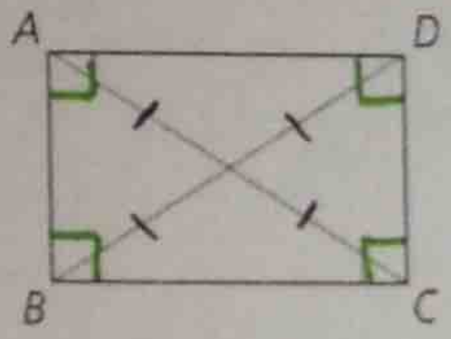
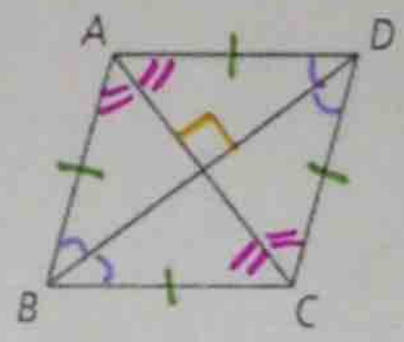
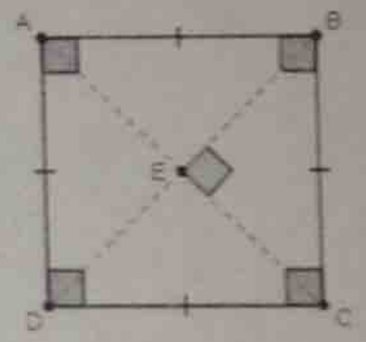
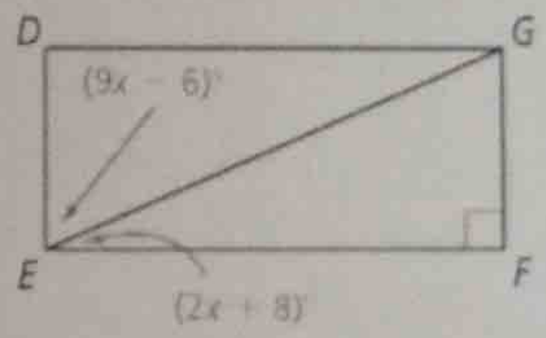
6.5 Quadrilaterals

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: • 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.



$9x-6+2x+8=90$

$11x+2=90$

$11x=88$

$x=8$

$m\angle DEG = 66°$

$m\angle FEG = 24°$

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

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

$2x-4=36$

$2x=40$

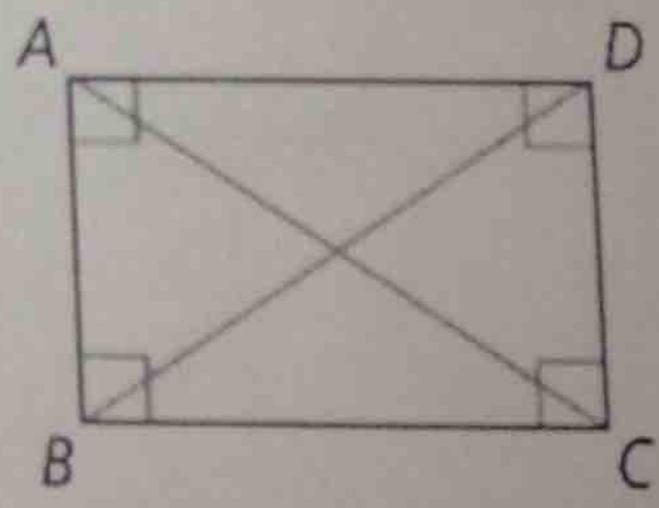
$x=20$

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

$6y+2=4y+6$

$2y=4$

$y=2$



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

a) Find the m∠1.

90°

b) Find the m∠2.

58°

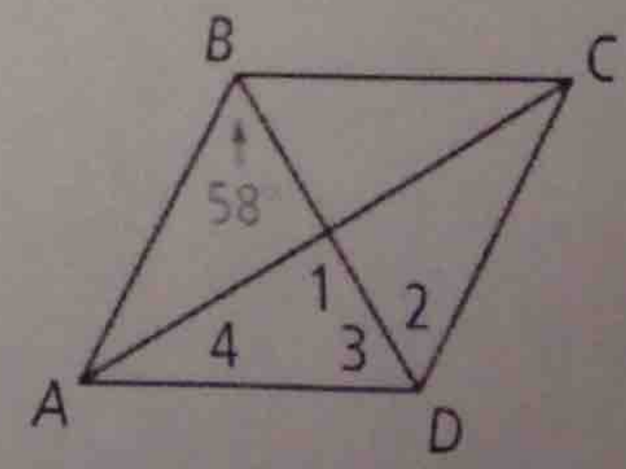
c) Find the m∠3.

58°

* Diagonals bisect ∠s

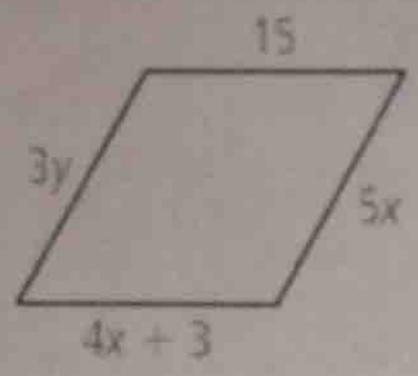
d) Find the m∠4.

180 − 90 − 58 = 32°



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

a)

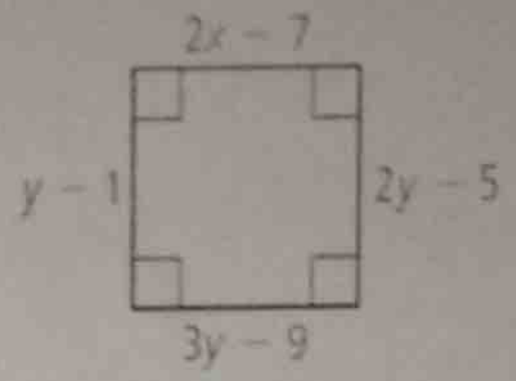


$4x+3=15$ $\quad 3y=5(3)$

$4x=12$ $\quad 3y=15$

$x=3$ $\quad y=5$

b)



$2y-5=y-1$ $\quad 2x-7=3(4)-9$

$y=4$ $\quad 2x-7=3$

$2y=10$

$y=5$

Trapezoid

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

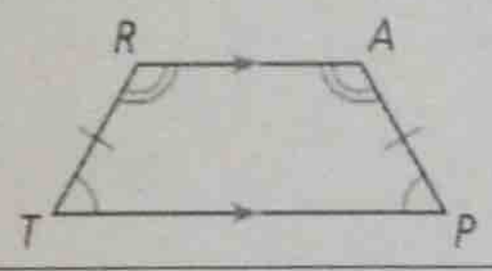
Isosceles Trapezoids

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

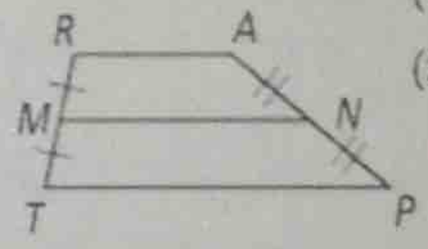
$\angle T \cong \angle P, \angle R \cong \angle A$



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.

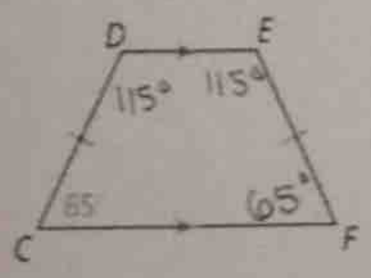
Theorem: If a quadrilateral is a trapezoid, then a) the midsegment is parallel to the bases and b) the length of the midsegment is half the sum of the lengths of the bases



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

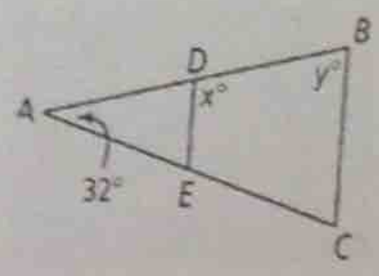
(2) $MN = \frac{1}{2}\left(TP + RA\right)$

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



$\begin{array}{r} 180 \\ -\ 65 \\ \hline 115 \end{array}$

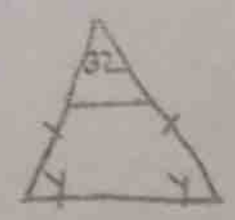
Example 6: What are the values of x and y in the isosceles triangle below if DE || DC?



$32+2y=180$

$2y=148$

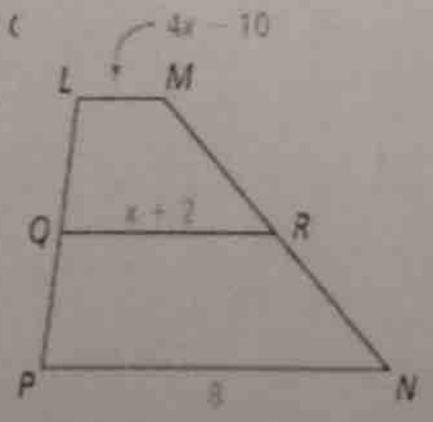
$y=74°$



$180-74=x$

$x=106°$

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



$\frac{4x-10+8}{2} = x+2$

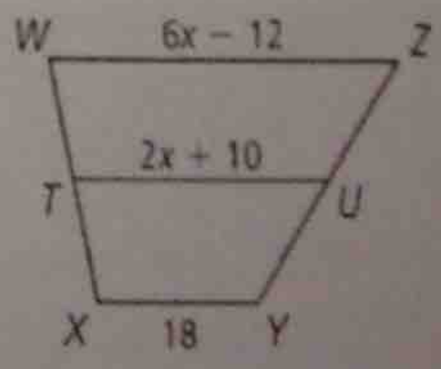
$4x-2=2x+4$

$2x=6$

$x=3$

$\overline{LM} = 2$

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



$\frac{6x-12+18}{2} = 2x+10$

$6x+6=4x+20$

$2x=14$

$x=7$

$TU=24$