Warm-up

Triangle *PQR* has angles in the ratio of 2: 3: 5. What type of Triangle is it?

Q

$3x$

$2x$ $5x$ R

P

$= 180$
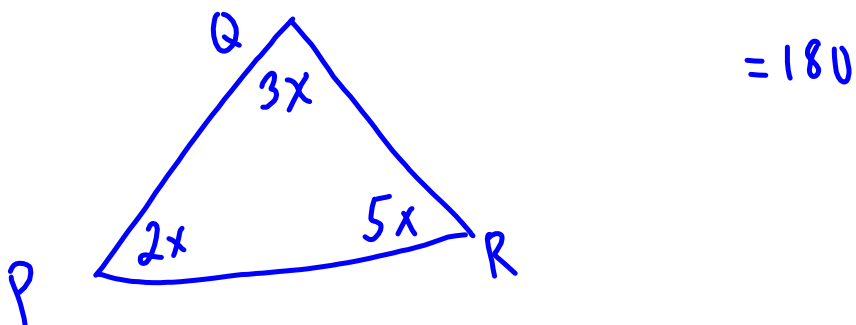
Name _____

Geometry HW: Intro Geo Proofs – 6 Multiplication and Division Postulates

For each problem, *use the definitions and postulates we have covered* to **state a valid conclusion** for each set of givens and **give a reason** for your conclusion. Good conclusions should *use all the information in the givens*. The reason should be either a brief statement of the definition used or the name of the postulate used. For problems #1 - 5, use the figure below. Treat each problem as *separate* (the givens for one problem do *not* apply to the following problems). You *may* assume $\overline{BTR}$, $\overline{BGS}$, and $\overline{RAS}$ for all eight problems.

1.   **Given:** $\overline{AB}$ **bisects** ∠**RBS.**

      Conclusion/Reason: _____

2.   **Given:** $\overline{RA} \cong \overline{AS}$.

      Conclusion/Reason: _____

3.   **Given: ∠BAT ≅ ∠BAG,**

      ∠RAT ≅ ∠SAG

      Conclusion/Reason: _____
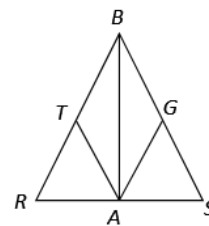
4.   **Given:** $\overline{BR} \cong \overline{BS}$

      Conclusion/Reason: _____

5.   **Given:** $\overline{BR} \cong \overline{BS}$,

      $\overline{TR} \cong \overline{GS}$.

      Conclusion/Reason: _____

The following are simple "statement-reason" geometry proofs. For each one, fill in the missing reasons with appropriate definitions or postulates.

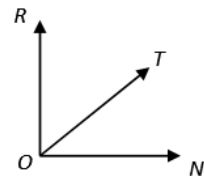6.   **Given:** $\angle A$ is supplementary to $\angle Z$

           $\angle B$ is supplementary to $\angle Z$

Prove: $\angle A \cong \angle B$

| **Statement**	**Reason**
1. $\angle A$ is supplementary to $\angle Z$ $\angle B$ is supplementary to $\angle Z$	1. Given
2. $m\angle A + m\angle Z = 180$	2. _____
3. $m\angle B + m\angle Z = 180$	3. (same as #2)
4. $m\angle A + m\angle Z = m\angle B + m\angle Z$	4. _____
5. $m\angle Z = \quad m\angle Z$	5. _____
6. $m\angle A = m\angle B$ or $\angle A \cong \angle B$	6. _____

7.   **Given:** $\overline{OR} \perp \overline{ON}$

Prove: $\angle ROT$ **is complementary to** $\angle NOT$

Statement	**Reason**
1. $\overline{OR} \perp \overline{ON}$	1. Given
2. $\angle NOR$ is a right angle	2. _____
3. $m\angle RON = 90$	3. _____
4. $m\angle RON = m\angle ROT + m\angle NOT$	4. _____
5. $m\angle ROT + m\angle NOT = 90$	5. _____
6. $\angle ROT$ is complementary to $\angle NOT$	6. _____

3

90

8. In the diagram at right, $\overline{AOD}$, and $\overline{OC} \perp \overline{BOE}$,
    $m\angle DOC = x^2 + 15$ and $m\angle AOB = 20x - 81$.

    $6x^2 + 15$
    51
    $20x - 81$ $x^2 + 15$
    39
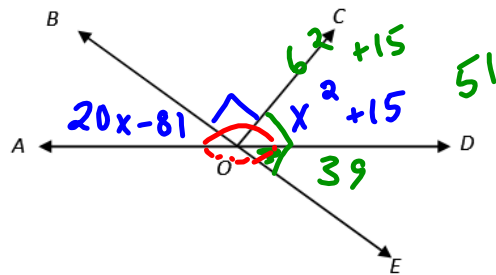
    a.   Find $m\angle BOC$. 90

    b.   Find the value of x.

$$x^2 + 15 + 20x - 81 + 90 = 180$$

$$x^2 + 20x + 24 = 180$$
$$-180 \quad -180$$

$$x^2 + 20x - 156 = 0$$

$$(x + 26)(x - 6)$$

$$x = -26 \quad \boxed{x = 6}$$
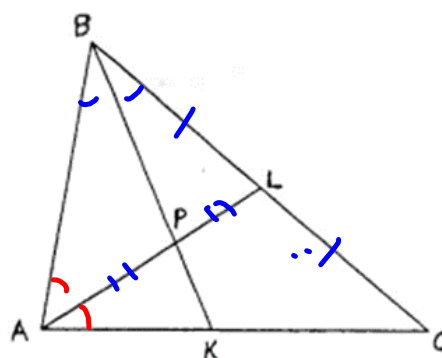
    c.   Find $m\angle DOE$.
         $90 - 51 = 39$

    d.   Find $m\angle AOE$.
         $180 - 39 = 141$

For the accompanying figure, state the pair of segments or angles that are congruent based on the following premises:

1.   Given: $\overline{AL}$ bisects $\overline{BC}$.

             Conclusion: $\overline{BL}$ ≅ $\overline{LC}$

2.   Given: $\overline{BK}$ bisects $\angle ABC$.

             Conclusion: $\angle ABK$ ≅ $\angle KBC$

3.   Given: $\overline{BK}$ bisects $\overline{AL}$.

             Conclusion: $\overline{AP}$ ≅ $\overline{PL}$

4.   Given: $\overline{AL}$ bisects $\angle CAB$.

             Conclusion: $\angle BAL$ ≅ $\angle CAL$

Making Conclusions: For each piece of given information make a valid conclusion based on the following diagram.
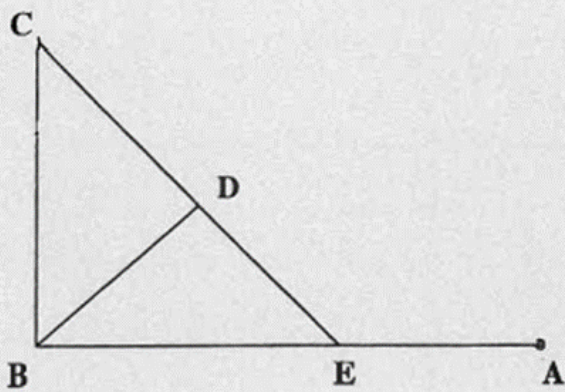
1. $\overline{BD}$ bisects $\angle CBE$

2. E is the midpoint of $\overline{BA}$

3. $\overline{BD}$ is an altitude of $\triangle CBE$

4. $\overline{BD} \cong \overline{ED}$

Name:_____   Date:_____

Geometry Notes Intro to Geo Proofs - 7: Statement-Reason Proofs

Proofs

A formal geometry proof is a series of *statements* in logical order. Each statement is justified by a *reason*.

Statements

1. Should start with one or more givens
2. Are facts/true that are relevant to the problem
3. Should follow a logical order

   Each new statement should either   *- Green sheet*
   a. Be a direct conclusion from one or more previous statements or
   b. Go together with one or more previous statements to lead to a conclusion
4. The final statement is whatever was to be proved.

Reasons

1. Should explain why the statement is true, often buy referring to previous statements
2. Acceptable reasons are
   a. Given (but only if the statement really was given!)
   b. Definitions: **write them out**.
   c. Postulates: by name for the few that have a name; otherwise **write them out**.
   d. Previously proven theorems: **write them out.**

Ex: **Given:** $\angle KJM \cong \angle NJL$
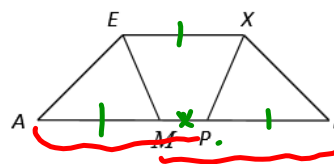
   Prove: $\angle KJL \cong \angle MJN$
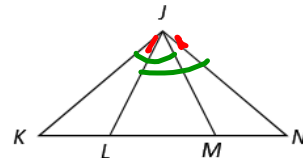
1. Mark the givens on the diagram. (See what you know.)

2. Work backwards. (Find out what you need to prove.)

3. Try to have a *plan*. (Figure out how to get from what you know to where you need to go.)

4. Write the proof.

S	R
1) $\angle KJM \cong \angle NJL$	1) given
2) $\angle LJM \cong \angle LJM$	2) Reflexive
3) $\angle KJL \cong \angle MJN$	3) Subtraction

Ex: Given: $\overline{AMPL}$, $\overline{AM} \cong \overline{EX}$, $\overline{EX} \cong \overline{PL}$

Prove: $\overline{AP} \cong \overline{ML}$

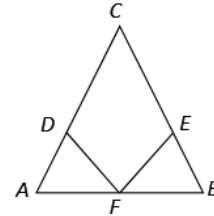| Statements	Reasons
1) $\overline{AM} \cong \overline{EX}$, $\overline{EX} \cong \overline{PL}$	1) given
2) $\overline{AM} \cong \overline{PL}$	2) Transitive
3) $\overline{MP} \cong \overline{MP}$	3) Reflexive
4) $\overline{AP} \cong \overline{ML}$	4) Addition

Name _____

Geometry HW: Intro Geo Proofs – 7 Statement and Reason Proofs

1. Fill in appropriate reasons in the proof below.

   Given: $\angle AFE \cong \angle BFD$.

   Prove: $\angle AFD \cong \angle BFE$

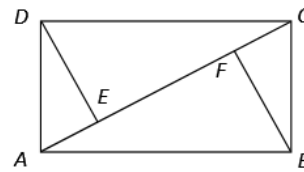| **Statement**	**Reason**
1. $\angle AFE \cong \angle BFD$	1. _____
2. $\angle DFE \cong \angle DFE$	2. _____
3. $\angle AFE - \angle DFE \cong \angle BFD - \angle DFE$	3. _____
or $\angle AFD \cong \angle BFE$	

2. ***Write a complete "statement-reason" proof .***

   Given: $\overline{AEFC}$, $\overline{AE} \cong \overline{CF}$.

   Prove: $\overline{AF} \cong \overline{EC}$

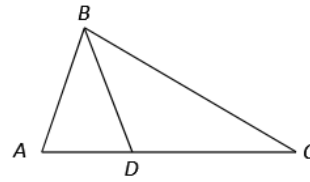| **Statement**	**Reason**
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

3. Fill in appropriate reasons in the proof below.

Given: $\overline{BD}$ is an angle bisector of $\triangle ABC$, $\angle DBC \cong \angle DCB$

Prove: $\angle DBA \cong \angle DCB$

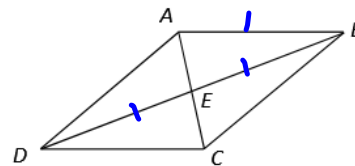| Statement	Reason
1. $\overline{BD}$ is an angle bisector of $\triangle ABC$	1. Given
2. $\angle DBA \cong \angle DBC$	2. _____
3. $\angle DBC \cong \angle DCB$	3. Given
4. $\angle DBA \cong \angle DCB$	4. _____

4. **Write a complete "statement-reason" proof .**

Given: E is the midpoint of $\overline{BD}$, $\overline{DE} \cong \overline{AB}$

Prove: $\triangle ABE$ is isosceles

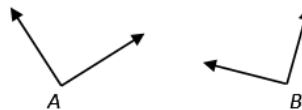| Statement	Reason
1) E is midpt of $\overline{BD}$ $\overline{DE} \cong \overline{AB}$	1) given
2) $\overline{DE} \cong \overline{EB}$	2) A midpt cuts a segment into 2 ≅ segments
3) $\overline{AB} \cong \overline{EB}$	3) Transitive
4) $\triangle ABE$ is isosceles	4) An isosceles $\triangle$ has 2 ≅ sides

5. **Given:** ∠A is a right angle; ∠B is a right angle

A   B

   a. Write a brief explanation of why ∠A ≅ ∠B. Your explanation should refer to at least one postulate.

_____

_____

_____

_____

_____

   b. *Think.* Does the *logic* of your proof only work for the two right angles A and B shown above or will it work for other right angles? Are there right angles for which the logic would *not* apply?

     You have (hopefully) proven the following simple but very important and useful *theorem*:

   Theorem: All right angles are congruent.
                              Memorize.

   Abbreviation: All rt. ∠s are ≅.