DO NOW!

Suppose the diagonals of a parallelogram are both perpendicular and congruent. What type of special quadrilateral is it? Explain your reasoning.

rhombus

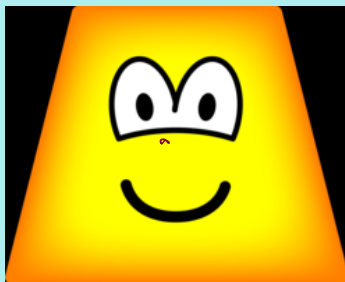& rectangle
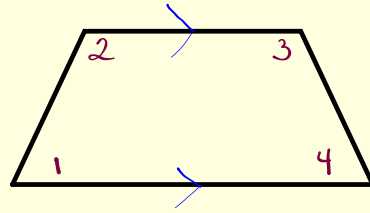
Square

U4 L6 Trapezoids

U4 L6 Trapezoids

Trapezoid

Common Core Definition

A Quadrilateral with @ least one pair of parallel sides.

The old way...

By definition , A Trapezoid is a quadrilateral with exactly one pair of parallel sides.

Trapezoid
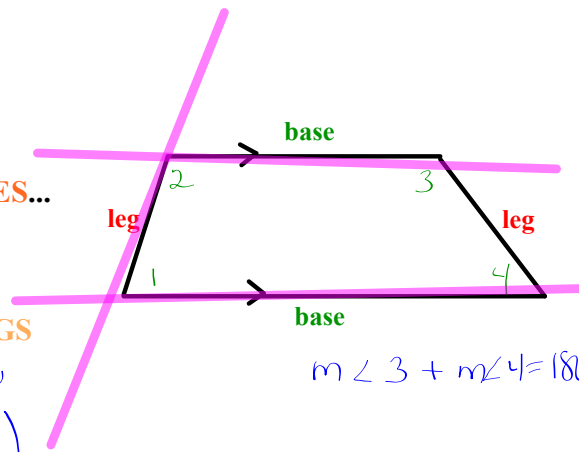
The parallel sides are known as the **BASES**...

It has 2 pairs of base angles

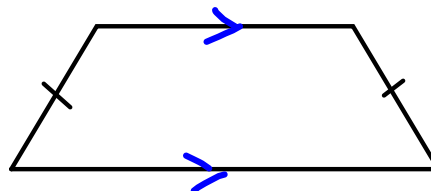The Non-Parallel sides are called the **LEGS**

$m\angle 1 + m\angle 2 = 180°$
(supplementary)

base

leg

leg

base

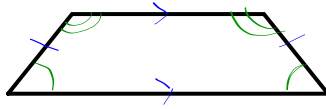$m\angle 3 + m\angle 4 = 180°$

What is an Isosceles Trapezoid?

An Isosceles Trapezoid is a trapezoid with congruent legs.

Theorems involving Trapezoids

If a Trapezoid is ISOSCELES, then each pair of base angles are congruent

All 4 ∡s
of any
quad =
360°

The converse is also true!

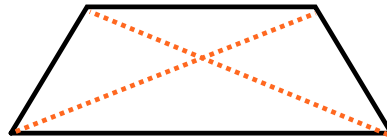If a Trapezoid has a pair of congruent base angles, then it is an ISOSCELES Trapezoid

Also, consecutive angles that are NOT base angles are supplementary.

(In any trapezoid)

Another Trapezoid Theorem

A Trapezoid is ISOSCELES if and only if the diagonals are congruent

This means-

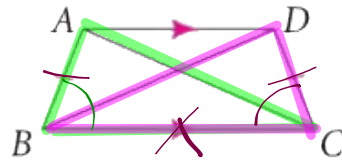If a trapezoid has congruent diagonals then it's an isosceles trapezoid.

AND

If a trapezoid is an isosceles trapezoid, then it has congruent diagonals.

Prove the theorem that states that the diagonals of an isosceles trapezoid are congurent:

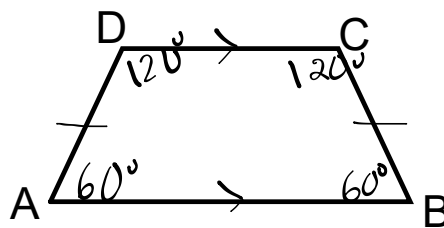**Given:** Isosceles trapezoid $ABCD$ with $\overline{AB} \cong \overline{DC}$

Prove: $\overline{AC} \cong \overline{DB}$ CPCTC

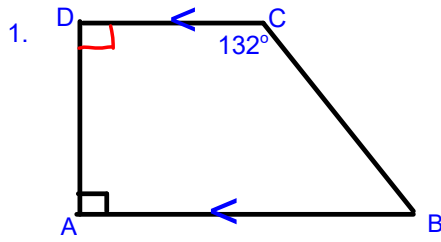| Statements	Reasons
1) Isosceles trapezoid $ABCD$ with $\overline{AB} \cong \overline{DC}$	1) given
2) $\overline{BC} \cong \overline{CB}$	2) Reflexive
3) $\angle ABC \cong \angle DCB$	3) Base $\angle s$ Isos. trap. are $\cong$
4) $\triangle ABC \cong \triangle DCB$	4) SAS
5) $\overline{AC} \cong \overline{DB}$	5) CPCTC

plan
$\triangle ABC \cong \triangle DCB$

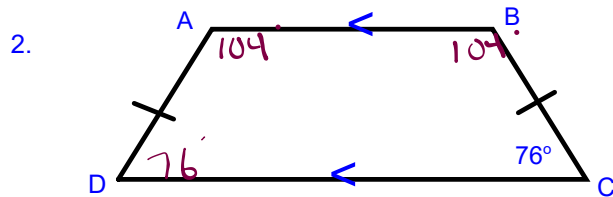Given isosceles trapezoid ABCD, if the m<A = 60 degrees, find the remaining angles.

D 120° → C 120°
A 60° → 60° B

Examples:
Find the angle measures of ABCD

1.

D   C
132°

A   B

$m \angle B = 48°$

2.

A   B
104   104

76   76°
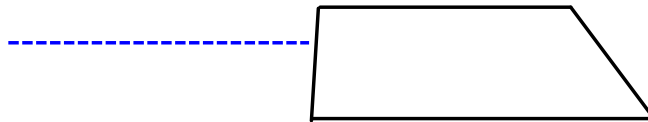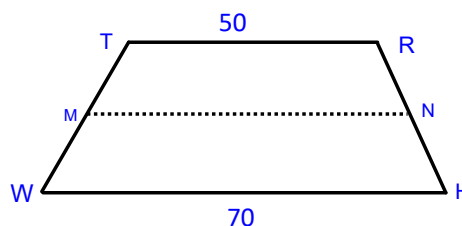D   C

Recall a midsegment for triangles..... We will do this on Monday 1/7.

Definition of Midsegment/Median of a Trapezoid:
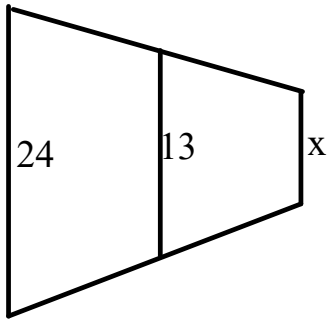the segment connecting the midpoints of the two non-parallel sides.

- - - - - - - - - - - - - - - - - - - -

Theorem:

The midsegment or median for a trapezoid is parallel to each base and is one-half the sum of the bases.

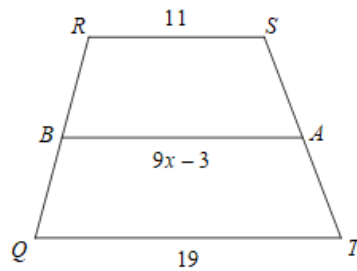1) Find the length of the midsegment (median) $\overline{MN}$.

50
T   R
M ·········· N
W   H
70

2) Find the value of x, knowing that the picture contains a trapezoid with its midsegment.

#11 from last nights HW

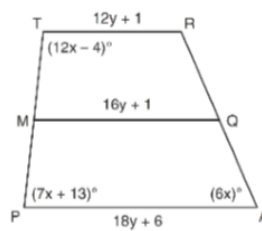**Solve for _x_. Each figure is a trapezoid.**

11)

R — 11 — S

B |————| A
9x − 3

Q — 19 — T

Old Regents Question!

15 Trapezoid _TRAP_, with median $\overline{MQ}$, is shown in the diagram below. Solve algebraically for _x_ and _y_.
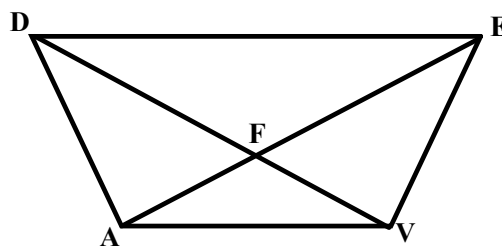

T — 12y + 1 — R
(12x − 4)°

M ————— 16y + 1 ————— Q

(7x + 13)°   (6x)°
P — 18y + 6 — A

$$32y + 2 = 30y + 7$$
$$-30y \qquad\quad -30y$$
$$2y + 2 = 7$$
$$2y = 5$$
$$\boxed{y = \frac{5}{2}}$$

Quick and easy Proof:

given: $\overline{DE} \parallel \overline{AV}$

$\triangle DAV \cong \triangle EVA$

prove: DAVE is an Isosceles Trapezoid

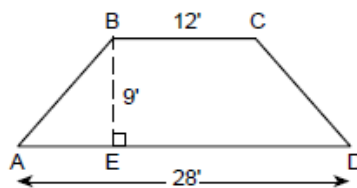| Statements	Reasons
1. $\overline{DE} \parallel \overline{AV}$ $\triangle DAV \cong \triangle EVA$	1. Given

Homework

U4 L6 Trapezoid HW

Online

U4 L4 More Trapezoids

10 The cross section of an attic is in the shape of an isosceles trapezoid, as shown in the accompanying figure. If the height of the attic is 9 feet, $BC = 12$ feet, and $AD = 28$ feet, find the length of $\overline{AB}$ to the *nearest foot*.
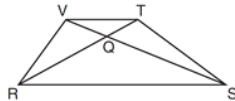
U4 L4 Trapezoid HW

1 If the diagonals of a quadrilateral do *not* bisect each other, then the quadrilateral could be a
   1) rectangle
   2) rhombus
   3) square
   4) trapezoid

2 In trapezoid $RSTV$ with bases $\overline{RS}$ and $\overline{VT}$, diagonals $\overline{RT}$ and $\overline{SV}$ intersect at Q.

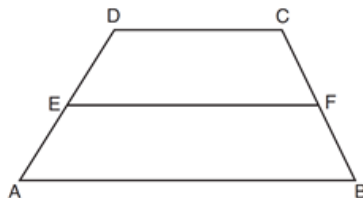   If trapezoid $RSTV$ is *not* isosceles, which triangle is equal in area to $\triangle RSV$?
   1) $\triangle RQV$
   2) $\triangle RST$
   3) $\triangle RVT$
   4) $\triangle SVT$

3 Isosceles trapezoid $ABCD$ has diagonals $\overline{AC}$ and $\overline{BD}$. If $AC = 5x + 13$ and $BD = 11x - 5$, what is the value of x?
   1) 28
   2) $10\frac{3}{4}$
   3) 3
   4) $\frac{1}{2}$

4 In the diagram below of isosceles trapezoid $DEFG$, $\overline{DE} \parallel \overline{GF}$, $DE = 4x - 2$, $EF = 3x + 2$, $FG = 5x - 3$, and $GD = 2x + 5$. Find the value of x.
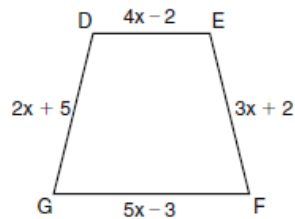
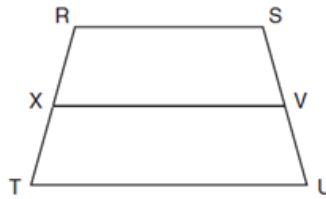5 In the diagram below, $\overline{EF}$ is the median of trapezoid $ABCD$.

   If $AB = 5x - 9$, $DC = x + 3$, and $EF = 2x + 2$, what is the value of x?
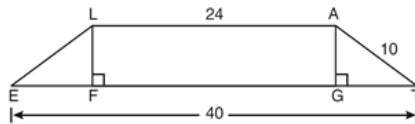   1) 5
   2) 2
   3) 7
   4) 8

6 In the diagram below of trapezoid $RSUT$, $\overline{RS} \parallel \overline{TU}$, X is the midpoint of $\overline{RT}$, and V is the midpoint of $\overline{SU}$.

If $RS = 30$ and $XV = 44$, what is the length of $\overline{TU}$?
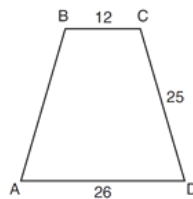1) 37
2) 58
3) 74
4) 118

7 In the diagram below, $LATE$ is an isosceles trapezoid with $\overline{LE} \cong \overline{AT}$, $LA = 24$, $ET = 40$, and $AT = 10$. Altitudes $\overline{LF}$ and $\overline{AG}$ are drawn.

What is the length of $\overline{LF}$?
1) 6
2) 8
3) 3
4) 4

8 In the diagram below of isosceles trapezoid $ABCD$, $AB = CD = 25$, $AD = 26$, and $BC = 12$.

What is the length of an altitude of the trapezoid?
1) 7
2) 14
3) 19
4) 24

12 In the diagram below, $\overline{AB}$ and $\overline{CD}$ are bases of trapezoid $ABCD$.

(Not drawn to scale)

If $m\angle B = 123$ and $m\angle D = 75$, what is $m\angle C$?
1) 57
2) 75
3) 105
4) 123