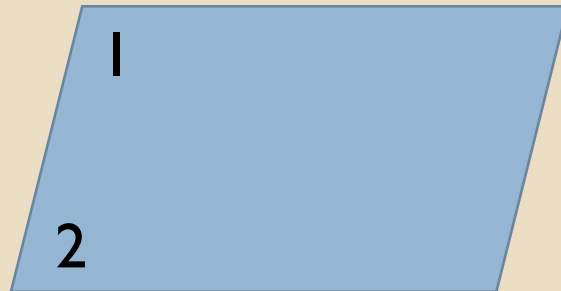


KEY CONCEPT

If a quadrilateral is a parallelogram, then:

Definition of Parallelogram	its opposite sides are parallel.
Theorem 6-2-1	its opposite sides are congruent.
Theorem 6-2-2	its opposite angles are congruent.
Theorem 6-2-3	its consecutive angles are supplementary.
Theorem 6-2-4	

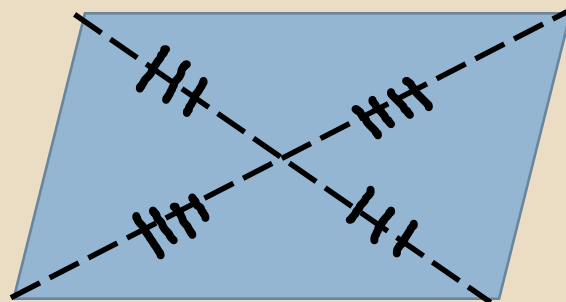
$$m\angle 1 + m\angle 2 = 180^\circ$$



KEY CONCEPT

If a quadrilateral is a parallelogram, then:

Definition of Parallelogram	its opposite sides are parallel.
Theorem 6-2-1	its opposite sides are congruent.
Theorem 6-2-2	Its opposite angles are congruent.
Theorem 6-2-3	its consecutive angles are supplementary.
Theorem 6-2-4	its diagonals bisect each other.

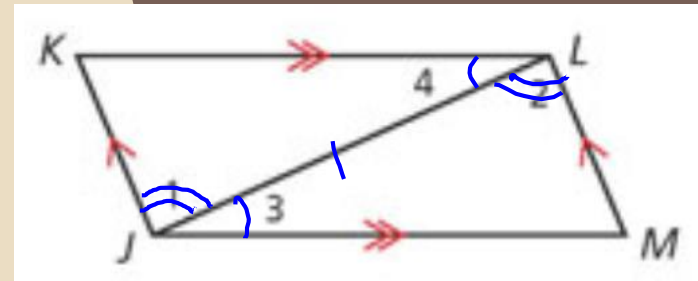


CLASS WORK

Proof of Theorem 6-2-1:

Given: JKLM is a 

Prove: $\overline{JK} \cong \overline{LM}$; $\overline{KL} \cong \overline{MJ}$



Statements	Reasons
1) JKLM is a parallelogram	1) Given
2) $\overline{JK} \parallel \overline{LM}$, $\overline{KL} \parallel \overline{MJ}$	2) Def. of parallelogram
3) $\angle 3 \cong \angle 4$; $\angle 1 \cong \angle 2$	3) Alt. Int. \angle s Thm
4) $\overline{JL} \cong \overline{JL}$	4) Reflexive Prop of \cong
5) $\triangle K LJ \cong \triangle MJL$	5) ASA
6) $\overline{JK} \cong \overline{LM}$; $\overline{KL} \cong \overline{MJ}$	6) CPCTC

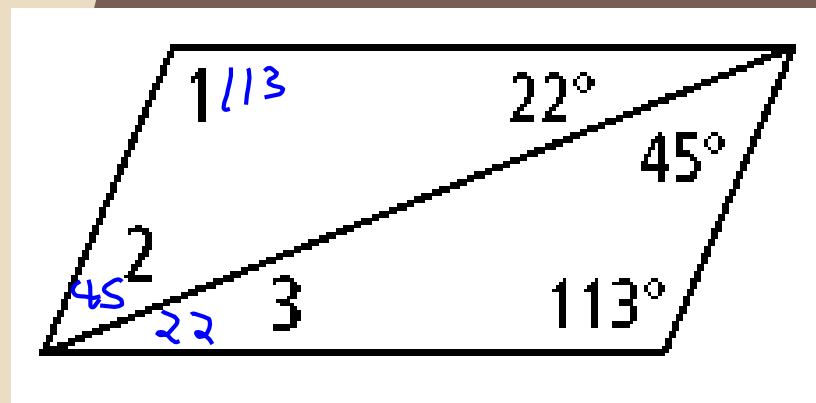
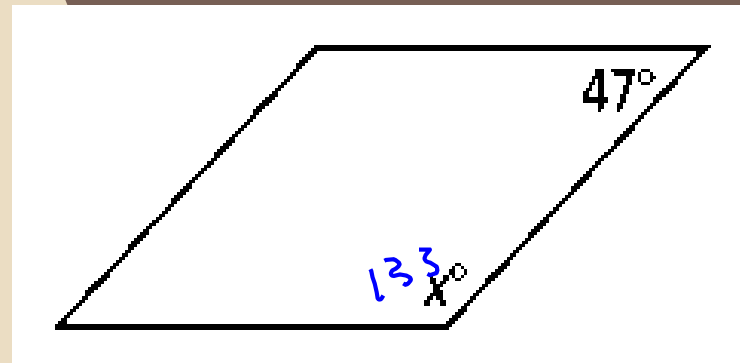
CLASS WORK

1. Find the value of x for the parallelogram.

$$x + 47 = 180$$

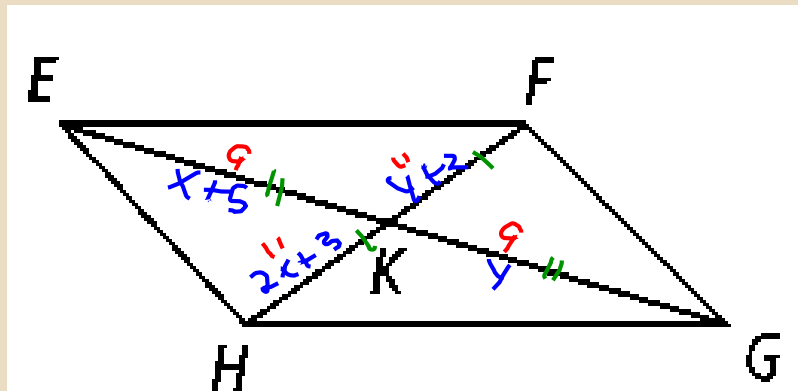
$$x = 133$$

2. Find the measures of the numbered angles in the parallelogram.



CLASS WORK

3. $EK = x + 5$, $KG = y$, $HK = 2x + 3$,
 $KF = y + 2$

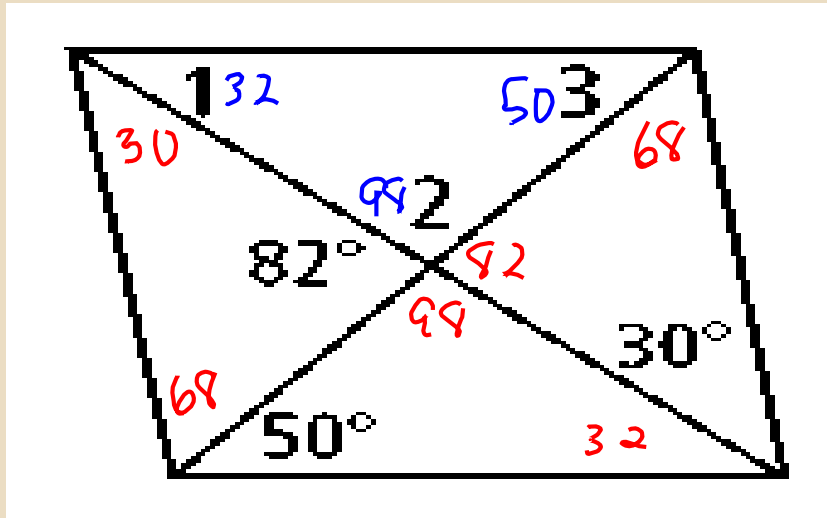


$$\begin{aligned}2x+3 &= y+2 & x+5 &= y \\2x+3 &= x+5+2 & 9 &= 4 \\2x+3 &= x+7 \\x &= 4\end{aligned}$$

Find the
values for
 x and y in
EFGH.

CLASS WORK

4. Parallelogram:

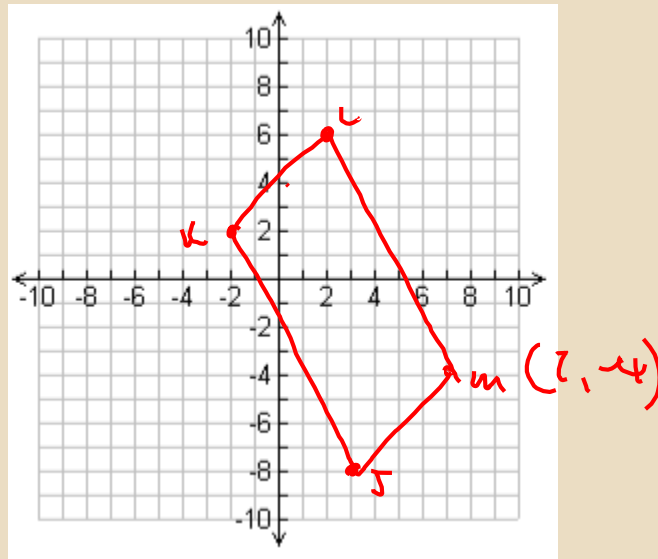


Find the measures of the numbered angles.

CLASS WORK

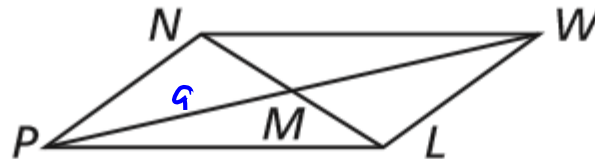
5. Three vertices of $\triangle JKLM$ are $J(3,-8)$, $K(-2,2)$, and $L(2,6)$. Find the coordinates of vertex M .

Find the coordinates of vertex M .



EXIT PROBLEMS

In $\square PNWL$, $NW = 12$, $PM = 9$, and $m\angle WLP = 144^\circ$. Find each measure.

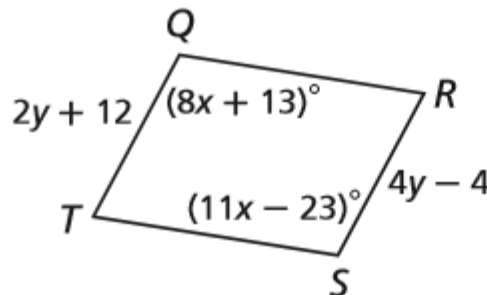


1. $PW = 2(9) = 18$

2. $m\angle PNW = 144^\circ$

$QRST$ is a parallelogram. Find each measure.

$$\begin{aligned} 2y + 12 &= 4y - 4 \\ 16 &= 2y \\ 8 &= y \end{aligned}$$



$$8x + 13 = 11x - 23$$

$$36 = 3x$$

$$12 = x$$

$$m\angle Q = 8(12) + 13 = 109$$

3. $TQ = 2(8) + 12 = 28$

4. $m\angle T = 180 - 109 = 71$

LEARNING RUBRIC

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

Almost There: Applies the properties of parallelograms on the coordinate plane

Moving Forward: Applies the properties of parallelograms to write equations to solve for segment lengths and angle measures

Getting Started: Identifies congruent and supplementary measures in parallelograms

HOMework

Pages 407 – 409:

22 – 48 even

52

SUMMARY

**PROPERTIES OF A PARALLELOGRAM:
IF A QUADRILATERAL IS A
PARALLELOGRAM,**

- 1. OPPOSITE SIDES ARE PARALLEL**
- 2. OPPOSITE SIDES ARE CONGRUENT**
- 3. OPPOSITE ANGLES ARE
CONGRUENT**
- 4. CONSECUTIVE ANGLES ARE
SUPPLEMENTARY**
- 5. DIAGONALS BISECT EACH OTHER**