

Notes: **TRAPEZOIDS**

Content Objective: I will be able to apply properties of trapezoids to determine the measures of sides, diagonals, and/or angles.

TERM	DEFINITION	EXAMPLE
Trapezoid	A quadrilateral with exactly one pair of <u>parallel</u> sides.	
Bases	The <u>parallel</u> sides of a trapezoid.	BC and AD
Legs	The <u>non-parallel</u> sides of a trapezoid.	AB and CD
Base angles	The angles <u>adjacent</u> to the bases.	$\angle B$ and $\angle C$; $\angle A$ and $\angle D$
	Each lower base angle is <u>supplementary</u> to the upper base angle on the same side.	$\angle A + \angle B = 180^\circ$ $\angle C + \angle D = 180^\circ$

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EXAMPLE 1: Find the length of the angle indicated in the trapezoid.

$6x - 22$
 $8x + 34$

$6x - 22 + 8x + 34 = 180$
 $14x + 12 = 180$
 $14x = 168$
 $x = 12$

$x = 12$
 $m\angle R = 59^\circ$

QUICK CHECK: Find the length of the angle indicated in the trapezoid.

$11x + 8$
 $11x + 103$

$11x + 8 + 11x + 103 = 180$
 $22x + 111 = 180$
 $22x = 69$
 $x = 3$

$x = 7$
 $m\angle A = 85^\circ$

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Notes: **TRAPEZOIDS**

TERM	DEFINITION	EXAMPLE
MEDIAN	A segment that joins the <u>mid pts.</u> of the legs of a trapezoid. It is <u>parallel</u> to the bases.	

The median is equal to half the sum of the length of the bases:
 $MN = \frac{1}{2}(b_1 + b_2)$

EXAMPLE 2: In trapezoid ABCD, EF is a median. Find each of the following.

AB = 25, DC = 13

$EF = \frac{1}{2}(25 + 13)$
 $EF = \frac{1}{2}(38)$
 $EF = 19$

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EXAMPLE 3: In trapezoid ABCD, EF is a median. Find each of the following.

AE = 11, FB = 8

AD = 22 units, BC = 16 units

$m\angle EAB = 63^\circ$, $m\angle DEF = 63^\circ$

$x + 63 = 180$
 $x = 117$

EXAMPLE 4: In trapezoid ABCD, EF is a median. Find each of the following.

AB = 29, EF = 24

DC = 19 units

$2(24) = x + 29$
 $48 = x + 29$
 $19 = x$

$2(19) = x + 29$
 $38 = x + 29$
 $9 = x$

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EXAMPLE 5: In trapezoid ABCD, EF is a median. Find each of the following.

AB = $7y + 6$, EF = $5y - 3$, DC = $y - 8$

$2(5y - 3) = 7y + 6 + y - 8$
 $10y - 6 = 8y - 2$
 $2y = 4$
 $y = 2$

QUICK CHECK: In trapezoid ABCD, EF is a median. Find each of the following.

AB = $6x - 6$, EF = $7x - 4$, DC = 38

$2(7x - 4) = 6x - 6 + 38$
 $14x - 8 = 6x + 32$
 $8x = 40$
 $x = 5$

AB = 24

TERM	DEFINITION	EXAMPLE
ISOSCELES TRAPEZOID	A trapezoid with <u>congruent</u> legs.	

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Label the figure to represent each of the properties listed below:

PROPERTIES OF ISOSCELES TRAPEZOID

- It has exactly one pair parallel sides.
- The median is equal to $\frac{1}{2}(b_1 + b_2)$
- The legs are congruent.
- The diagonals are congruent.
- The base angles are congruent.

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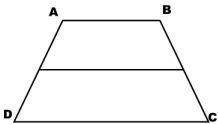
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EXAMPLE 6: ABCD is an isosceles trapezoid. Find the missing measurements.

a. $m\angle ADC = 54^\circ$; $m\angle BCD =$ 54
 $180 - 54 = 126$

b. $m\angle BAD = 112^\circ$; $m\angle BCD =$ 112
 $180 - 112 = 68$

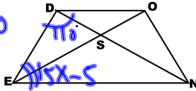
c. $m\angle ABC = 95^\circ$; $m\angle ADC =$ 85
 $180 - 95 = 85$



For Examples # 7 – 8, set up and solve equations to determine the value of x.

EXAMPLE 7: DONE is an isosceles trapezoid. $m\angle EDO = 110^\circ$ and $m\angle DEN = (15x - 5)^\circ$. Find the value of x.

$15x - 5 + 110 = 180$
 $15x + 105 = 180$
 $15x = 75$
 $x = 5$

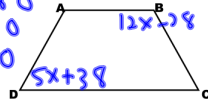


QUICK CHECK:

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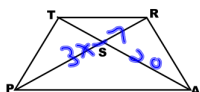
QUICK CHECK:
 ABCD is an isosceles trapezoid. $m\angle ABC = 12x - 28^\circ$ and $m\angle ADC = (5x + 38)^\circ$. Find the value of x.

$12x - 28 + 5x + 38 = 180$
 $17x + 10 = 180$
 $17x = 170$
 $x = 10$



EXAMPLE 8: TRAP is an isosceles trapezoid. $PR = 3x - 7$ and $TA = 20$. Find the value of x.

$3x - 7 = 20$
 $3x = 27$
 $x = 9$



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