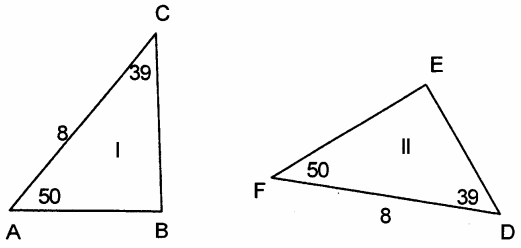
Solutions

Math 61 Spring 2006 Name:

QUIZ #2 @ 30 points

Write in a neat and organized fashion. Use a pencil. Show all work to get credit.

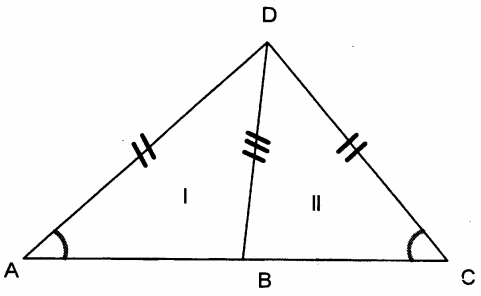
1. a) Write the congruences given by the indicated measures or marks.
   b) State whether from the given congruences only you may conclude that triangles I and II are congruent.
   c) If so, write SSS, ASA, AAS, SAS as appropriate.



a) $\overline{AC} \cong \overline{FD}$
$\angle A \cong \angle F$
$\angle C \cong \angle D$

b) yes: $\triangle BAC \cong \triangle EFD$

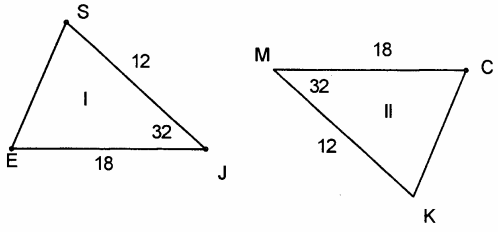
c) ASA



a) $\overline{AD} \cong \overline{DC}$
$\overline{BD} \cong \overline{BD}$
$\angle A \cong \angle C$

b) No

c)



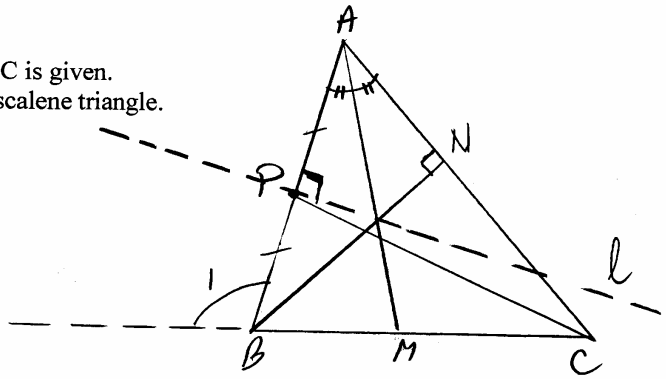
a) $\overline{SJ} \cong \overline{MK}$
$\overline{EJ} \cong \overline{MC}$
$\angle J \cong \angle M$

b) yes $\triangle EJS \cong \triangle CMK$

c) SAS

2. A triangle ABC is given.

a) Draw a scalene triangle.



b) Write three inequalities involving the sides of the triangle.

$AB < BC + CA$

$BC < AC + AB$

$AC < AB + BC$

c) Write an equation involving the angles of the triangle. $m\angle A + m\angle B + m\angle C = 180°$

d) Write an equation relating an exterior angle (mark it on your drawing) to the interior angles of the triangle.

$m\angle 1 = m\angle A + m\angle C$

e) Write one inequality relating the exterior angle to an interior angle of the triangle.

$m\angle 1 > m\angle C$

f) Draw the bisector of angle A, name it $\overline{AM}$, and state, using mathematical notation, that $\overline{AM}$ is the bisector of angle A (what does it mean?).

$\overline{AM}$ bisector $\angle A$, $M \in \overline{BC}$

$\angle BAM \cong \angle CAM$

g) Draw the altitude from vertex B to the opposite side, name it $\overline{BN}$, and state, using mathematical notation, that $\overline{BN}$ is an altitude (what does it mean?).

$\overline{BN} \perp \overline{AC}$, $N \in \overline{AC}$

h) Draw the median from vertex C, name it $\overline{CP}$, and state, using mathematical notation, that $\overline{CP}$ is a median (what does it mean?).

$\overline{CP}$ median, $P \in \overline{AB}$

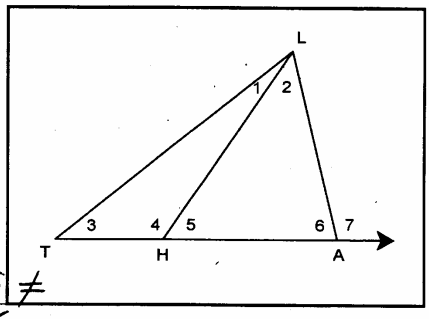
$\overline{AP} \cong \overline{BP}$

i) Draw the perpendicular bisector of side $\overline{AB}$, name it l, and state, using mathematical notation, that l is the perpendicular bisector of $\overline{AB}$ (what does it mean?).

$l \perp \overline{AB}$, $\overline{AP} \cong \overline{BP}$

at P

4. Write the theorem that justifies each statement. Refer to the given figure.



a) $m\angle 7 > m\angle 5$ ext. $\angle$ > nonadj int. $\angle$

b) If $LH < TL$, then $m\angle 3 < m\angle 4$

($\triangle LHT$) if 2 sides $\neq$, opp $\angle$'s $\neq$ same order

c) If $m\angle 6 > m\angle 3$, then $TL > LA$. ($\triangle LTA$) if 2 $\angle$'s $\neq$, opp sides $\neq$ same order

d) $TL < LA + TA$ ($\triangle LTA$) one side < sum other two sides

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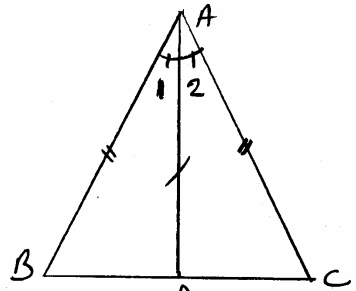
5. Give the formal proof of the following:

Given: $\triangle ABC$ isosceles with vertex A.
$\overline{AD}$ bisector of angle A, $D \in \overline{BC}$
Prove: $\overline{AD}$ is a median.



Statements	Reasons
1. $\triangle ABC$ isosceles, $\angle A$ = vertex	1. given
2. $\overline{AB} \cong \overline{AC}$	2. def. of isosceles $\triangle$ (isos. $\triangle$ iff 2 sides $\cong$)
3. $\overline{AD}$ bisector $\angle A$	3. given
4. $\angle 1 \cong \angle 2$	4. def of bisector of angle
5. $\triangle BAD$, $\triangle CAD$: $\overline{AB} \cong \overline{AC}$, $\overline{AD} \cong \overline{AD}$, $\angle 1 \cong \angle 2$	5. (2), reflexive prop. $\cong$, (4)
6. $\triangle BAD \cong \triangle CAD$	6. SAS
7. $\overline{BD} \cong \overline{CD}$	7. CPCTC
8. $\overline{AD}$ - median	8. def. ~~of~~ median

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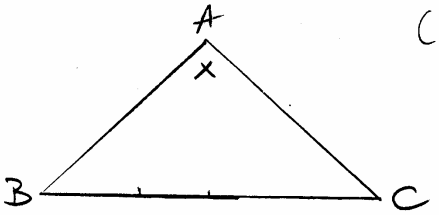
6. In an isosceles triangle ABC with vertex A, each base angle is 72 degrees smaller than the vertex angle. Find the measure of each angle.



Let $m\angle A = x$

then $m\angle B = m\angle C = x - 72$

(in an isosceles $\triangle$, the base $\angle$'s are congruent)

$m\angle A + m\angle B + m\angle C = 180$

$x + x - 72 + x - 72 = 180$

$3x - 144 = 180$

$3x = 324$

$x = 108$

then $x - 72 = 36$

Therefore,
$m\angle A = 108^\circ$
$m\angle B = m\angle C = 36^\circ$