- Ch 6 Review Problems pp. 250-254 #9-19, 33-53 - DUE FRIDAY 01/13

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.

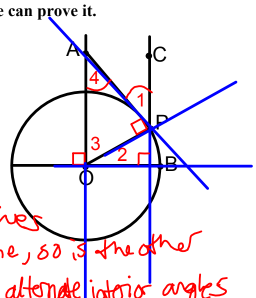
Theorem 20: The Angle Sum Theorem – The sum of the angles of a triangle is 180°.
Corollary 1: If two angles of one triangle are equal to two angles of another triangle, the third angles are equal.
Corollary 2: The acute angles of a right triangle are complementary.
Corollary 3: Each angle of an equilateral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

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

In Peculiar, Missouri, the North Star is always 38° above the horizon. The angle between Peculiar and the equator also is 38°, which isn't really peculiar, because we can prove it.

Given: Line OB represents the equator of planet Earth.
Point P represents Peculiar, Missouri.
Point C represents the North Star.
The angle of elevation of the North Star at P is 1.
The latitude of P is 2.
OA||PC, OA OB, and OP PA.

Prove: 1= 2.

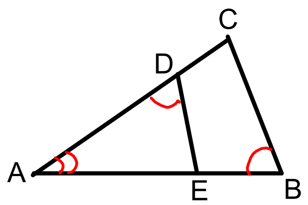


Proof:

1. $OB \perp PC$ — If one of 2 parallel lines is perpendicular to a line, so is the other
2. $\angle 1 = \angle 4$ — parallel lines form equal alternate interior angles
3. $\angle AOB$ is a right $\angle$; $\angle CBO$ & $\angle APO$ are right $\angle$'s — Perpendicular lines form right $\angle$'s
4. $\angle AOB = \angle CBO = \angle APO = 90°$ — right $\angle$'s measure 90° & all are equal
5. $\angle 3 + \angle 4 + \underline{\angle APO} = 180°$ — Triangle Sum Theorem
6. $\angle 3 + \angle 4 + 90° = 180°$ — Substitution (#4 into #5)
7. $\angle 3 + \angle 4 = 90°$ — subtraction
8. $\angle 3 + \angle 1 = 90°$ — Substitution (#2 into #3)
9. $\angle 2 + \angle 3 = \angle AOB$ — Betweenness of Rays Theorem
10. $\angle 2 + \angle 3 = 90°$ — Substitution (#4 into #9)
11. $\angle 2 + \angle 3 = \angle 3 + \angle 1$ — Substitution (#8 into #10)
12. $\angle 2 = \angle 1$ — subtraction

45. *Given:* In ΔABC and ΔADE, ADE= B.

Prove: AED= C.



Proof

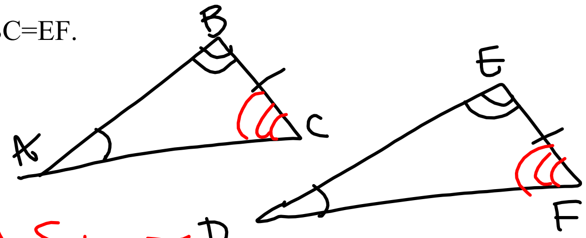
1. $\angle A = \angle A$ — Reflexivity
2. $\angle DEB = \angle ADE + \angle A$ — exterior $\angle$ is equal to the sum of its remote interior angles
3. $\angle DEB = \angle B + \angle A$ — Substitution (Given into #3)
4. $\angle DEB$ & $\angle AED$ are supplementary — angles in a linear pair are supplementary
5. $\angle DEB + \angle AED = 180°$ — Supplementary $\angle$'s sum to 180°
6. $\angle B + \angle A + \angle AED = 180°$ — Substituting #3 into #5
7. $\angle A + \angle B + \angle C = 180°$ — Triangle Sum Theorem
8. $\angle B + \angle A + \angle AED = \angle A + \angle B + \angle C$ — substitution #6 into #7
9. $\angle AED = \angle C$ — Subtraction

6.6 - AAS and HL Congruence

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.

Given: ΔABC and ΔDEF with A= D, B= E, and BC=EF.

Prove: ΔABC ΔDEF



Proof :

1. $\angle A+\angle B+\angle C=180°$
   $\angle D+\angle E+\angle F=180°$ — △ Sum Thm.
2. $\angle A+\angle B+\angle C=\angle D+\angle E+\angle F$ — Substitution (#1)
3. $\angle D+\angle E+\angle C=\angle D+\angle E+\angle F$ — substitution (Given into #2)
4. $\angle C=\angle F$ — Subtraction
5. $\triangle ABC \cong \triangle DEF$ — ASA congruence

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.

Given: ΔABC and ΔDEF are right triangles with right angles C and F; AB=DE and BC=EF.

Prove: ΔABC ΔDEF

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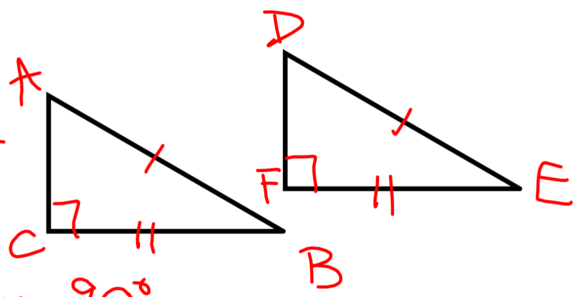
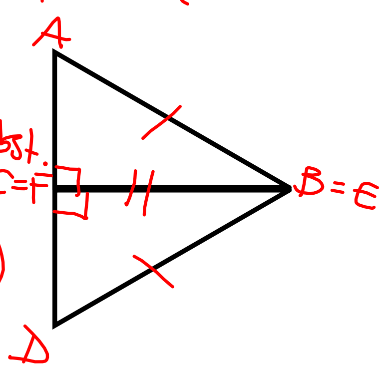


Proof :

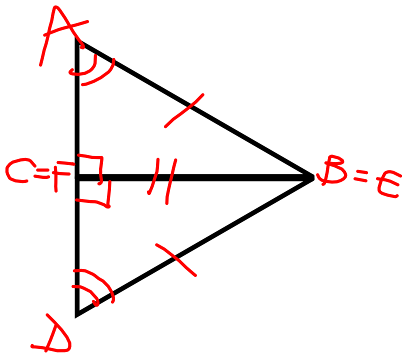
1. $\angle C=\angle F$ — all right ∠'s are =
2. $\angle C=\angle F=90°$ — right ∠'s measure 90°
3. $\angle A+\angle B+\angle C=180°$
   $\angle D+\angle E+\angle F=180°$ — Triangle Sum Theorem
4. $\angle A+\angle B+\angle C=\angle D+\angle E+\angle F$ — subst.
5. $\angle A+\angle B+\angle F=\angle D+\angle E+\angle F$ — Subst. C=F
6. $\angle A+\angle B=\angle D+\angle E$ — subtr. ($\angle F$)



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.

Given: ΔABC and ΔDEF are right triangles with right angles C and F; AB=DE and BC=EF.

Prove: ΔABC ΔDEF



1. ∠ACB & ∠DFE are 90°
2. ∠ACD = ∠ACB + ∠DEF (Betweenness of Rays)
3. ∠ACD = 90° + 90° = 180° (Subst. & simplification)
4. ∠ACD is a straight ∠ by definition
5. ∠A = ∠D angles opposite equal sides in a △ are equal
6. ΔABC ≅ ΔDEF AAS congruence