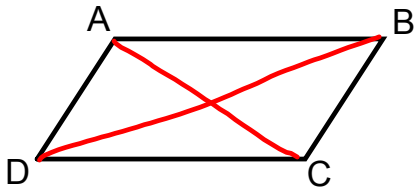
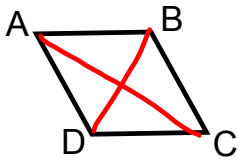
Review

Given a quadrilateral ABCD, if we know that it is a parallelogram, name four other things that we know about it.



1. AB ∥ DC & AD ∥ BC (opposite sides are parallel)
2. AC & BD bisect each other (diagonals bisect each other)
3. ∠A = ∠C & ∠B = ∠D (opposite angles are equal)
4. AB = DC & AD = BC (opposite sides are equal)

Given a quadrilateral ABCD, if we know that it is a rhombus, name three other things that we know about it.

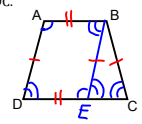


1. All sides are equal AB = BC = CD = DA
2. ABCD is a parallelogram
3. diagonals AC ⊥ BD

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.
Def: A parallelogram is a quadrilateral whose opposite sides are parallel.
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.
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.
Def: A regular polygon is one that is equilateral and equiangular.
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.
Def: An isosceles trapezoid is a trapezoid whose legs are equal.
Theorem 35: The base angles of an isosceles trapezoid are equal.

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

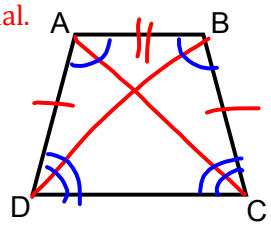
Theorem 35: The base angles of an isosceles trapezoid are equal.
Given: ABCD is an isosceles trapezoid with bases AB and DC.
Prove: ∠A=∠B and ∠D=∠C



Proof

Statements	Reasons
1. ABCD is an isosceles trapezoid w/ bases AB and DC	Given
2. AD = BC	Legs of an isosceles trapezoid are equal
3. AB ∥ DC	Bases of a trapezoid are parallel
4. Draw BE so that AD ∥ BE	Parallel Postulate
5. ABED is a parallelogram	quadrilateral w/ both pairs of opposite sides parallel is a parallelogram
6. ∠A=∠BED & ∠D=∠ABE	opposite ∠s of a parallelogram are equal
7. AD=BE & AB=DE	opposite sides of a parallelogram are equal
8. ∠D & ∠DEB are supplementary	parallel lines form supplementary ∠s on same side of the transversal
9. ∠D=∠BEC	parallel lines form equal corresponding ∠'s
10. ∠C=∠BEC	if 2 sides of a triangle are equal the angles opposite them are equal
11. ∠D=∠C	Substitution (#9 & 10)
12. ∠EBC+∠C+∠BEC=180°	triangle sum theorem
13. ∠ABC=∠ABE+∠EBC	Betweenness of Rays Theorem
14. ∠ABE=∠BEC=∠C	Substitution (#10 & 9) & #10)
15. ∠EBC+2∠ABE=180°	Substitution (#12 & 14)
16. ∠A & ∠ABE are supplementary	parallel lines form supplementary ∠'s on same sided transversal
17. ∠A+∠ABE=180°	supplementary ∠s sum to 180°
18. ∠EBC+2∠ABE=∠A+∠ABE	Substitution (#15 & 17)
19. ∠EBC+∠ABE=∠A	Subtraction
20. ∠A=∠ABC	Substitution (#13 & 19)

Theorem 36: The diagonals of an isosceles trapezoid are equal.



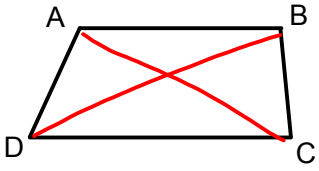
Given: ABCD is an isosceles trapezoid with bases AB and DC.
Prove: DB=CA.

Proof:

Statements	Reasons
1. ABCD is an isosc trpz w/ bases AB & DC	Given
2. Draw DB & CA	2 points define a line
3. AD=BC	legs of an isosceles trapezoid are equal
4. ∠DAB=∠ABC & ∠ADC=∠DCB	base pairs of angles are equal in an isosceles trapezoid
5. AB=AB	Reflexive
6. △DAB≅△CBA	SAS congruence
7. AC=BD	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 and DB do bisect each other (indirect proof assumption)

ABCD is a parallelogram — quadrilateral whose diagonals bisect each other is a parallelogram

AB ∥ DC & AD ∥ BC — both pairs of opposite sides of a parallelogram are parallel

This contradicts the assumption that ABCD is a trapezoid

Hence, our original assumption is false, and the diagonals do not in fact bisect each other

[HW #1](#) (submitted Friday, 11/7)
- Ch 1 Review Problems pp. 36-38
- Start working on Geometry badge on Khan Academy

[HW #2](#) (submitted Friday, 11/14)
- Ch 2 Review Problems pp. 71-74
- Ch 3 Review Problems pp. 124-128
- Khan Academy exercises:"Introduction to Euclidean geometry," "Angles and intersecting lines"

[HW #3](#) (submitted Friday, 11/21)
- Ch 4 Review Problems pp.176-180
- Khan Academy exercises:"Congruence"

[HW #4](#) (submitted Friday, 12/5)
- Ch 5 Review Problems pp. 206-209
- Work towardmastery of practiced Khan Academy exercisesin "Introduction to Euclidean Geometry," "Angles and Intersecting Lines," and "Congruence"

[HW #5](#) (submitted Monday, 12/15)
- Ch 6 Review Problems pp. 250-254

[HW #6](#) (due Friday, 01/09)
- Ch 7 Review Problems pp. 292-295
- Khan Academy exercises: **anything that has been recommended by me!**