

Geometric and Paragraph Proofs

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Two Column Proof

Property	Segments	Angles
Reflexive	$AB = AB$	$m\angle 1 = m\angle 1$
Symmetric	If $AB = CD$, then $CD = AB$.	If $m\angle 1 = m\angle 2$, then $m\angle 2 = m\angle 1$.
Transitive	If $AB = CD$ and $CD = EF$, then $AB = EF$.	If $m\angle 1 = m\angle 2$ and $m\angle 2 = m\angle 3$, then $m\angle 1 = m\angle 3$.

Goals:

You will use properties of equality to write geometric proofs.

You will write paragraph proofs.

MP 1, 3

Example 1: Write the property that justifies the following statement:

If $5AB = 5CD$, then $AB = CD$ *division property*

Example 2: A starfish has 5 arms. If the length of arm 1 is 22cm, and arm 1 is congruent to arm 2, and arm 2 is congruent to arm 3, prove that arm 3 has the length 22cm.



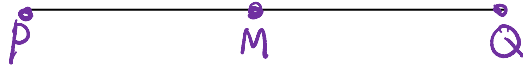
Statements	Reasons
$m \text{ arm } 1 = 22$ $\text{arm } 1 \cong \text{arm } 2$ $\text{arm } 2 \cong \text{arm } 3$	given
$m \text{ arm } 1 = m \text{ arm } 2$ $m \text{ arm } 2 = m \text{ arm } 3$	def of \cong
$m \text{ arm } 1 = m \text{ arm } 3$	transitive prop
$22 = m \text{ arm } 3$	subst.
$m \text{ arm } 3 = 22$	Symm

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 $m \text{ arm } 1 = 22$ ,  $\text{arm } 1 \cong \text{arm } 2$ , and  $\text{arm } 2 \cong \text{arm } 3$  because it was given. By the definition of  $\cong$   $m \text{ arm } 1 = m \text{ arm } 2$  and  $m \text{ arm } 2 = m \text{ arm } 3$ .  $m \text{ arm } 1 = m \text{ arm } 3$  because of the transitive property,  $22 = m \text{ arm } 3$  because of the Substitution prop and  $m \text{ arm } 3 = 22$  because of the symmetric prop.

Midpt thm

**Example 2:** Given: M is the midpoint of  $\overline{PQ}$

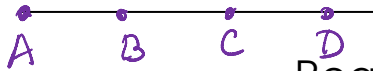
Prove:  $\overline{PM} \cong \overline{MQ}$



| Statements                          | Reasons        |
|-------------------------------------|----------------|
| M is midpt of $\overline{PQ}$       | given          |
| $PM = MQ$                           | def of midpt   |
| $\overline{PM} \cong \overline{MQ}$ | def of $\cong$ |

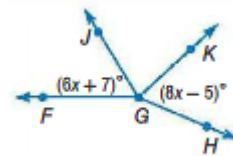
**Example 3:** Given: B is the midpoint of  $\overline{AC}$ , C is the midpoint of  $\overline{BD}$

Prove:  $AB = CD$



| Statements                    | Reasons      |
|-------------------------------|--------------|
| B is midpt of $\overline{AC}$ | given        |
| C is midpt of $\overline{BD}$ |              |
| $AB = BC$                     | def of midpt |
| $BC = CD$                     |              |
| $AB = CD$                     | transitive   |

4. If  $m\angle FGJ = m\angle HGK$ , prove  $x = 6$ .



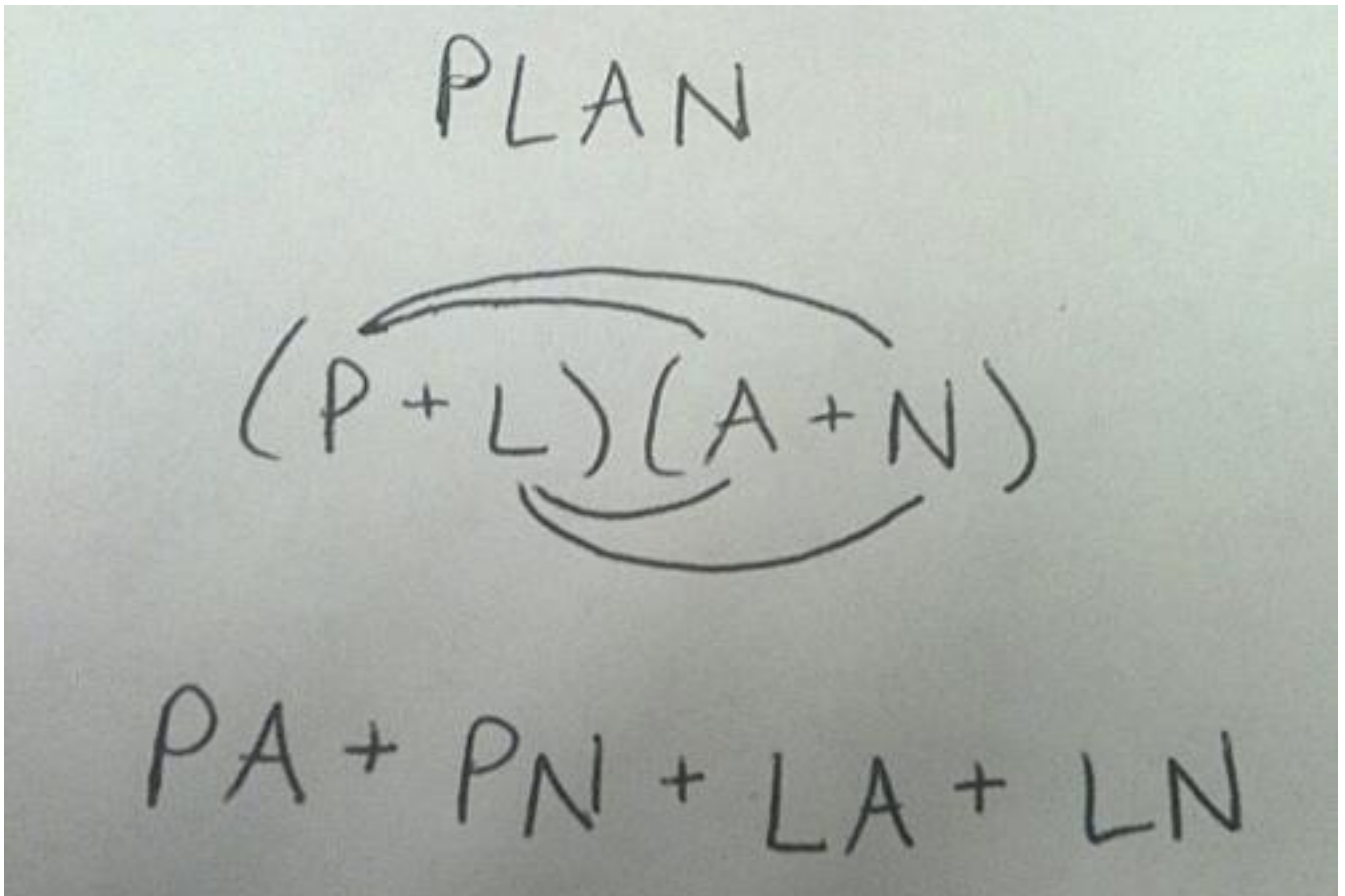
|                             |       |
|-----------------------------|-------|
| $m\angle FGJ = m\angle HGK$ | given |
| $m\angle FGJ = 6x + 7$      |       |
| $m\angle HGK = 8x - 5$      |       |
| $6x + 7 = 8x - 5$           | subst |
| $7 = 2x - 5$                | subt  |
| $12 = 2x$                   | add   |
| $6 = x$                     | div   |
| $x = 6$                     | Symm  |

Paragraph proof: in paragraph form to explain why a conjecture for a given situation is true.

Homework:

2.6 Geometric Proofs Pg. 137 #12, 14, 15, 23-26

2.5 Pg. 128 #30, 31 (Must be paragraph proofs)



**I foiled your plan.**