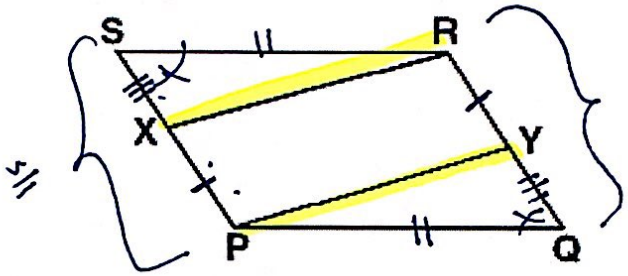
Day 2 - Ways to prove a quadrilateral is a parallelogram

Warm – Up

Given: ▱PQRS
$\overline{XP} \cong \overline{RY}$

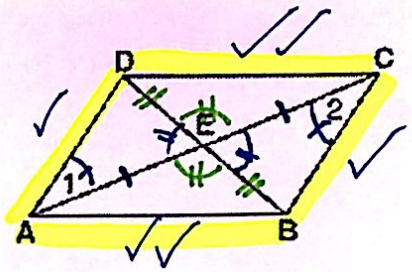
Prove: $\overline{XR} \cong \overline{YP}$



Statements	Reasons
1. ▱PQRS , $\overline{XP} \cong \overline{RY}$	1. Given
2. $\overline{SP} \cong \overline{QR}$ $\overline{SR} \cong \overline{PQ}$ (S) $\overline{SX}+\overline{XP} \cong \overline{SP}$ & $\overline{QY}+\overline{YR}=\overline{QR}$	2. Opp sides ≅ Prop. Segment Add. Post.
3. $\overline{SX} \cong \overline{YQ}$ (S)	3. Def. ≅
4. $\angle S \cong \angle Q$ (A)	4. Opp. ∠'s ≅ Prop.
5. $\triangle SRX \cong \triangle QPY$	5. SAS
6. $\overline{XR} \cong \overline{YP}$	6. CPCTC

1. Given: $\overline{DB}$ bisects $\overline{AC}$
$\angle 1 \cong \angle 2$

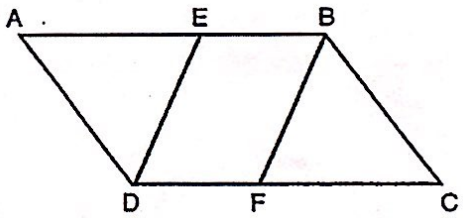
Prove: ABCD is a parallelogram



Statements	Reasons
1. $\overline{DB}$ bisects $\overline{AC}$, $\angle 1 \cong \angle 2$	1. Given
2. $\overline{AE} \cong \overline{CE}$	2. Def. Bisect
3. $\angle DEA \cong \angle BEC$	3. Def. Vert $\angle$'s
4. $\triangle DEA \cong \triangle BEC$	4. ASA
5. $\overline{DA} \cong \overline{CB}$	5. CPCTC
6. $\angle DEC \cong \angle BEC$	6. Def. Vert. $\angle$'s
7. $\overline{DE} \cong \overline{BE}$	7. CPCTC
8. $\triangle DEC \cong \triangle BEA$	8. SAS
9. $\overline{DC} \cong \overline{BA}$	9. CPCTC
10. ABCD is parallelogram	10. Opp. sides $\cong$ Prop.
2.	

Given: $\square$ABCD
$\overline{AE} \cong \overline{CF}$

Prove: $\square$EBFD



STATEMENT	REASONS
1. $\overline{AE} \cong \overline{CF}$, $\square$ABCD	1.
2. $\angle A \cong$ ____	2.
3. $\overline{AD} \cong$ ____	3.
4. $\triangle$____ $\cong \triangle$____	4.
5. $\overline{ED} \cong$ ____	5.
6. $\overline{EB} \cong$ ____	6.
7. EBFD is a ____	7.

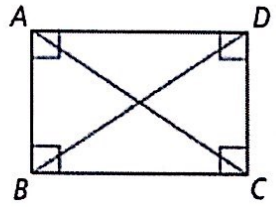
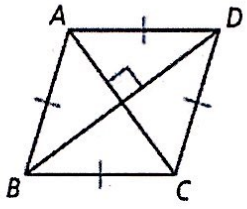
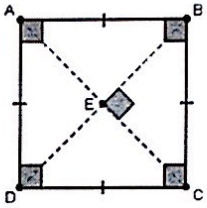
Need 2 steps before #6 and #7

Math 3

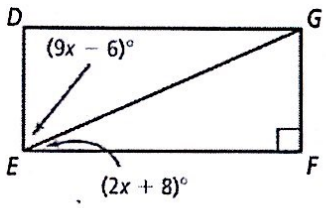
6.4 Quadrilaterals

Unit 6

SWBAT use the properties of quadrilaterals to solve for unknowns.

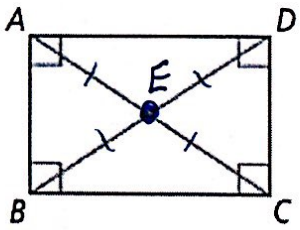
Rectangle	Rhombus	Square
A **rectangle** is a parallelogram with four right angles.	A **rhombus** is a parallelogram with four congruent sides.	A **square** is a parallelogram with four congruent sides and four right angles.
A **rectangle** has all the properties of a parallelogram PLUS: • 4 right angles • Diagonals are congruent 	A **rhombus** has all the properties of a parallelogram PLUS: • 4 congruent sides • Diagonals bisect angles • Diagonals are perpendicular 	A **square** has all the properties of a parallelogram PLUS: • All the properties of a rectangle • All the properties of a rhombus 

Example 1: Solve for x and the measure of each angle if □DGFE is a rectangle.



$9x-6+2x+8=90°$

Example 2: □ABCD is a rectangle whose diagonals intersect at point E.



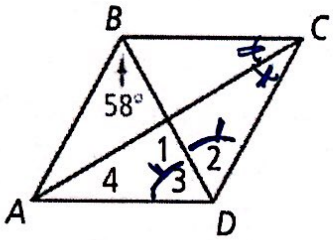
a) If AE = 36 and CE = 2x – 4, find x.

$36 = 2x-4$

b) If BE = 6y + 2 and CE = 4y + 6, find y.

$6y+2 = 4y+6$

Example 3: Using the diagram to the right to answer the following if □ABCD is a rhombus.



a) Find the m∠1.

$90°$

b) Find the m∠2.

$58°$

c) Find the m∠3.

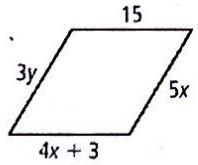
$58°$

d) Find the m∠4.

$180-90-58 = 32°$

Example 4: Solve for each variable if the following are rhombi.

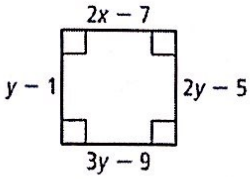
a)



$15 = 3y$

$15 = 5x$

b)



Trapezoid

A **trapezoid** is a quadrilateral with exactly one pair of parallel sides, called bases, and two nonparallel sides, called legs.

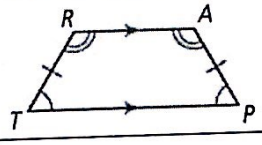
Isosceles Trapezoids

An **isosceles trapezoid** is a trapezoid with congruent legs.

A trapezoid is isosceles if there is only:

- One set of parallel sides
- Base angles are congruent
- Legs are congruent
- Diagonals are congruent
- Opposite angles are supplementary

$\angle T \cong \angle P, \angle R \cong \angle A$



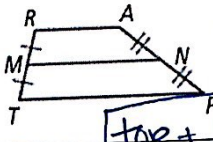
Trapezoid Midsegment

The **median** (also called the midsegment) of a trapezoid is a segment that connects the midpoint of one leg to the midpoint of the other leg.

Theorem: If a quadrilateral is a trapezoid, then a) the midsegment is parallel to the bases and b) the length of the midsegment is half the sum of the lengths of the bases

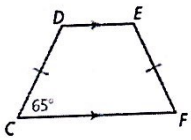
(1) $\overline{MN} \parallel \overline{TP}, \overline{MN} \parallel \overline{RA}$, and

(2) $MN = \frac{1}{2}(TP + RA)$

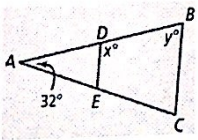


top + bottom = 2 middle

Example 5: CDEP is an isosceles trapezoid and m<C = 65. What are m<D, m<E, and m<F?

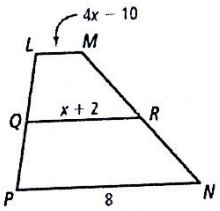


Example 6: What are the values of x and y in the isosceles triangle below if DE || DC?

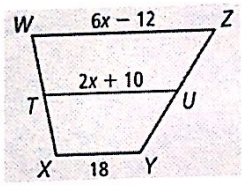


Example 7: QR is the midsegment of trapezoid LMNP. What is x and the length of LM?

$4x - 10 + 8 = 2(x + 2)$



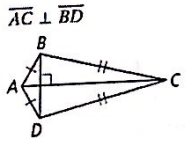
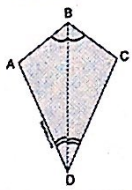
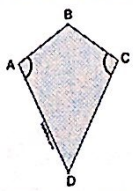
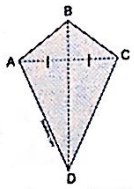
You Try! TU is the midsegment of trapezoid WXYZ. What is x and the length of TU?



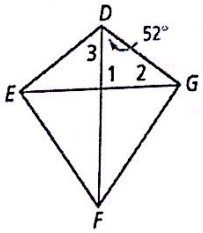
Kite

A **kite** is a quadrilateral with two pairs of adjacent, congruent sides.

If a quadrilateral is a kite, then:

Its diagonals are perpendicular.	Its diagonals bisect the opposite angles.	One pair of opposite angles are congruent.	One diagonal bisects the other.
$\overline{AC} \perp \overline{BD}$ 			

Example 4: Quadrilateral DEFG is a kite. What are m<1, m<2, and m<3?



$m\angle 1 = 90°$

$m\angle 2 = 90 - 52 = 38°$

$m\angle 3 = 52°$

You Try! Quadrilateral KLMN is a kite. What are m<1, m<2, and m<3?