Chapter 7: Quadrilaterals and Other Polygons

Addressed or Prepped VA SOL:

G.9 The student will verify and use properties of quadrilaterals to solve problems, including practical problems.

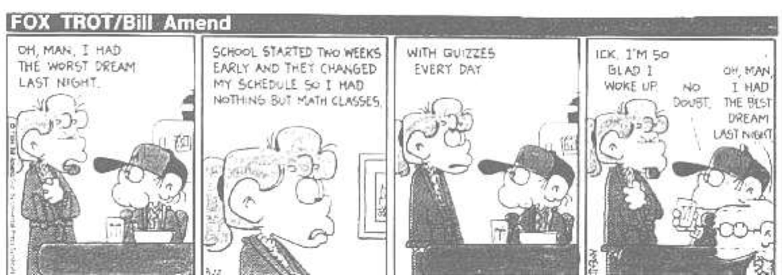
G.10 The student will solve problems, including practical problems, involving angles of convex polygons. This will include determining the
a) sum of the interior and/or exterior angles;
b) measure of an interior and/or exterior angle; and
c) number of sides of a regular polygon.

SOL Progression

Middle School:
- Compare and Contrast quadrilaterals based on their properties
- Determine unknown side lengths or angle measures in quadrilaterals
- Solve linear equations with rational number coefficients
- Draw polygons in the coordinate plane given vertices and find lengths of sides

Algebra I:
- Create equations in one variable
- Solve linear equations in one variable
- Graph in the coordinate plane
- Find the slope of a line
- Identify and write equations of parallel and perpendicular lines

Geometry:
- Find and use the interior and exterior angle measurements of polygons
- Use properties of parallelograms and special parallelograms
- Prove that a quadrilateral is a parallelogram
- Identify and use properties of trapezoids and kites
- Determine angle measurements of a regular polygon in a tessellation



Chapter 7: Quadrilaterals and Other Polygons

Section 7-1: Angles of Polygons

SOL: G.10

Objective:

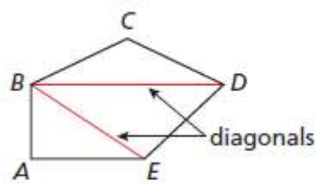
Use the interior angle measures of polygons
Use the exterior angle measures of polygons

Vocabulary:

Convex – no line that contains a side of the polygon goes into the interior of the polygon
Diagonal – a segment of a polygon that joins two nonconsecutive vertices
Equilateral polygon – all sides of the polygon are congruent
Equiangular polygon – all interior angles of the polygon are congruent
Exterior angles – angle outside the polygon formed by an extended side
Interior angles – an angle inside the polygon
Regular polygon – convex polygon that is both equilateral and equiangular

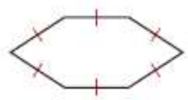
Core Concept:

Polygon $ABCDE$

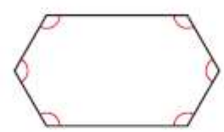


A and B are consecutive vertices.
Vertex B has two diagonals, $\overline{BD}$ and $\overline{BE}$.

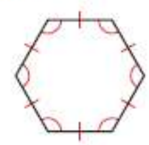
In an **equilateral polygon**, all sides are congruent.



In an **equiangular polygon**, all angles in the interior of the polygon are congruent.



A **regular polygon** is a convex polygon that is both equilateral and equiangular.



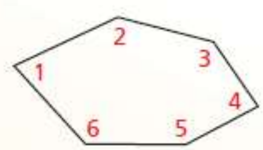
Theorem

Theorem 7.1 Polygon Interior Angles Theorem

The sum of the measures of the interior angles of a convex n-gon is $(n - 2) \cdot 180°$.

$$m\angle 1 + m\angle 2 + \cdots + m\angle n = (n - 2) \cdot 180°$$

Proof Ex. 42 (for pentagons), p. 329



$n = 6$

Note: Sum of interior angles in a polygon is found by S = (n – 2) × 180°

Corollary

Corollary 7.1 Corollary to the Polygon Interior Angles Theorem

The sum of the measures of the interior angles of a quadrilateral is 360°.

Proof Ex. 43, p. 330

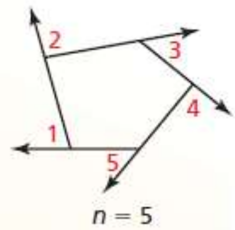
Theorem

Theorem 7.2 Polygon Exterior Angles Theorem

The sum of the measures of the exterior angles of a convex polygon, one angle at each vertex, is 360°.

$$m\angle 1 + m\angle 2 + \cdots + m\angle n = 360^\circ$$

Proof Ex. 51, p. 330

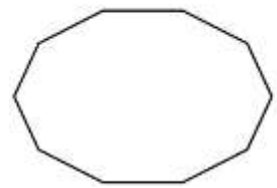


Note: Sum of exterior angles in a polygon is 360°

Examples:

Example 1:

Find the sum of the measures of the interior angles of the figure.

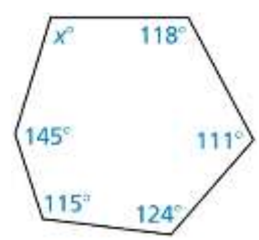


Example 2:

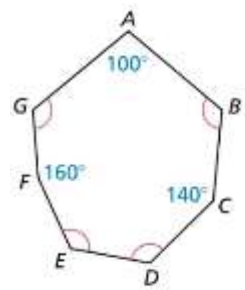
The sum of the measures of the interior angles of a convex polygon is 1800°. Classify the polygon by the number of sides.

Example 3:

Find the value of x in the diagram.



Example 4:

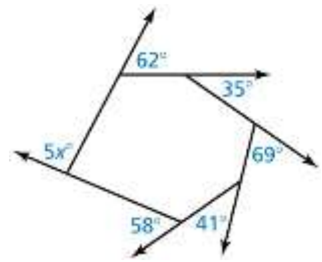


A polygon is shown.

a. Is the polygon regular? Explain your reasoning

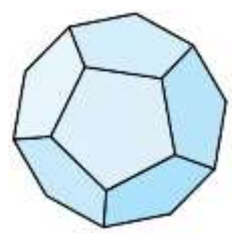
b. Find the measures of ∠*B*, ∠*D*, ∠*E*, and ∠*G*.

Example 5:



Find the value of *x* in the diagram.

Example 6:



Each face of the dodecahedron is shaped like a regular pentagon.

a. Find the measure of each interior angle of a regular pentagon.

b. Find the measure of each exterior angle of a regular pentagon.

Concept Summary:

The sum of exterior angles is always 360° (regardless of number of sides)
The sum of interior angles is given by the formula, $S = (n-2) \times 180$
To find the number of sides use: $n = 360/Ext$
The interior and exterior angles always form a linear pair (sum to 180)

Khan Academy Videos:

1. Sum of interior angles of a polygon
2. Sum of exterior angles of a polygon

Homework: 7-1SOL Worksheet

Reading Assignment: student notes section 7-2

Section 7-2: Properties of Parallelograms

SOL: G.9

Objectives:

Use properties to find side lengths and angles of parallelograms
Use parallelograms in the coordinate plane

Vocabulary:

Parallelogram – a quadrilateral with both pairs of opposite sides parallel

Core Concept:

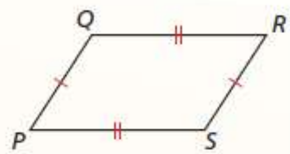
Theorems

Theorem 7.3 Parallelogram Opposite Sides Theorem

If a quadrilateral is a parallelogram, then its opposite sides are congruent.

If $PQRS$ is a parallelogram, then $\overline{PQ} \cong \overline{RS}$ and $\overline{QR} \cong \overline{SP}$.

Proof p. 332

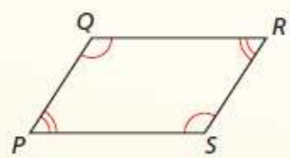


Theorem 7.4 Parallelogram Opposite Angles Theorem

If a quadrilateral is a parallelogram, then its opposite angles are congruent.

If $PQRS$ is a parallelogram, then $\angle P \cong \angle R$ and $\angle Q \cong \angle S$.

Proof Ex. 37, p. 337



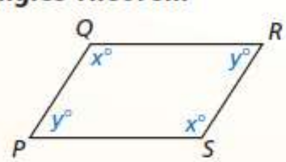
Theorems

Theorem 7.5 Parallelogram Consecutive Angles Theorem

If a quadrilateral is a parallelogram, then its consecutive angles are supplementary.

If $PQRS$ is a parallelogram, then $x° + y° = 180°$.

Proof Ex. 38, p. 337

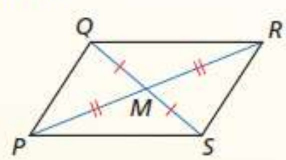


Theorem 7.6 Parallelogram Diagonals Theorem

If a quadrilateral is a parallelogram, then its diagonals bisect each other.

If $PQRS$ is a parallelogram, then $\overline{QM} \cong \overline{SM}$ and $\overline{PM} \cong \overline{RM}$.

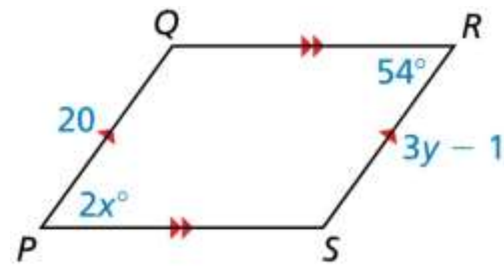
Proof p. 334



Examples:

Example 1:

Find the values of *x* and *y*.

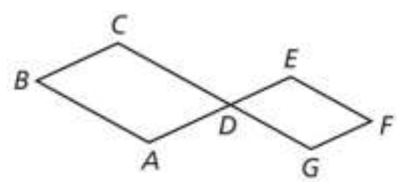


Example 2:

In parallelogram PQRS, $m\angle P$ is four times $m\angle Q$. Find $m\angle P$.

Example 3:

Write a two-column proof.

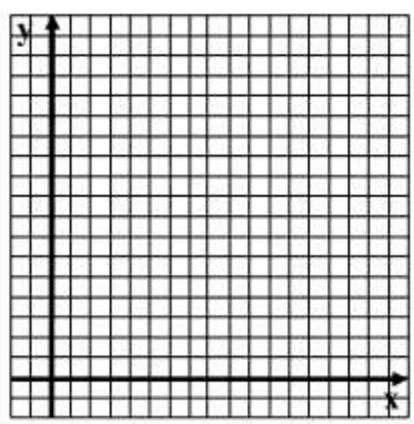


Given: ABCD and GDEF are parallelograms
Prove: $\angle C \cong \angle G$

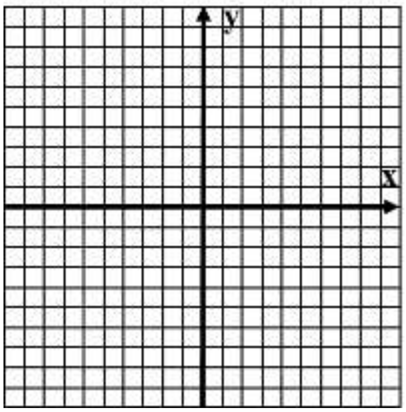
Statements	Reasons

Example 4:

Find the coordinates of the intersection of the diagonals of parallelogram *ABCD* with vertices *A*(1,0), *B*(6,0), *C*(5,3), and *D*(0,3).



Example 5:

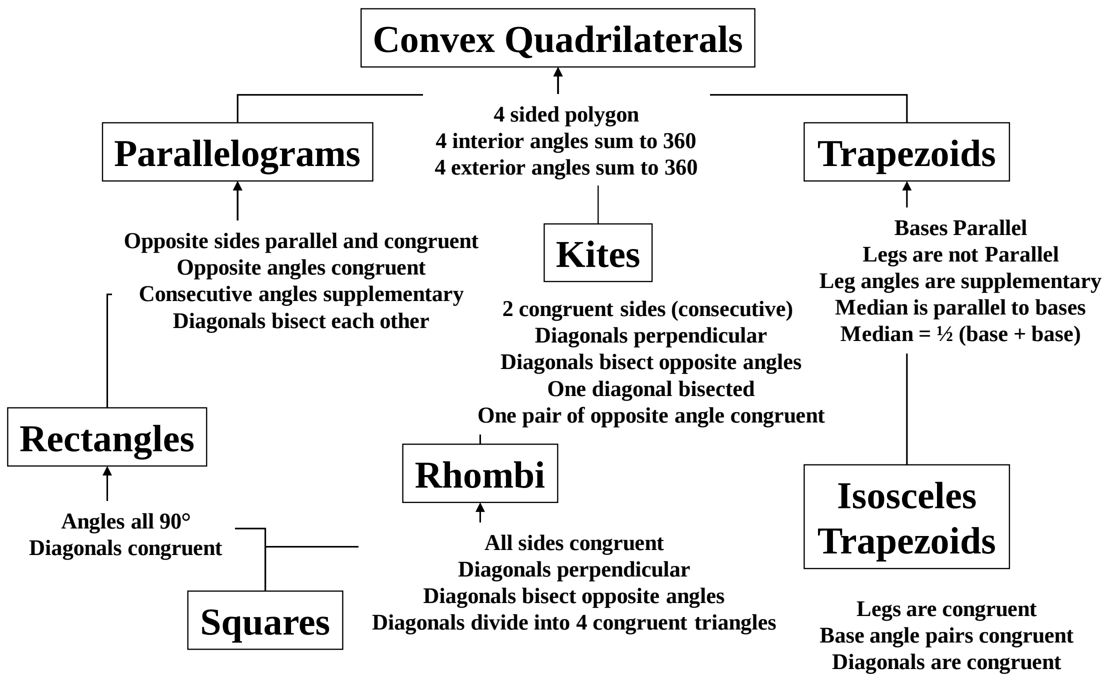


Three vertices of parallelogram *DEFG* are *D*(-1,4), *E*(2,3), and *F*(4,-2). Find the coordinates of vertex *G*.

Concept Summary:

Opposite sides are parallel and congruent
Opposite angles are congruent; Consecutive angles are supplementary
Diagonals bisect each other

Quadrilateral Characteristics Summary



Khan Academy Videos:

1. Introduction to quadrilaterals
2. Quadrilateral properties

Homework: Parallelogram characteristics and problems, Quadrilaterals Worksheet

Reading Assignment: read section 7-3

Chapter 7: Quadrilaterals and Other Polygons

Section 7-3: Proving a Quadrilateral is a Parallelogram

SOL: G.9

Objective:

Identify and verify parallelograms

Show that a quadrilateral is a parallelogram in the coordinate plane

Vocabulary: None new

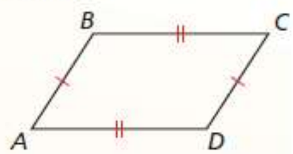
Core Concepts:

Theorems

Theorem 7.7 Parallelogram Opposite Sides Converse

If both pairs of opposite sides of a quadrilateral are congruent, then the quadrilateral is a parallelogram.

If $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \cong \overline{DA}$, then $ABCD$ is a parallelogram.

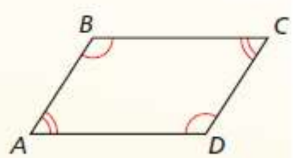


Theorem 7.8 Parallelogram Opposite Angles Converse

If both pairs of opposite angles of a quadrilateral are congruent, then the quadrilateral is a parallelogram.

If $\angle A \cong \angle C$ and $\angle B \cong \angle D$, then $ABCD$ is a parallelogram.

Proof Ex. 39, p. 347



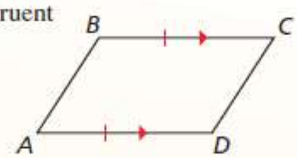
Theorems

Theorem 7.9 Opposite Sides Parallel and Congruent Theorem

If one pair of opposite sides of a quadrilateral are congruent and parallel, then the quadrilateral is a parallelogram.

If $\overline{BC} \parallel \overline{AD}$ and $\overline{BC} \cong \overline{AD}$, then $ABCD$ is a parallelogram.

Proof Ex. 40, p. 347

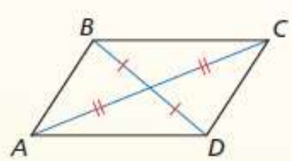


Theorem 7.10 Parallelogram Diagonals Converse

If the diagonals of a quadrilateral bisect each other, then the quadrilateral is a parallelogram.

If $\overline{BD}$ and $\overline{AC}$ bisect each other, then $ABCD$ is a parallelogram.

Proof Ex. 41, p. 347



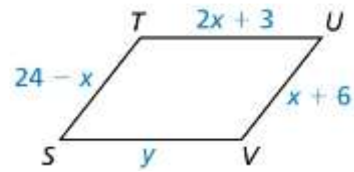
Examples:

Example 1:

In quadrilateral *ABCD*, *AB* = *BC* and *CD* = *AD*. Is *ABCD* a parallelogram? Explain your reasoning.

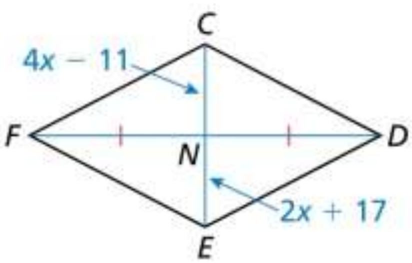
Example 2:

For what values of *x* and *y* is quadrilateral *STUV* a parallelogram?



Example 3:

Use the photograph to the right. Explain how you know that $\angle S \cong \angle U$.

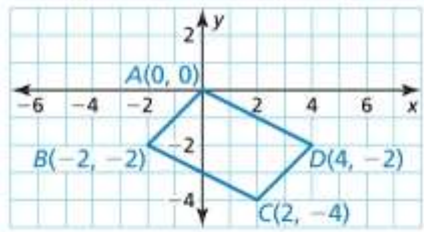


Example 4:

For what value of *x* is quadrilateral *CDEF* a parallelogram?

Example 5:

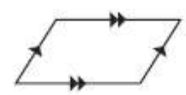
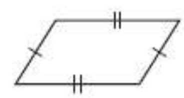
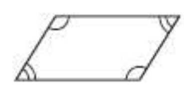
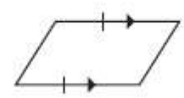
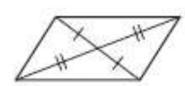
Show that quadrilateral ABCD is a parallelogram.



Concept Summary:

Concept Summary

Ways to Prove a Quadrilateral Is a Parallelogram

1. Show that both pairs of opposite sides are parallel. *(Definition)*	
2. Show that both pairs of opposite sides are congruent. *(Parallelogram Opposite Sides Converse)*	
3. Show that both pairs of opposite angles are congruent. *(Parallelogram Opposite Angles Converse)*	
4. Show that one pair of opposite sides are congruent and parallel. *(Opposite Sides Parallel and Congruent Theorem)*	
5. Show that the diagonals bisect each other. *(Parallelogram Diagonals Converse)*	

Khan Academy Videos:

1. Opposite sides of a parallelogram proof
2. Opposite angles of a parallelogram proof

Homework: Parallelogram characteristics and problems, Quadrilaterals Worksheet

Reading Assignment: section 7-4

Section 7-4: Properties of Special Parallelograms

SOL: G.9

Objective:

Use properties of special parallelograms
Use properties of diagonals of special parallelograms
Use coordinate geometry to identify special types of parallelograms

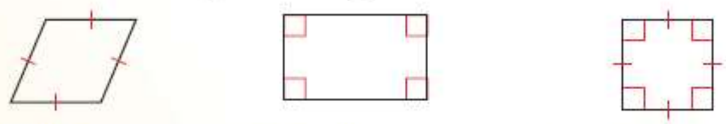
Vocabulary:

Rectangle – a parallelogram with four right angles
Rhombus – a parallelogram with four congruent sides
Square – a parallelogram with four congruent sides and four right angles

Core Concept:

Core Concept

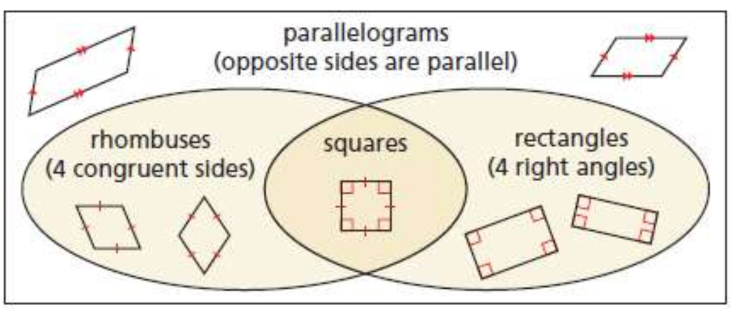
Rhombuses, Rectangles, and Squares



A **rhombus** is a parallelogram with four congruent sides.

A **rectangle** is a parallelogram with four right angles.

A **square** is a parallelogram with four congruent sides and four right angles.



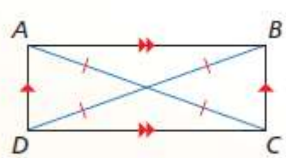
Theorem

Theorem 7.13 Rectangle Diagonals Theorem

A parallelogram is a rectangle if and only if its diagonals are congruent.

$\square ABCD$ is a rectangle if and only if $\overline{AC} \cong \overline{BD}$.

Proof Exs. 85 and 86, p. 358



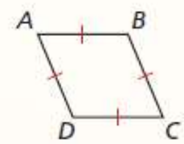
Corollaries

Corollary 7.2 Rhombus Corollary

A quadrilateral is a rhombus if and only if it has four congruent sides.

ABCD is a rhombus if and only if $\overline{AB} \cong \overline{BC} \cong \overline{CD} \cong \overline{AD}$.

Proof Ex. 79, p. 358

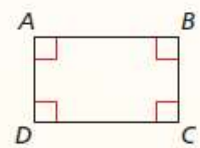


Corollary 7.3 Rectangle Corollary

A quadrilateral is a rectangle if and only if it has four right angles.

ABCD is a rectangle if and only if $\angle A$, $\angle B$, $\angle C$, and $\angle D$ are right angles.

Proof Ex. 80, p. 358

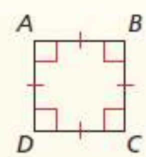


Corollary 7.4 Square Corollary

A quadrilateral is a square if and only if it is a rhombus and a rectangle.

ABCD is a square if and only if $\overline{AB} \cong \overline{BC} \cong \overline{CD} \cong \overline{AD}$ and $\angle A$, $\angle B$, $\angle C$, and $\angle D$ are right angles.

Proof Ex. 81, p. 358



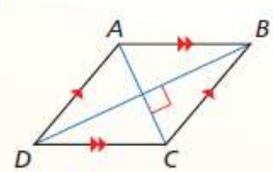
Theorems

Theorem 7.11 Rhombus Diagonals Theorem

A parallelogram is a rhombus if and only if its diagonals are perpendicular.

$\square ABCD$ is a rhombus if and only if $\overline{AC} \perp \overline{BD}$.

Proof p. 352; Ex. 72, p. 357

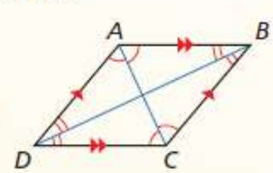


Theorem 7.12 Rhombus Opposite Angles Theorem

A parallelogram is a rhombus if and only if each diagonal bisects a pair of opposite angles.

$\square ABCD$ is a rhombus if and only if $\overline{AC}$ bisects $\angle BCD$ and $\angle BAD$, and $\overline{BD}$ bisects $\angle ABC$ and $\angle ADC$.

Proof Exs. 73 and 74, p. 357



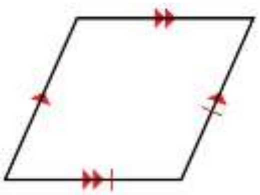
Examples:

Example 1:

For any rectangle *ABCD*, decide whether the statement is always or sometimes true. Explain your reasoning.

a. $AB = BC$

b. $AB = CD$

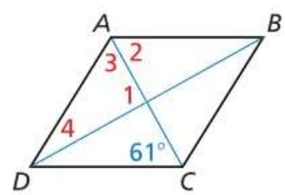


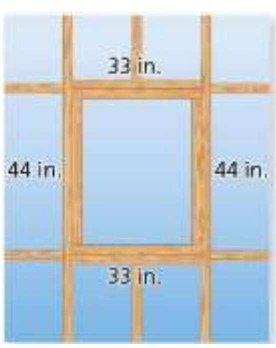
Example 2:

Classify the special quadrilateral. Explain your reasoning.

Example 3:

Find the $m\angle ABC$ and $m\angle ACB$ in the rhombus *ABCD*



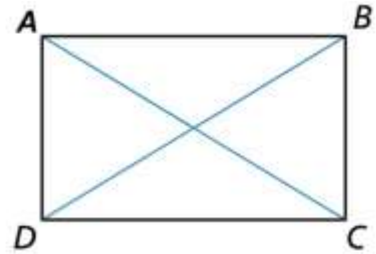


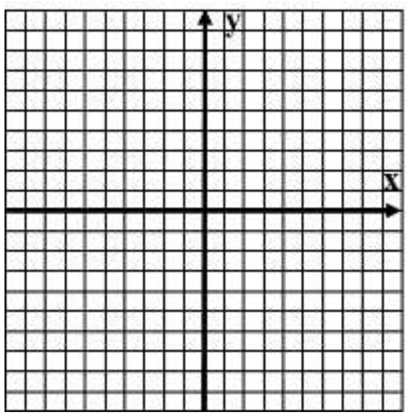
Example 4:

Suppose you measure one angle of the window opening and its measure is 90°. Can you conclude that the shape of the opening is a rectangle? Explain.

Example 5:

In rectangle *ABCD*, *AC* = 7*x* – 15 and *BD* = 2*x* + 25. Find the lengths of the diagonals of *ABCD*.





Example 6:

Decide whether quadrilateral *ABCD* with vertices *A*(-2,3), *B*(2,2), *C*(1,-2), and *D*(-3,-1) is a *rectangle*, a *rhombus*, or a *square*. Give all names that apply.

Concept Summary:

- Rectangle: A parallelogram with four right angles and congruent diagonals
  - Opposite sides parallel and congruent
  - All angles equal 90°
  - Diagonals congruent and bisect each other
  - Diagonals break figure into two separate congruent isosceles triangles
- Rhombus: A parallelogram with four congruent sides, diagonals that are perpendicular bisectors to each other and angle bisectors of corner angles
  - Opposite sides parallel; all sides congruent
  - Opposite angles congruent; consecutive angles supplementary
  - Diagonals perpendicular, bisect each other and bisect opposite angles
  - Diagonals break figure into 4 congruent triangles
- Square: All rectangle and a rhombus characteristics
  - Opposite sides parallel; all sides congruent
  - All angles equal 90°
  - Diagonals perpendicular, bisect each other and bisect opposite angles
  - Diagonals break figure into 4 congruent triangles

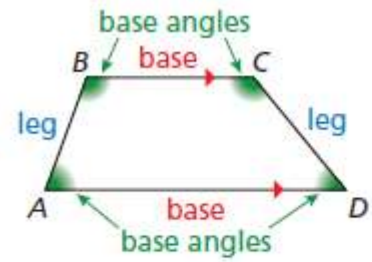
Khan Academy Videos: none relate

Homework: Characteristics and problems, Quadrilaterals Worksheet

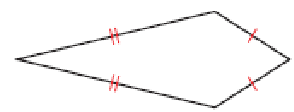
Reading Assignment: section 7-5

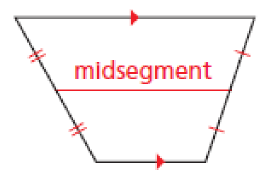
Chapter 7: Quadrilaterals and Other Polygons

Section 7-5: Properties of Trapezoids and Kites



Isosceles trapezoid





SOL: G.9

Objective:

Use properties of trapezoids
Use the Trapezoid Midsegment Theorem to find distance
Use properties of kites
Identify quadrilaterals

Vocabulary:

Bases – parallel sides of a trapezoid
Base angles – consecutive angles whose common side is the base of the trapezoid
Isosceles trapezoid – legs of the trapezoid are congruent
Kite – a quadrilateral that has two pairs of consecutive congruent sides, but opposite sides are not congruent
Legs – nonparallel sides of the trapezoid
Midsegment of a trapezoid – segment that connects the legs of the trapezoid; parallel to the bases
Trapezoid – a quadrilateral with exactly one pair of parallel sides

Core Concept:

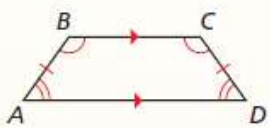
Theorems

Theorem 7.14 Isosceles Trapezoid Base Angles Theorem

If a trapezoid is isosceles, then each pair of base angles is congruent.

If trapezoid $ABCD$ is isosceles, then $\angle A \cong \angle D$ and $\angle B \cong \angle C$.

Proof Ex. 39, p. 367

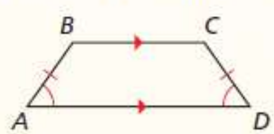


Theorem 7.15 Isosceles Trapezoid Base Angles Converse

If a trapezoid has a pair of congruent base angles, then it is an isosceles trapezoid.

If $\angle A \cong \angle D$ (or if $\angle B \cong \angle C$), then trapezoid $ABCD$ is isosceles.

Proof Ex. 40, p. 367

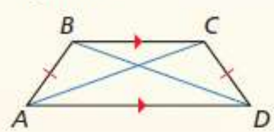


Theorem 7.16 Isosceles Trapezoid Diagonals Theorem

A trapezoid is isosceles if and only if its diagonals are congruent.

Trapezoid $ABCD$ is isosceles if and only if $\overline{AC} \cong \overline{BD}$.

Proof Ex. 51, p. 368

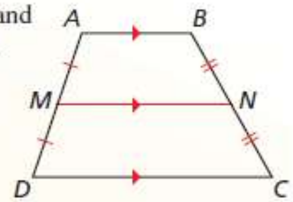


Theorem

Theorem 7.17 Trapezoid Midsegment Theorem

The midsegment of a trapezoid is parallel to each base, and its length is one-half the sum of the lengths of the bases.

If $\overline{MN}$ is the midsegment of trapezoid $ABCD$, then $\overline{MN} \parallel \overline{AB}$, $\overline{MN} \parallel \overline{DC}$, and $MN = \frac{1}{2}(AB + CD)$.



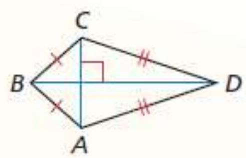
Proof Ex. 49, p. 368

Theorems

Theorem 7.18 Kite Diagonals Theorem

If a quadrilateral is a kite, then its diagonals are perpendicular.

If quadrilateral $ABCD$ is a kite, then $\overline{AC} \perp \overline{BD}$.

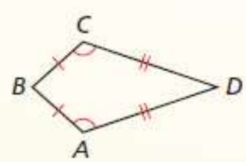


Proof p. 363

Theorem 7.19 Kite Opposite Angles Theorem

If a quadrilateral is a kite, then exactly one pair of opposite angles are congruent.

If quadrilateral $ABCD$ is a kite and $\overline{BC} \cong \overline{BA}$, then $\angle A \cong \angle C$ and $\angle B \ncong \angle D$.

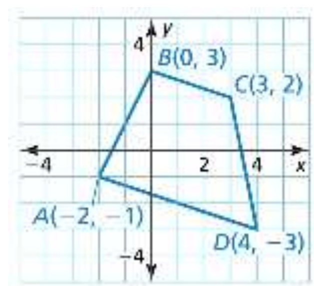


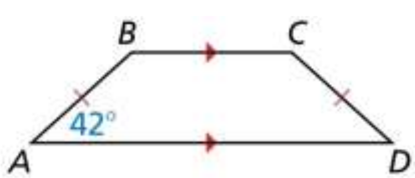
Proof Ex. 47, p. 368

Examples:

Example 1:

Show that *ABCD* is a trapezoid and decide whether it is isosceles.



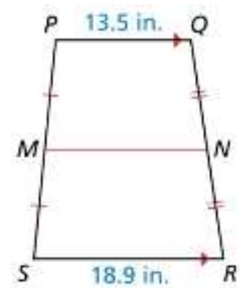


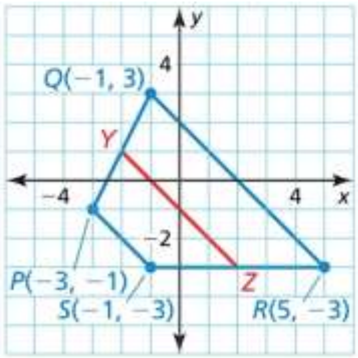
Example 2:

ABCD is an isosceles trapezoid, and $m\angle A = 42°$. Find $m\angle B$, $m\angle C$, and $m\angle D$.

Example 3:

In the diagram, $\overline{MN}$ is the midsegment of trapezoid *PQRS*. Find *MN*.



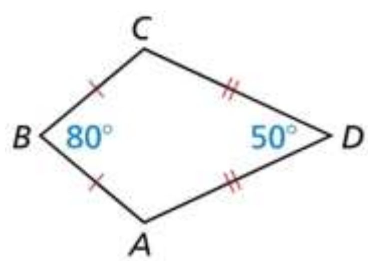


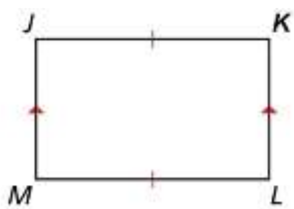
Example 4:

Find the length of midsegment $\overline{YZ}$ in trapezoid *PQRS*

Example 5:

Find $m\angle C$ in the kite shown.



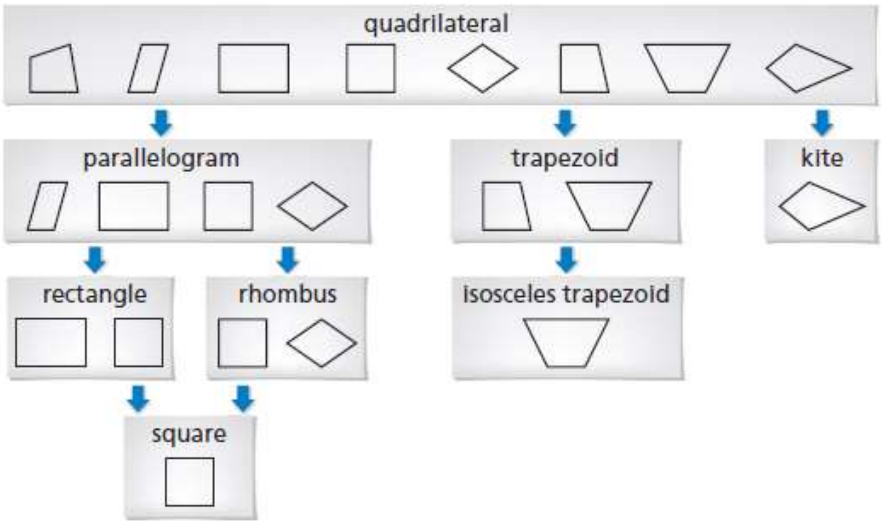


Example 6:

What is the most specific name for quadrilateral *JKLM*?

Chapter 7: Quadrilaterals and Other Polygons

Concept Summary:



- In an isosceles trapezoid, both pairs of base angles are congruent and the diagonals are congruent.
- The median of a trapezoid is parallel to the bases and its measure is one-half the sum of the measures of the bases
- Kites have diagonals perpendicular and "arm" angles congruent

Khan Academy Videos:

1. Kites as a geometric shape

Homework: Quadrilateral Worksheet

Reading Assignment: section 7-6

Chapter 7: Quadrilaterals and Other Polygons

Section 7-6: Tessellations

SOL: G.10

Objectives:

Determine whether a shape tessellates
Find angle measures in tessellations of polygons
Determine whether a regular polygon tessellates a plane

Vocabulary:

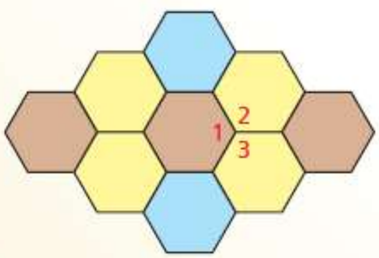
Regular tessellation – a transformation that enlarges or reduces an image
Tessellation – the covering of a plane with figures so that there are no gaps or overlaps

Key Concept:

Core Concept

Angle Measures in a Tessellation of Polygons

The sum of the angle measures around a point of intersection in a tessellation of polygons is 360°.



$m\angle 1 + m\angle 2 + m\angle 3 = 360°$

Core Concept

Regular Tessellations

A regular polygon tessellates a plane if the measure of an interior angle of the polygon is a factor of 360.

Examples:

Example 1:

Determine whether each shape tessellates.

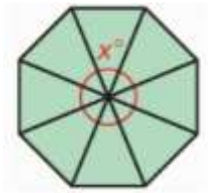
a. Rhombus

b. Crescent

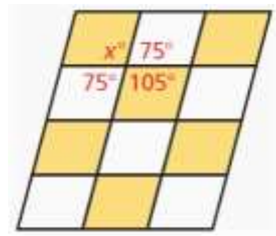
Example 2:

Find x in each tessellation.

a.



b.



Example 3:

Determine whether each polygon tessellates

a. Equilateral triangle

b. Regular 13-sided polygon

c. Regular 14-sided polygon

Concept Summary:

- A tessellation is a repetitious pattern that covers a plane without *overlaps* or *gaps*
- Only 3 regular polygons tessellate the plane
  - Triangle (Equilateral)
  - Quadrilateral (Square)
  - Hexagon
- Other irregular polygons can tessellate: rectangles, right isosceles triangle

Khan Academy Videos: none relate

Homework: Chapter Quiz Review

Reading Assignment: read section 7-R

Chapter 7: Quadrilaterals and Other Polygons

Section 7-R: Chapter Review

SOL: G.10

Objectives:

Review chapter material

Vocabulary: none new

Key Concept:

Angles in convex polygons:

- Interior angle + exterior angle = 180°
  - They are a Linear Pair
- Sum of Interior angles, S = (n-2) × 180°
- One Interior angle = S / n = (n-2) × 180°/n
- Sum of Exterior angles = 360°
- Number of sides, n = 360° / Exterior angle

Quadrilaterals: Sides, Angles and Diagonals

- Parallelograms:
  - Opposite sides parallel and congruent
  - Opposite angles congruent
  - Consecutive angles supplementary
  - Diagonals bisect each other
  - Rectangles:
    - Angles all 90°
    - Diagonals congruent
  - Rhombi:
    - All sides congruent
    - Diagonals perpendicular
    - Diagonals bisect opposite angles
    - Diagonals divide into 4 congruent triangles
  - Squares: Rectangle and Rhombi characteristics
- Trapezoids:
  - Bases Parallel
  - Legs are not Parallel
  - Leg angles are supplementary
  - Median is parallel to bases
    Median = ½ (base + base)
  - Isosceles Trapezoid:
    - Legs are congruent
    - Base angle pairs congruent
    - Diagonals are congruent

- Kites:
  - 2 congruent sides (consecutive)
  - Diagonals perpendicular
  - Diagonals bisect opposite angles
  - One diagonal bisected
  - One pair of opposite angles congruent ("arm" angles)

Homework: SOL Gateway

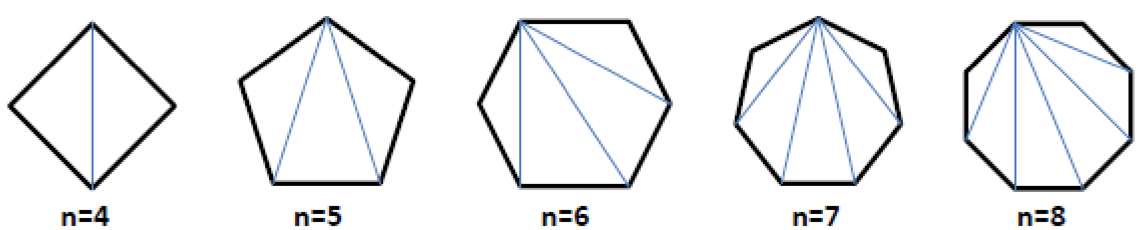
Reading Assignment: none

Interior and Exterior always make a linear pair (adds to 180°)

Interior angle + Exterior angle = 180
Exterior angle = 180 – interior angle

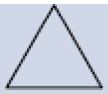
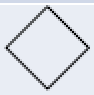
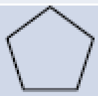
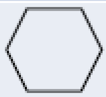
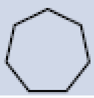
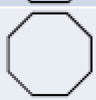
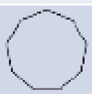
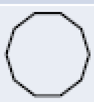
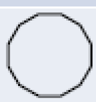
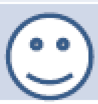
To find number of sides: 360 divided by exterior angle
n = 360 / Ext ∠

Sometimes use Int + Ext = 180 to find Ext angle



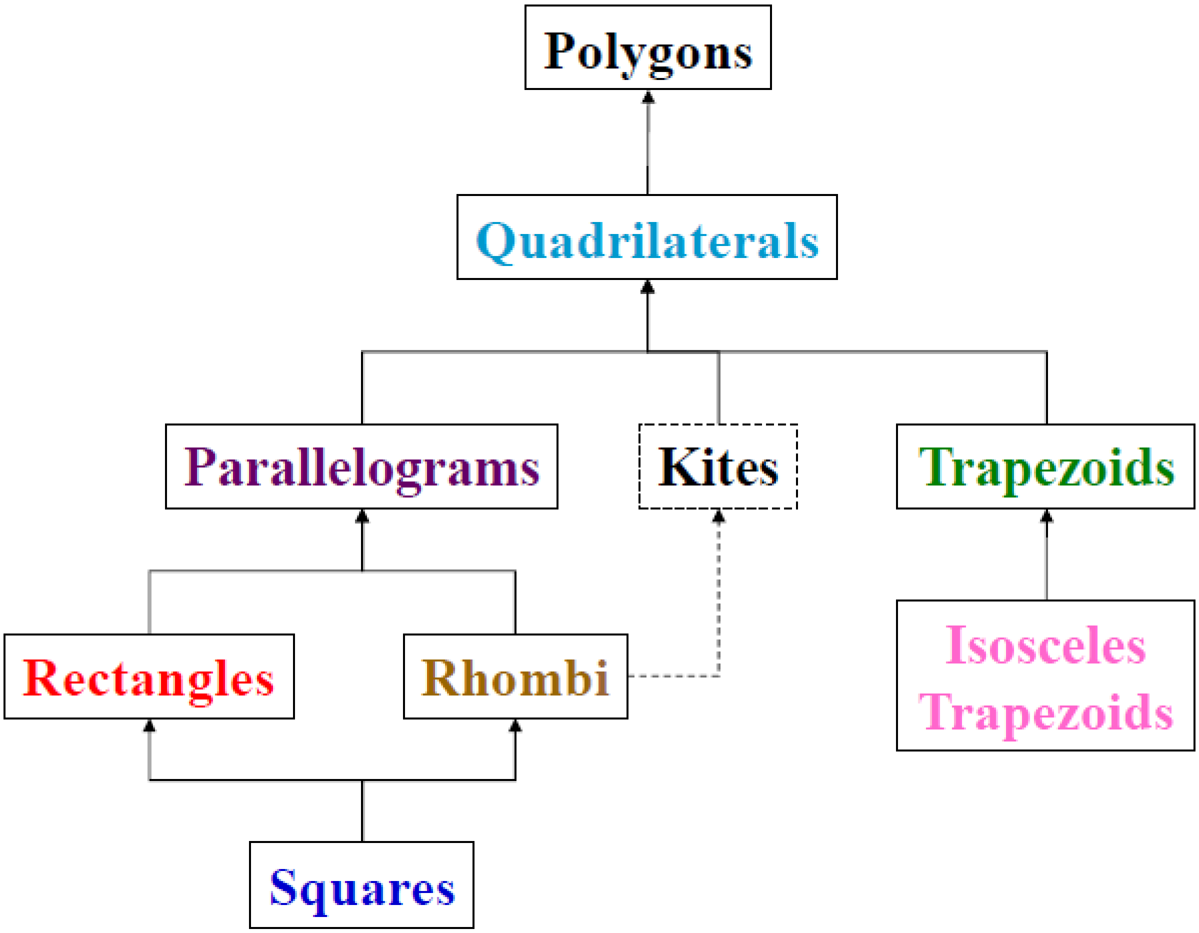
Sides	3	4	5	6	7	8
Triangles	1	2	3	4	5	6
Sum of Interior Angles = (n – 2) x 180						

Angles with Polygons

Name	Pic	Nr Sides	Int Sum	Ext Sum	One Int	One Ext
Triangle		3	180	360	60	120
Quadrilateral		4	360	360	90	90
Pentagon		5	540	360	108	72
Hexagon		6	720	360	120	60
Heptagon		7	900	360	128.57	51.43
Octagon		8	1080	360	135	35
Nonagon		9	1260	360	140	40
Decagon		10	1440	360	144	36
Eleven-gon		11	1620	360	147.27	32.72
Dodecagon		12	1800	360	150	30
N-gon		n	(n-2)×180	360	180-Ext	360/n

Exterior angles always <u>sum</u> to 360 (once around a circle).

Polygon Hierarchy



Polygons are closed figures
with line segments as sides
Exterior Angles add to 360

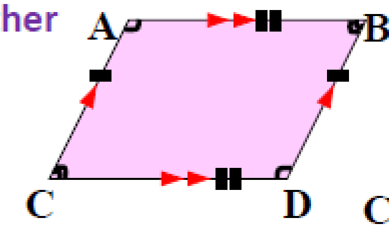
Quadrilaterals are 4-sided figures
Interior Angles add to 360

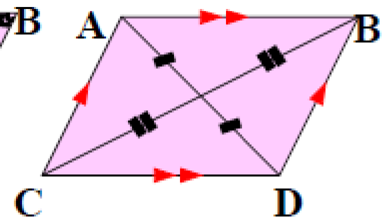
Parallelogram:

Sides: Opposite sides parallel and congruent

Angles: Opposite angles congruent
Consecutive angles supplementary

Diagonals: Bisect each other



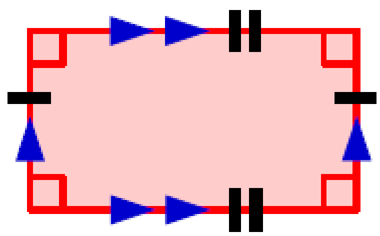


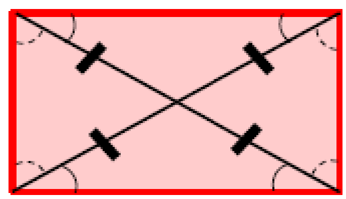
Rectangle:

Sides: Opposite sides parallel and congruent

Angles: Opposite angles congruent
Consecutive angles supplementary
Corner angles = 90°

Diagonals: Bisect each other
Congruent



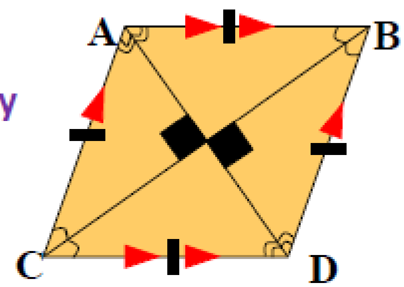


Rhombus

Sides: Opposite sides parallel and congruent
All four sides equal

Angles: Opposite angles congruent
Consecutive angles supplementary

Diagonals: Bisect each other
Bisect opposite angles
Perpendicular to each other
Divides into 4 congruent triangles

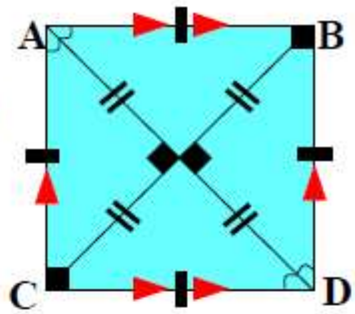


Square:

Sides: Opposite sides parallel and congruent
All four sides equal

Angles: Opposite angles congruent
Consecutive angles supplementary
Corner angles = 90°

Diagonals: Bisect each other
Congruent
Bisect opposite angles
Perpendicular to each other
Divides into 4 congruent triangles



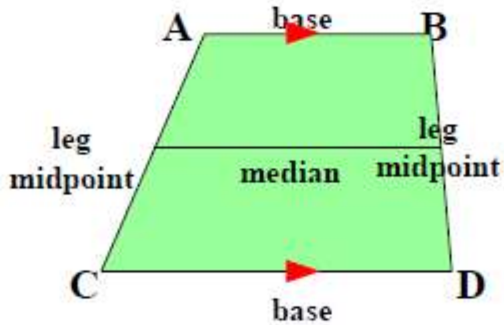
Trapezoid

Sides: Bases are parallel
Legs are not parallel

Angles: Leg angles supplementary

Diagonals: nothing special

Median: parallel to the bases
connects leg midpoint to other leg midpoint
formula: $Median = \frac{Base1+Base2}{2}$



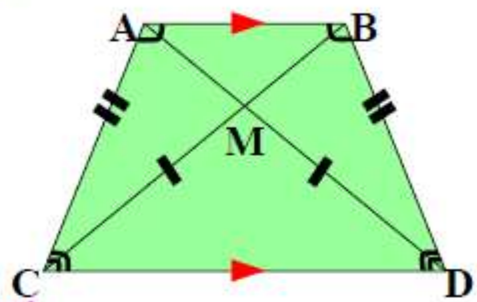
Isosceles Trapezoid

Sides: Bases are parallel
Legs are not parallel
but are congruent

Angles: Leg angles supplementary
Base angle pairs are congruent

Diagonals: congruent

Median: parallel to the bases
connects leg midpoint to other leg midpoint
formula: $Median = \frac{Base1+Base2}{2}$



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