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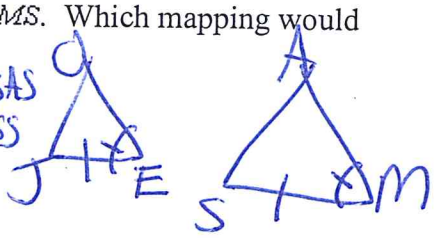
Date _____
Geometry

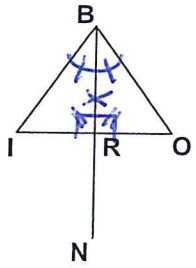
# *Triangle Proofs Review Sheet*

1. Triangles *JOE* and *SAM* are drawn such that $\angle E \cong \angle M$ and $\overline{EJ} \cong \overline{MS}$. Which mapping would *not* always lead to $\triangle JOE \cong \triangle SAM$?

1) $\angle J$ maps onto $\angle S$ ASA
2) $\angle O$ maps onto $\angle A$ AAS
3) $\overline{EO}$ maps onto $\overline{MA}$ SAS
4) $\overline{JO}$ maps onto $\overline{SA}$ ASS

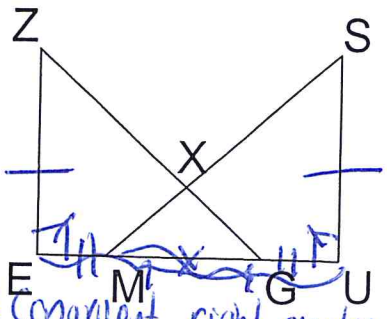



2. Given: $\overline{NB}$ bisects $\angle$IBO, $\overline{BR}$ is an altitude
Prove: $\angle$BIO $\cong$ $\angle$BOI




| Statements | Reasons |
|---|---|
| (1) $\overline{NB}$ bisects $\angle IBO$ | (1) given |
| (2) $\angle IBR \cong \angle OBR$ | (2) An angle bisector creates two congruent angles |
| (3) $\overline{BR}$ is an altitude | (3) given |
| (4) $\angle BRI \cong \angle BRO$ | (4) An altitude creates two congruent right angles |
| (5) $\overline{BR} \cong \overline{BR}$ | (5) Reflexive Property |
| (6) $\triangle BRI \cong \triangle BRO$ | (6) ASA |
| (7) $\angle BIO \cong \angle BOI$ | (7) CPCTC |

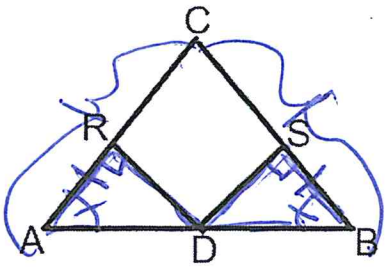
3. Given: $\overline{ZE} \perp \overline{EU}$, $\overline{SU} \perp \overline{EU}$, $\overline{ZE} \cong \overline{SU}$, $\overline{EM} \cong \overline{GU}$
Prove: $\angle Z \cong \angle S$




| statements | Reasons |
|---|---|
| (1) $\overline{ZE} \perp \overline{EU}$, $\overline{SU} \perp \overline{EU}$ | (1) given |
| (2) $\angle ZEM \cong \angle SUG$ | (2) Perpendicular lines create congruent right angles |
| (3) $\overline{ZE} \cong \overline{SU}$ | (3) given |
| (4) $\overline{EM} \cong \overline{GU}$ | (4) given |
| (5) $\overline{MG} \cong \overline{MG}$ | (5) Reflexive Property |
| (6) $\overline{EG} \cong \overline{MU}$ | (6) Addition Property |
| (7) $\triangle ZEG \cong \triangle SUM$ | (7) SAS |
| (8) $\angle Z \cong \angle S$ | (8) CPCTC |

4. Given: In $\triangle ABC$, $\overline{CA} \cong \overline{CB}$, $\overline{AR} \cong \overline{BS}$, $\overline{DR} \perp \overline{AC}$, and $\overline{DS} \perp \overline{BC}$

Prove: $\overline{DR} \cong \overline{DS}$




| Statements | Reasons |
|---|---|
| 1) $\overline{CA} \cong \overline{CB}$ | 1) given |
| 2) $\angle RAD \cong \angle SBD$ | 2) Isosceles Triangle Theorem |
| 3) $\overline{AR} \cong \overline{BS}$ | 3) given |
| 4) $\overline{DR} \perp \overline{AC}$, $\overline{DS} \perp \overline{BC}$ | 4) given |
| 5) $\angle DRA \cong \angle DSB$ | 5) Perpendicular lines create congruent right angles |
| 6) $\triangle ARD \cong \triangle BSD$ | 6) ASA |
| 7) $\overline{DR} \cong \overline{DS}$ | 7) CPCTC |

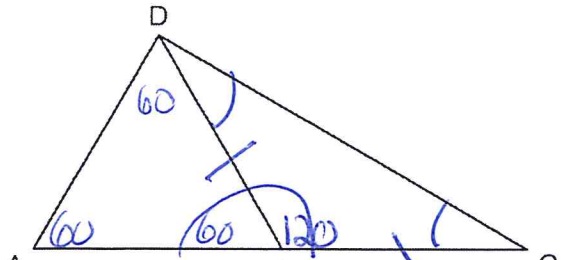
**Spiral Review**

**Complex Triangle Problems:**

1) The three angles of a triangle add to equal 180°. Look for triangles.
2) Linear pairs add to 180°. Look for linear pairs.
3) Isosceles triangle has congruent angles opposite congruent sides (given congruent sides).
4) Equilateral triangle has angles 60, 60, 60 (given equilateral triangle).
5) An angle bisector cuts an angle into two congruent halves (given bisected angles).
6) Use parallel lines cut by a transversal (extend and follow the transversal, fill in 8 angles.)

5. In the diagram below of $\triangle ACD$, $B$ is a point on $\overline{AC}$ such that $\triangle ADB$ is an equilateral triangle, and $\triangle DBC$ is an isosceles triangle with $\overline{DB} \cong \overline{BC}$. Find $m\angle C$.

60, 60, 60




180
−60
120

$\triangle DBC$

$x + x + 120 = 180$

$2x + 120 = 180$

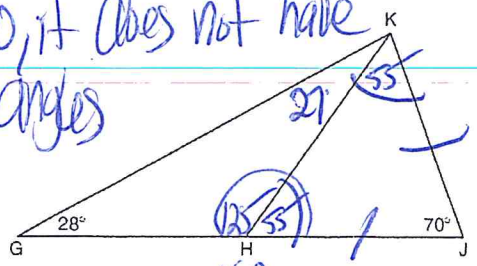
$-120 \quad -120$

$\frac{2x}{2} = \frac{60}{2}$

$x = 30$

6. In the diagram below of $\triangle GJK$, $H$ is a point on $\overline{GJ}$ such that $\overline{HJ} \cong \overline{JK}$, $m\angle G = 28$, and $m\angle GJK = 70$. Determine whether $\triangle GHK$ is an isosceles triangle and justify your answer.

No, it does not have 2 ≅ angles




180
−55
125

$\triangle HJK$

$x + x + 70 = 180$

$2x + 70 = 180$

$-70 \quad -70$

$\frac{2x}{2} = \frac{110}{2}$

$x = 55$

$\triangle GHK$

$125 + 28 + x = 180$

$153 + x = 180$

$-153 \quad -153$

$x = 27$

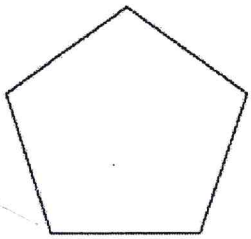
**Rotating Regular Polygons onto Themselves**

1) The minimum rotation is $\frac{360}{n}$.
2) Any multiple of that will also map the regular polygon onto itself!

7. The regular polygon below is rotated about its center.
Which angle of rotation will carry the figure onto itself?

1) 60°
2) 108°
3) 216° 72(3)
4) 540°

$\frac{360}{5}=72$



8. Which of the following rotations would not map an equilateral triangle onto itself?

(1) 120° ✓
(2) 240° 120(2) ✓
(3) 180° ✗
(4) 480° 120(4) ✓

$\frac{360}{3}=120$

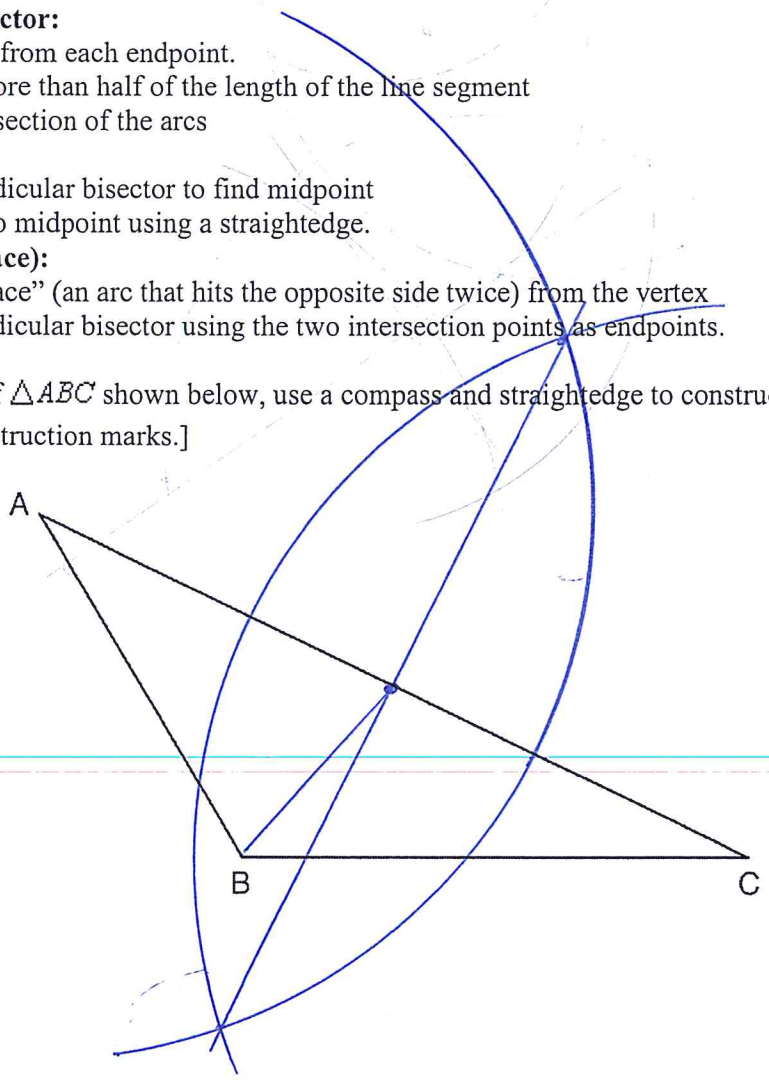
**Constructions**

**Perpendicular Bisector:**
1) Swing equal arcs from each endpoint.
*The arc must be more than half of the length of the line segment
2) Connect the intersection of the arcs

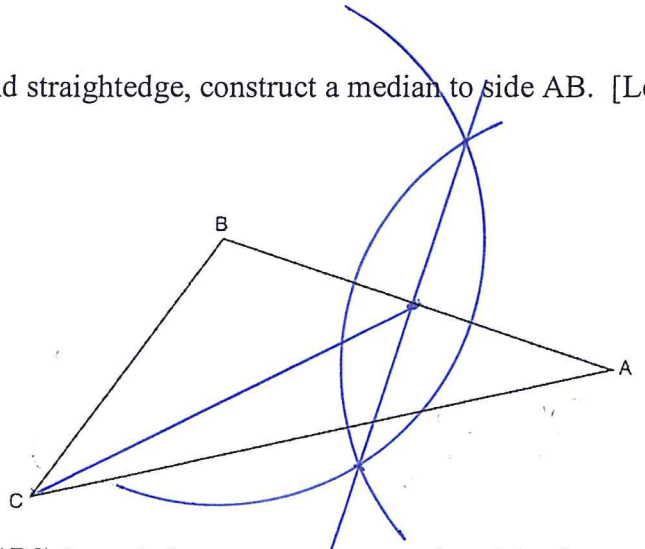
**Median:**
1) Construct perpendicular bisector to find midpoint
2) Connect vertex to midpoint using a straightedge.

**Altitude (Smiley Face):**
1) Draw a "smiley face" (an arc that hits the opposite side twice) from the vertex
2) Construct perpendicular bisector using the two intersection points as endpoints.

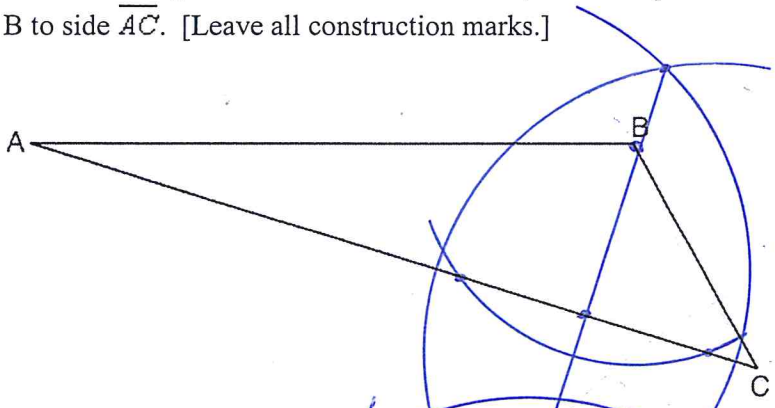
9. On the diagram of $\triangle ABC$ shown below, use a compass and straightedge to construct a median to side $\overline{AC}$. [Leave all construction marks.]



10. Using a compass and straightedge, construct a median to side AB. [Leave all construction marks.]




11. On the diagram of $\triangle ABC$ shown below, use a compass and straightedge to construct an altitude from B to side $\overline{AC}$. [Leave all construction marks.]




12. Using a compass and straightedge, construct an altitude from A to side BC. [Leave all construction marks.]