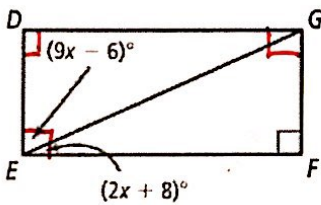


6.4 Quadrilaterals

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: <ul style="list-style-type: none"> • 4 right angles • Diagonals are congruent 	A rhombus has all the properties of a parallelogram PLUS: <ul style="list-style-type: none"> • 4 congruent sides • Diagonals bisect angles • Diagonals are perpendicular 	A square has all the properties of a parallelogram PLUS: <ul style="list-style-type: none"> • 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.



$$9x - 6 + 2x + 8 = 90^\circ$$

$$\begin{array}{r} 11x + 2 = 90 \\ -2 \quad -2 \\ \hline 11x = 88 \end{array}$$

$$\frac{11x}{11} = \frac{88}{11}$$

$$\boxed{x = 8}$$

$$9(8) - 6 = 66^\circ$$

$$2(8) + 8 = 24^\circ$$

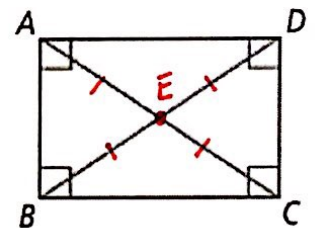
Example 2: □ABCD is a rectangle whose diagonals intersect at point E.

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

$$\begin{array}{r} 36 = 2x - 4 \\ +4 \quad +4 \\ \hline 40 = 2x \end{array}$$

$$\frac{40}{2} = \frac{2x}{2}$$

$$\boxed{x = 20}$$



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

$$\begin{array}{r} 6y + 2 = 4y + 6 \\ -4y \quad -4y \\ \hline 2y + 2 = 6 \end{array}$$

$$\begin{array}{r} 2y + 2 = 6 \\ -2 \quad -2 \\ \hline 2y = 4 \end{array}$$

$$\frac{2y}{2} = \frac{4}{2} \quad \boxed{y = 2}$$

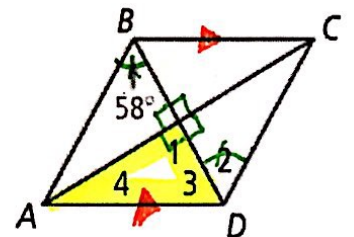
Example 3: Using the diagram to the right to answer the following if □ABCD is a rhombus.

a) Find the m∠1.

$$90^\circ$$

b) Find the m∠2.

$$58^\circ \text{ Alt int } \angle\text{'s}$$



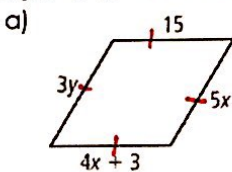
c) Find the m∠3.

$$58^\circ \text{ diagonals bisect } \angle\text{'s}$$

d) Find the m∠4.

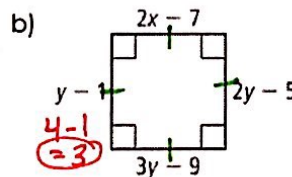
$$180 - 90 - 58 = 32^\circ$$

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



$$\frac{15}{6} = \frac{5x}{5}$$

$$\boxed{x = 3}$$



$$\begin{array}{r} y - 1 = 2y - 5 \\ -y \quad -y \\ \hline -1 = y - 5 \end{array}$$

$$\begin{array}{r} -1 = y - 5 \\ +5 \quad +5 \\ \hline 4 = y \end{array}$$

$$\boxed{y = 4}$$

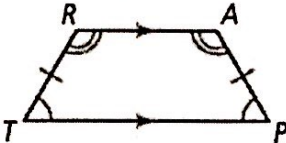
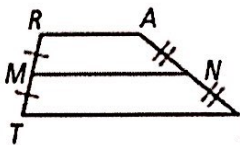
* All sides =

$$\frac{15}{3} = \frac{3y}{3}$$

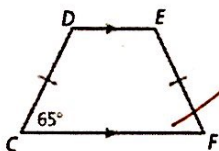
$$\boxed{y = 5}$$

$$\begin{array}{r} 2x - 7 = 3 \\ +7 \quad +7 \\ \hline 2x = 10 \end{array}$$

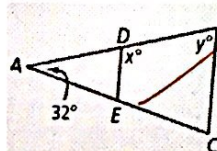
$$\frac{2x}{2} = \frac{10}{2} \quad \boxed{x = 5}$$

<h1>Trapezoid</h1>	A trapezoid is a quadrilateral with exactly one pair of parallel sides, called bases, and two nonparallel sides, called legs.	<h2>Isosceles Trapezoids</h2>	<h2>Trapezoid Midsegment</h2>
		An isosceles trapezoid is a trapezoid with congruent legs.	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.
		<p>A trapezoid is isosceles if there is only:</p> <ul style="list-style-type: none"> • One set of parallel sides • Base angles are congruent • Legs are congruent • Diagonals are congruent • Opposite angles are supplementary <p style="text-align: center;">$\angle T \cong \angle P, \angle R \cong \angle A$</p> 	<p>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</p> <p>(1) $\overline{MN} \parallel \overline{TP}, \overline{MN} \parallel \overline{RA}$, and (2) $MN = \frac{1}{2}(TP + RA)$</p> <p style="border: 1px solid black; padding: 5px; display: inline-block;">* Top + bottom = 2 middle</p> 

Example 5: CDEF is an isosceles trapezoid and $m\angle C = 65$. What are $m\angle D$, $m\angle E$, and $m\angle F$?

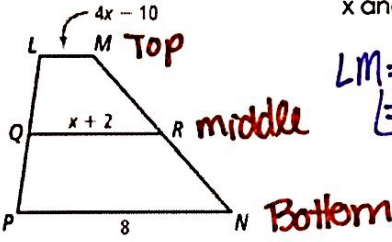


Example 6: What are the values of x and y in the isosceles triangle below if $DE \parallel DC$?



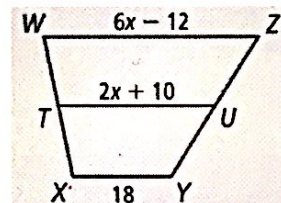
Example 7: QR is the midsegment of trapezoid LMNP. What is x and the length of LM?

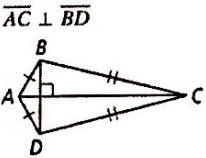
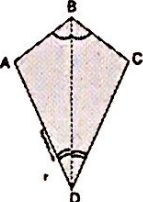
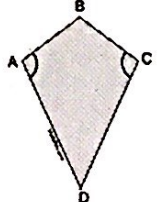
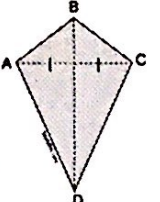
$4x - 10 + 8 = 2(x + 2)$
 $4x - 2 = 2x + 4$
 $-2x \quad -2x$
 $2x - 2 = 4$
 $\quad +2 \quad +2$
 $2x = 6$
 $x = 3$



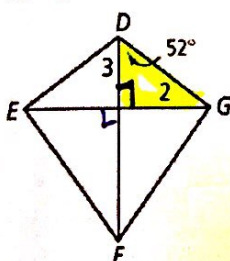
$LM = 4(3) - 10 = 2$

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



<h1>Kite</h1>	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 $m\angle 1$, $m\angle 2$, and $m\angle 3$?



$m\angle 1 = 90^\circ$
 $m\angle 3 = 52^\circ$
 $m\angle 2 = 180 - 90 - 52 = 38^\circ$

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

