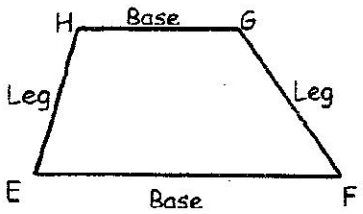
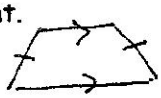
Trapezoid Study Guide



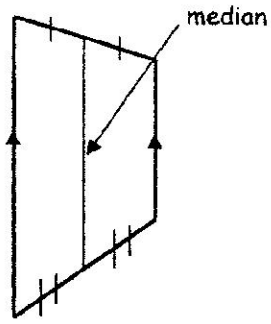
A trapezoid is a quadrilateral with exactly one pair of parallel sides. The parallel sides are called **bases** and the nonparallel sides are called **legs**.

An isosceles trapezoid is a trapezoid whose legs are congruent.

- The diagonals of an isosceles trapezoid are congruent.

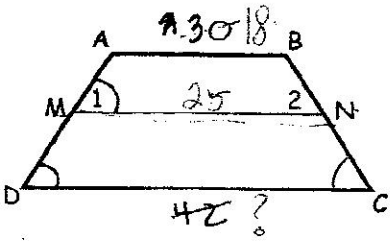


* base ∠s are ≅
* has line of symmetry



The **median** of a trapezoid is the segment that joins the midpoints of the legs. The median is parallel to the bases and its measure is half the sum of the measures of the bases.

median = avg of bases



ABCD is an isosceles trapezoid. $\overline{MN}$ is a median.

Ex. 1 AB = 30, CD = 42, MN = 36 $\quad \frac{30+42}{2} = \frac{72}{2}$

Ex. 2 AB = 18, MN = 25, CD = 32 $\quad \frac{18+x}{2} = 25$

$18 + x = 50$

Ex. 3 AB = 6x − 3; MN = 15; CD = 8x + 5. Find x, AB, and CD.

$\frac{6x - 3 + 8x + 5}{2} = 15$

$14x + 2 = 30$

$14x = 28$

$x = 2$

AB = 9

CD = 21

Ex. 4 m∠1 = 4x − 60; m∠C = 30 − x. Find x, m∠1, and m∠C.

$4x - 60 = 30 - x$

$5x = 90$

$x = 18$

$m\angle 1 = 12 \quad m\angle C = 12$

Ex. 5 m∠B = 4x + 40, m∠D = 3x. Find x, m∠B, and m∠D.

$4x + 40 + 3x = 180$

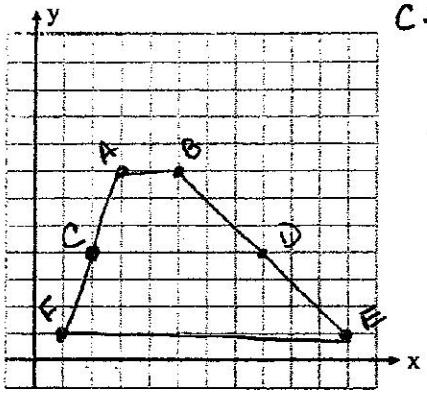
$7x = 140$

$x = 20$

$m\angle B = 120$

$m\angle D = 60$

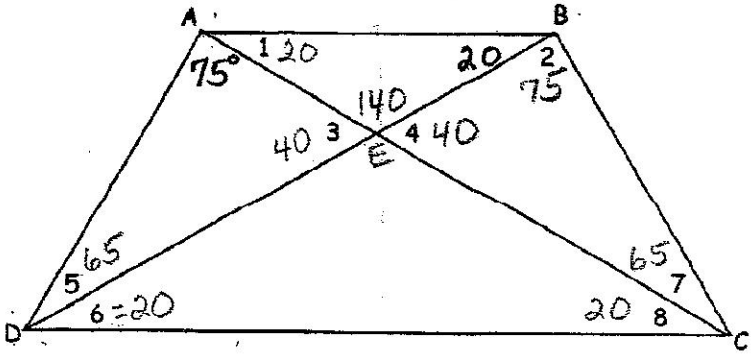
Ex. 6 $\overline{CD}$ is the median of a trapezoid that bases $\overline{AB}$ and $\overline{EF}$ with C on $\overline{AF}$ and D on $\overline{BE}$. If the vertices of the trapezoid are A(3, 7), B(5, 7), E(11, 1), and F(1,1), find the coordinates of C and D.



C is midpt of $\overline{AF} = \left(\frac{3+1}{2}, \frac{7+1}{2}\right) = (2, 4)$

D is midpt of $\overline{BE} = \left(\frac{5+11}{2}, \frac{7+1}{2}\right) = (8, 4)$

Ex. 7 Given: Isosceles trapezoid ABCD, m∠ABD = 20°, m∠DAC = 75°. (Note that an isosceles trapezoid has a line of symmetry.)



m∠1 = 20

m∠2 = 75

m∠3 = 40

m∠4 = 40

m∠5 = 65

m∠6 = 20

m∠7 = 65

m∠8 = 20

m∠DAB = 95

m∠ABC = 95

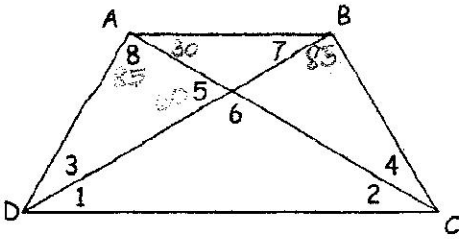
m∠ADC = 85

m∠BCD = 85

Geometry Worksheet
Trapezoids (6.5)

Name_____
Date_____ Period_____

1. Given: Isosceles trapezoid ABCD, m∠BAC = 30° and m∠DBC = 85°



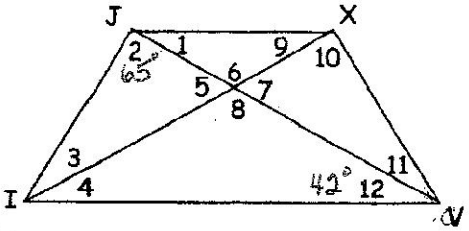
m∠1= 30 m∠5= 60 m∠ ADC = 65

m∠2= 30 m∠6= 120 m∠ BCD = 65

m∠3= 35 m∠7= 30 m∠ DAB = 115

m∠4 = 35 m∠8 = 85 m∠CBA= 115

2. Given: Isosceles trapezoid JXVI, m∠JVI = 42° and m∠IJV = 65°



m∠1= 42 m∠6= 96 m∠11= 31

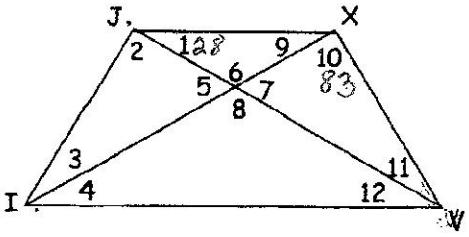
m∠2= 65 m∠7= 84 m∠12= 42

m∠3= 31 m∠8= 96 m∠ JIV = 73

m∠4= 42 m∠9= 42 m∠IJX= 107

m∠5 = 84 m∠10= 65

3. Given: Isosceles trapezoid JXVI, m∠IXV = 83° and m∠VJX = 28°



m∠1= 28 m∠6= 124 m∠11= 41

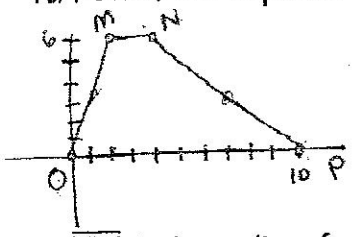
m∠2= 83 m∠7= 56 m∠12= 28

m∠3= 41 m∠8= 124 m∠ IVX = 69

m∠4= 28 m∠9= 28 m∠VXJ= 111

m∠5 = 56 m∠10= 83

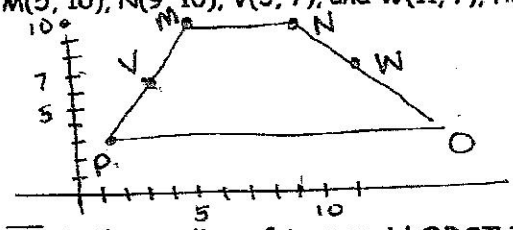
4. $\overline{VW}$ is the median of a trapezoid that has bases $\overline{MN}$ and $\overline{PO}$, with V on $\overline{OM}$ and W on $\overline{PN}$. If the vertices of the trapezoid are M(2, 6), N(4, 6), P(10, 0), and O(0, 0), find the coordinates of V and W.



$V = \text{midpt of } \overline{OM} = \left(\frac{2+0}{2}, \frac{6+0}{2}\right) = (1, 3)$

$W = \text{midpt of } \overline{NP} = \left(\frac{4+10}{2}, \frac{6+0}{2}\right) = (7, 3)$

5. $\overline{VW}$ is the median of a trapezoid MNPO that has bases $\overline{MN}$ and $\overline{PO}$, with V on $\overline{PM}$ and W on $\overline{ON}$. If M(5, 10), N(9, 10), V(3, 7), and W(11, 7), find the coordinates of P and O.



$V = (3, 7) = \left(\frac{5+x}{2}, \frac{10+y}{2}\right)$

$6 = 5 + x \quad 14 = 10 + y$

$1 = x \quad 4 = y$

$P(1, 4)$

$W = (11, 7) = \left(\frac{9+x}{2}, \frac{10+y}{2}\right)$

$22 = 9 + x \quad 14 = 10 + y$

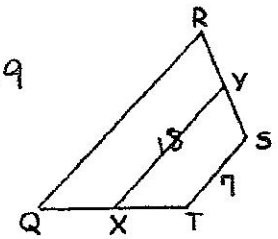
$13 = x \quad 4 = y$

$O(13, 4)$

$\overline{XY}$ is the median of trapezoid QRST in problems 6-11.

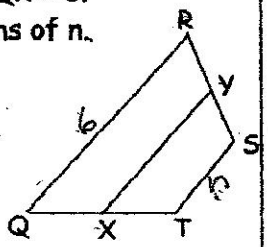
6. XY=18 and TS = 7.
Find QR.

QR = 29



7. TS = n and QR = 6.
Find XY in terms of n.

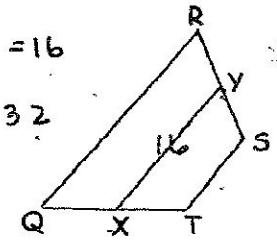
$XY = \frac{6+n}{2}$



8. XY=16. Find TS+QR.

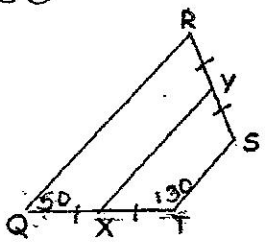
$\frac{TS+QR}{2} = 16$

$TS + QR = 32$



9. $TX = \frac{1}{2}(SR)$ and m∠T=130.
Find m∠R. makes it isos.

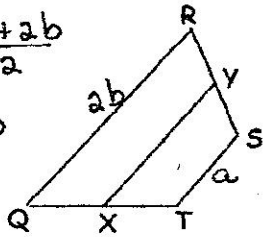
m∠R = 50



10. ST = a and QR = 2b.
Find XY.

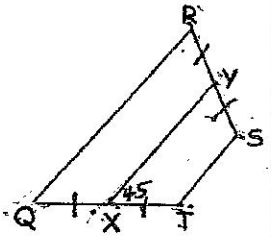
$XY = \frac{a+2b}{2}$

or $\frac{1}{2}a + b$



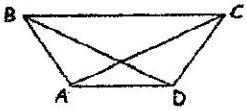
11. QX=SY and m∠TXY = 45.
Find m∠R. makes it isos

m∠R = 45°



In problems 12-14, trapezoid ABCD is isosceles. Find the variable in each.

12. AB = x+5 and CD = 3x + 3

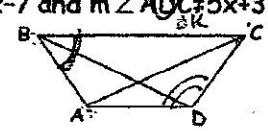


$x + 5 = 3x + 3$

$2 = 2x$

$1 = x$

13. m∠ABC=3x-7 and m∠ADC=5x+3



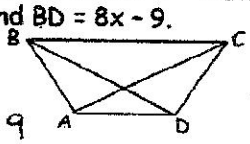
$3x - 7 + 5x + 3 = 180$

$8x - 4 = 180$

$8x = 184$

$x = 23$

14. AC = x^2 + 6 and BD = 8x - 9.



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

$x^2 - 8x + 15 = 0$

$(x - 3)(x - 5) = 0$

$x = 3 \quad x = 5$