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
       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:  ∠KJM ≅ ∠NJL**

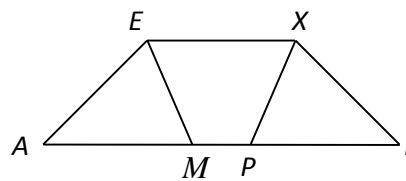   **Prove:  ∠KJL ≅ ∠MJN**
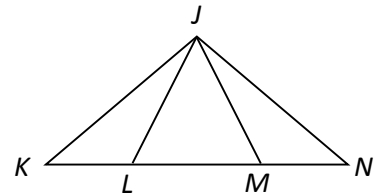


1.  Mark the givens on the diagram.  (See what you know.)

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.

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

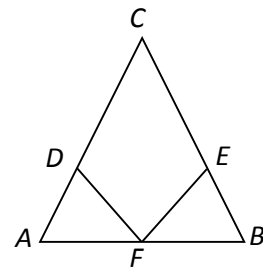Prove: $\overline{AP} \cong \overline{ML}$

**Name** _____

1.  Fill in appropriate reasons in the proof below.

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

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

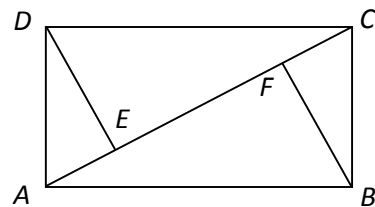| Statement | Reason |
|---|---|
| 1.    $\angle AFE \cong \angle BFD$ | 1. _____ |
| 2.    $\angle DFE \cong \angle DFE$ | 2. _____ |
| 3. $\angle AFE - \angle DFE \cong \angle BFD - \angle DFE$ | 3. _____ |
|      or $\angle AFD \cong \angle BFE$ | |

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

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

    **Prove:** $\overline{AF} \cong \overline{EC}$
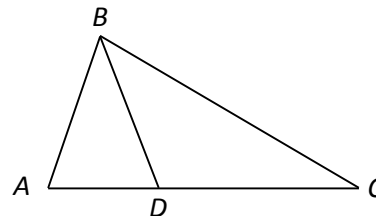
| Statement | Reason |
|---|---|
| | |
| | |
| | |
| | |

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:** $\angle DBA \cong \angle DCB$

B

A          D          C

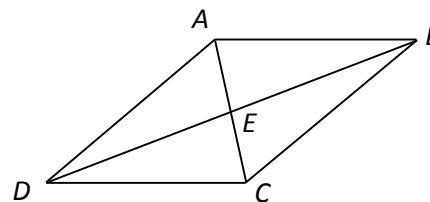| Statement | Reason |
|---|---|
| 1. $\overline{BD}$ is an angle bisector of $\triangle ABC$ | 1. _____ |
| 2. $\angle DBA \cong \angle DBC$ | 2. _____ |
| 3. $\angle DBC \cong \angle DCB$ | 3. _____ |
| 4. $\angle DBA \cong \angle DCB$ | 4. _____ |

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

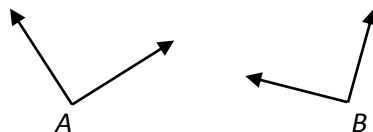**Given:** *E* is the midpoint of $\overline{BD}$, $\overline{DE} \cong \overline{AB}$

**Prove:** $\triangle ABE$ is isosceles

A          B

E

D          C

| Statement | Reason |
|---|---|
| | |
| | |
| | |
| | |

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

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 ≅.**