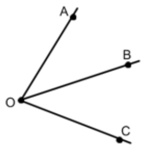
Homework #7 - Due Thursday, 14 January

Ch 7 Review, pp. 292-295 **#1-53**

Test #3 - Thurs, 14 Jan

Emphasis on Ch 7 except Midsegment Theorem, plus review

1. For the angles in the given diagram, write the name of the theorem or property that best describes each expression.



a. AOC=AOB+BOC

Betweenness of Rays Theorem

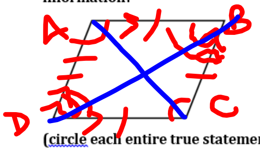
b. AOC > AOB

Whole is Greater than Part

c. OA-OB-OC

Betweenness of Rays definition

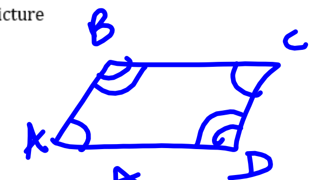
2. **Which of the following are true about parallelogram ABCD without being provided any additional information?**



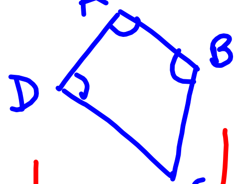
(circle each entire true statement; note that even though the figure above is not labeled, the order of letters "ABCD" matter!)

a. AB=BC
b. AB=CD
c. AD=BC
d. AC=BD
e. AB||BC
f. AB||CD
g. AD||BC
h. AC||BD
i. AB⊥BC
j. AB⊥CD
k. AD⊥BC
l. AC⊥BD
m. AB and BC bisect each other
n. AB and CD bisect each other
o. AD and BC bisect each other
p. AC and BD bisect each other
q. ∠A=∠B
r. ∠A=∠C
s. ∠B=∠C
t. ∠B=∠D
u. ∠A and ∠B are supplementary
v. ∠A and ∠C are supplementary
w. ∠B and ∠C are supplementary
x. ∠B and ∠D are supplementary

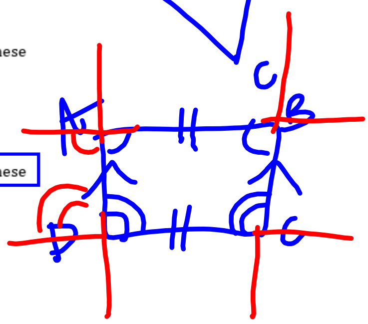
Determine whether each of the quadrilaterals with the given properties can be classified additionally as any special quadrilaterals. Circle each correct answer that can be assumed with only the given information. Drawing a picture may help in many situations.



3. Quadrilateral $ABCD$ with $\angle A = \angle C$ and $\angle B = \angle D$
   a. Trapezoid
   b. Isosceles trapezoid
   c. Parallelogram
   d. Rectangle
   e. Rhombus
   f. Square
   g. None of these



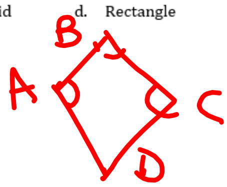
4. Quadrilateral $ABCD$ with $\angle A = \angle B$ and $\angle A = \angle D$
   a. Trapezoid
   b. Isosceles trapezoid
   c. Parallelogram
   d. Rectangle
   e. Rhombus
   f. Square
   g. None of these



5. Quadrilateral $ABCD$ with $\angle A = \angle B,\ \angle C = \angle D, AD \parallel BC, AB = DC$
   a. Trapezoid
   b. Isosceles trapezoid
   c. Parallelogram
   d. Rectangle
   e. Rhombus
   f. Square
   g. None of these

∠'s in a linear pair are equal

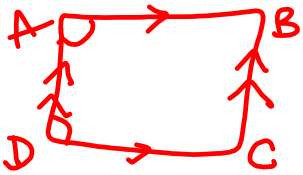
6. Quadrilateral $ABCD$ with $\angle A = \angle B = \angle C$
   a. Trapezoid
   b. Isosceles trapezoid
   c. Parallelogram
   d. Rectangle
   e. Rhombus
   f. Square
   g. None of these



7. Quadrilateral $ABCD$ with $AB \parallel CD, AD \parallel BC$, and $\angle A = \angle D$
   - a. Trapezoid
   - b. Isosceles trapezoid
   - $\boxed{\text{c. Parallelogram}}$
   - $\boxed{\text{d. Rectangle}}$
   - e. Rhombus
   - f. Square
   - g. None of these

interior

equal & supplementary ∠'s on same side of transversal ⇒ 90°

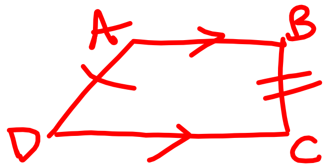


8. Quadrilateral $ABCD$ with $AB \parallel CD$ and $AD \nparallel BC$
   - $\boxed{\text{a. Trapezoid}}$
   - b. Isosceles trapezoid
   - c. Parallelogram
   - d. Rectangle
   - e. Rhombus
   - f. Square
   - g. None of these

def.

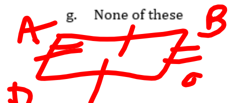
9. Quadrilateral $ABCD$ with $AB \parallel CD$ and $AB = CD$
   - a. Trapezoid
   - b. Isosceles trapezoid
   - $\boxed{\text{c. Parallelogram}}$
   - d. Rectangle
   - e. Rhombus
   - f. Square
   - g. None of these

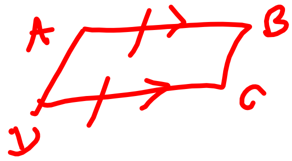
thm.



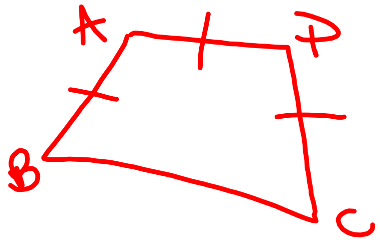
10. Quadrilateral $ABCD$ with $AB = CD$ and $AD = BC$
   - a. Trapezoid
   - b. Isosceles trapezoid
   - $\boxed{\text{c. Parallelogram}}$
   - d. Rectangle
   - e. Rhombus
   - f. Square
   - g. None of these

thm.



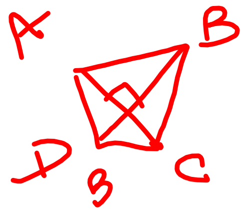


11. Quadrilateral $ABCD$ with $AB = CD = AD$
   - a. Trapezoid
   - b. Isosceles trapezoid
   - c. Parallelogram
   - d. Rectangle
   - e. Rhombus
   - f. Square
   - $\boxed{\text{g. None of these}}$



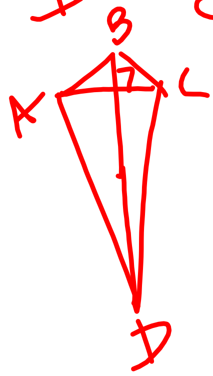
12. Quadrilateral $ABCD$ with $AB = CD = AD = BC$
   - a. Trapezoid
   - b. Isosceles trapezoid
   - c. Parallelogram
   - d. Rectangle
   - $\boxed{\text{e. Rhombus}}$
   - f. Square
   - g. None of these

def.



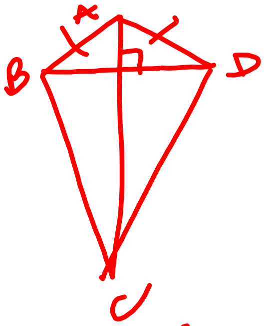
13. Quadrilateral $ABCD$ with $AC = BD$
   - a. Trapezoid
   - b. Isosceles trapezoid
   - c. Parallelogram
   - d. Rectangle
   - e. Rhombus
   - f. Square
   - $\boxed{\text{g. None of these}}$

14. Quadrilateral $ABCD$ with $AC \perp BD$
   - a. Trapezoid
   - b. Isosceles trapezoid
   - c. Parallelogram
   - d. Rectangle
   - e. Rhombus
   - f. Square
   - $\boxed{\text{g. None of these}}$

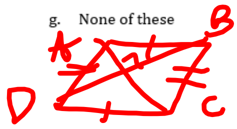


15. Quadrilateral $ABCD$ with $AC = BD$ and $AC \perp BD$
   - a. Trapezoid
   - b. Isosceles trapezoid
   - c. Parallelogram
   - d. Rectangle
   - e. Rhombus
   - f. Square
   - $\boxed{\text{g. None of these}}$

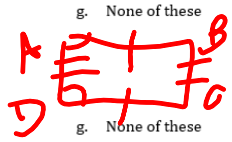
16. Quadrilateral $ABCD$ with $AC \perp BD$ and $AB = AD$
    a. Trapezoid c. Parallelogram e. Rhombus g. None of these
    b. Isosceles trapezoid d. Rectangle f. Square



17. Quadrilateral $ABCD$ with $AC \perp BD, AB = CD,$ and $AD = BC$
    a. Trapezoid c. Parallelogram e. Rhombus g. None of these
    b. Isosceles trapezoid d. Rectangle f. Square

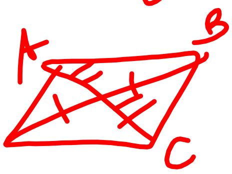


18. Quadrilateral $ABCD$ with $AB = CD, AD = BC,$ and $\angle A = \angle D$
    a. Trapezoid c. Parallelogram e. Rhombus g. None of these
    b. Isosceles trapezoid d. Rectangle f. Square

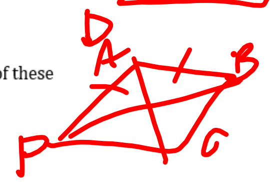


19. Quadrilateral $ABCD$ with AC bisecting BD
    a. Trapezoid c. Parallelogram e. Rhombus g. None of these
    b. Isosceles trapezoid d. Rectangle f. Square

tkm



20. Quadrilateral $ABCD$ with AC bisecting BD and $AB = AD$
    a. Trapezoid c. Parallelogram e. Rhombus g. None of these
    b. Isosceles trapezoid d. Rectangle f. Square



Theorem 17: Equal corresponding angles mean that lines are parallel.
Corollary 1: Equal alternate interior angles mean that lines are parallel.
Corollary 2: Supplementary interior angles on the same side of a transversal mean that lines are parallel.
Corollary 3: In a plane, two lines perpendicular to a third line are parallel.

The Parallel Postulate – Through a point not on a line, there is exactly one line parallel to the given line.
Theorem 18: In a plane, two lines parallel to a third line are parallel to each other.

Theorem 19: Parallel lines form equal corresponding angles.
Corollary 1: Parallel lines form equal alternate interior angles.
Corollary 2: Parallel lines form supplementary interior angles on the same side of a transversal.
Corollary 3: In a plane, a line perpendicular to one of two parallel lines is also perpendicular to the other.

Theorem 20: The Triangle Sum Theorem – The sum of the angles of a triangle is 180°.
Corollary 1: If two angles of one triangle are equal to two angles of another triangle, the third angles are equal.
Corollary 2: The acute angles of a right triangle are complementary.
Corollary 3: Each angle of an equilateral triangle is 60°.

Theorem 21: An exterior angle of a triangle is equal to the sum of the remote interior angles.

Theorem 22: The AAS Theorem – If two angles and the side opposite one of them in one triangle are equal to the corresponding parts of another triangle, the triangles are congruent.

Theorem 23: The HL Theorem – If the hypotenuse and a leg of one right triangle are equal to the corresponding parts of another right triangle, the triangles are congruent.

SSS, SAS, AAS, ASA, HL

Def: A diagonal of a polygon is a line segment that connects any two nonconsecutive vertices.

Theorem 24: The sum of the angles of a quadrilateral is 360° .

Def: A rectangle is a quadrilateral each of whose angles is a right angle.

Corollary to Theorem 24: A quadrilateral is equiangular iff it is a rectangle.

In general, if a polygon has n sides, in terms of n,

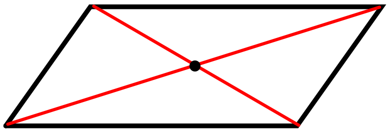
- n-3 diagonals can be drawn from one vertex
- these diagonals form n-2 triangles
- the sum of the angles of an n-gon is (n-2)*180°
- If the n-gon is equiangular, each angle measures (n-2)*180°/n

Def: A parallelogram is a quadrilateral whose opposite sides are parallel.

A figure has point symmetry if it looks exactly the same when it is rotated about a point.

Def: Two points are symmetric with respect to a point iff it is the midpoint of the line segment joining them.

Parallelograms have point symmetry about the point in which their diagonals intersect.



Theorem 25: The opposite sides and angles of a parallelogram are equal.
Theorem 26: The diagonals of a parallelogram bisect each other.
Theorem 27: A quadrilateral is a parallelogram, if its opposite sides are equal.
Theorem 28: A quadrilateral is a parallelogram if its opposite angles are equal.
Theorem 29: A quadrilateral is a parallelogram if two opposite sides are both parallel and equal.

Theorem 30: A quadrilateral is a parallelogram if its diagonals bisect each other.

7.4 – Rectangles, Rhombuses, and Squares

Def: A square is a quadrilateral all of whose sides and angles are equal.

Every square is a rhombus.

Def: A rhombus is a quadrilateral all of whose sides are equal.

Theorem 31: All rectangles are parallelograms.

Theorem 32: All rhombuses are parallelograms.

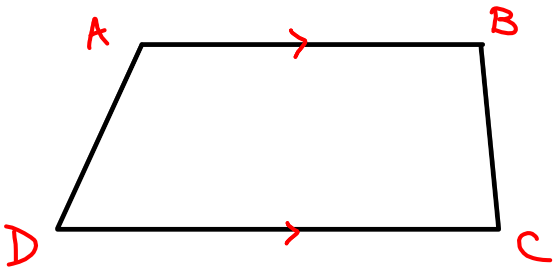
Theorem 33: The diagonals of a rectangle are equal.

Theorem 34: The diagonals of a rhombus are perpendicular.

7.5 – Trapezoids

Def: A trapezoid is a quadrilateral that has exactly one pair of parallel sides.

The parallel sides are called the bases of the trapezoid, and the non-parallel sides are called its legs. The pairs of angles that include each base are called base angles.



In this trapezoid:

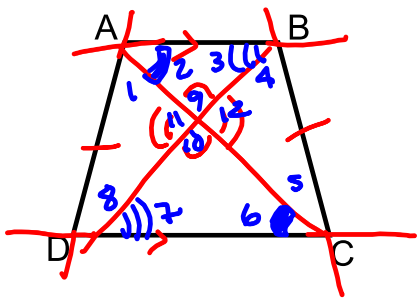
Sides AB and DC are bases.

Sides AD and BC are legs.

Angles A and B are one pair of base angles.

Angles D and C are another pair of base angles.

Def: An isosceles trapezoid is a trapezoid whose legs are equal.



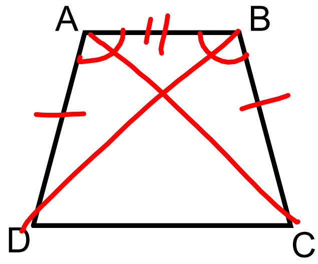
Theorem 35: The base angles of an isosceles trapezoid are equal.
Given: ABCD is an isosceles trapezoid with bases AB and DC.
Prove: ∠A=∠B and ∠D=∠C

Proof:

Given

1. AB ∥ CD — def. of trapezoid
2. AD = BC — def. of isosceles trapezoid
3. ∠A+∠B+∠C+∠D = 360° — Quadrilateral sum theorem
4. ∠A+∠D = 180°, ∠B+∠C = 180° — Interior ∠'s on same side of transversal are supplementary
5. ∠A+∠D = ∠B+∠C — Substitution

Theorem 36 : The diagonals of an isosceles trapezoid are equal.
Given: ABCD is an isosceles trapezoid with bases AB and DC.
Prove: DB=CA.

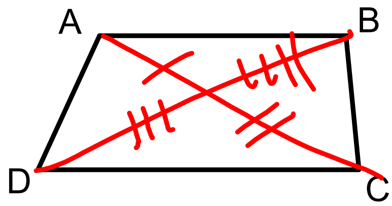


Proof

1. ABCD is isosceles △ w/ bases AB & DC	Given
2. Draw AC & BD	2 points define a line
3. AD = BC	def. of isosceles trapezoid
4. ∠A = ∠B	base ∠'s of an isosceles trapezoid are equal
5. AB = AB	reflexive
6. △DBA ≅ △CAB	SAS congruence
7. DB = CA	corresponding parts of congruent △'s are equal

If a quadrilateral is a trapezoid, then its diagonals cannot bisect each other.

Given: ABCD is a trapezoid
Prove: AC and DB do not bisect each other.



Proof

Suppose AC & DB bisect each other.

ABCD is a parallelogram. thm.

AB ∥ DC & AD ∥ BC def

contradicts ABCD is a trapezoid

Hence, our assumption is false & AC & BD can not bisect each other