

**2 - 6**

**Algebraic Proof**

**Reflexive:**  $a = a$

**Symmetric:** If  $a = b$ , then  $b = a$ .

**Transitive:** If  $a = b$  and  $b = c$ , then  $a = c$ .



## ***Addition/Subtraction:***

$$\text{If } a=b, \text{ then } a+c=b+c.$$
$$a-c=b-c$$

## ***Multiplication/Division:***

$$\text{If } a=b, \text{ then } ac=bc.$$
$$c/a = b/c$$



**Substitution:** If  $a=b$ , then  $a$  may be replaced by  $b$ .

**Distributive:**  $a(b+c) = ab+ac$



two-column proof / formal proof:

statements and reasons  
organized in 2 columns

statements: each step

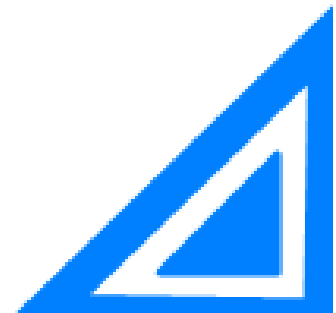
reasons: properties that justify  
each step



## Write a two-column proof...

If  $3(x - 2) = 42$ , then  $x = 16$ .

Statements	Reasons
1. $3(x-2) = 42$	1. Given
2. $3x - 3(2) = 42$	2. Distributive
3. $3x - 6 = 42$	3. Substitution
4. $3x - 6 + 6 = 42 + 6$	4. Addition
5. $3x = 48$	5. Substitution
6. $\frac{3x}{3} = \frac{48}{3}$	6. Division
7. $x = 16$	7. Substitution



**Given:**  $\frac{7}{2} - n = 4 - \frac{1}{2}n$

**Prove:**  $n = -1$

**Statements**

**Reasons**

1.  $\frac{7}{2} - n = 4 - \frac{1}{2}n$

1. Given

2.  $2\left(\frac{7}{2} - n\right) = 2\left(4 - \frac{1}{2}n\right)$

2. Multiplication

3.  $7 - 2n = 8 - n$

3. Distributive

4.  $7 - 2n + n = 8 - n + n$

4. Addition

5.  $7 - n = 8$

5. Substitution

6.  $7 - n - 7 = 8 - 7$

6. Subtraction

7.  $-n = 1$

7. Substitution

8.  $\frac{-n}{-1} = \frac{1}{-1}$

8. Division

9.  $n = -1$

9. Substitution



## Geometric Proof

Reflexive

Segments:

$$AB = AB$$

Angles:

$$m\angle 1 = m\angle 1$$

Symmetric

Segments:

$$\text{If } AB = CD, \text{ then } CD = AB.$$

Angles:

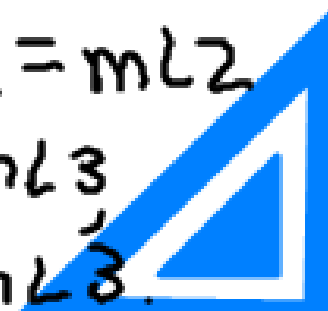
$$\text{If } m\angle 1 = m\angle 2, \text{ then } m\angle 2 = m\angle 1.$$

Transitive

Segments:

$$\text{If } AB = CD \text{ and } CD = EF, \\ \text{then } AB = EF.$$

$$\text{Angles: If } m\angle 1 = m\angle 2 \\ \text{and } m\angle 2 = m\angle 3 \\ \text{then } m\angle 1 = m\angle 3.$$





**Given:**  $m \angle 2 = 60$   
 $\angle 2 \cong \angle 10$

**Prove:**  $m \angle 10 = 60$

**Statements**

1.  $m \angle 2 = 60$   
 $\angle 2 \cong \angle 10$
2.  $m \angle 2 = m \angle 10$
3.  $60 = m \angle 10$
4.  $m \angle 10 = 60$

**Reasons**

1. Given
2. defn. of  $\cong$
3. Substitution
4. Symmetric



---

## Homework:

p.97 #3-10, 14-23, ~~26-31~~

