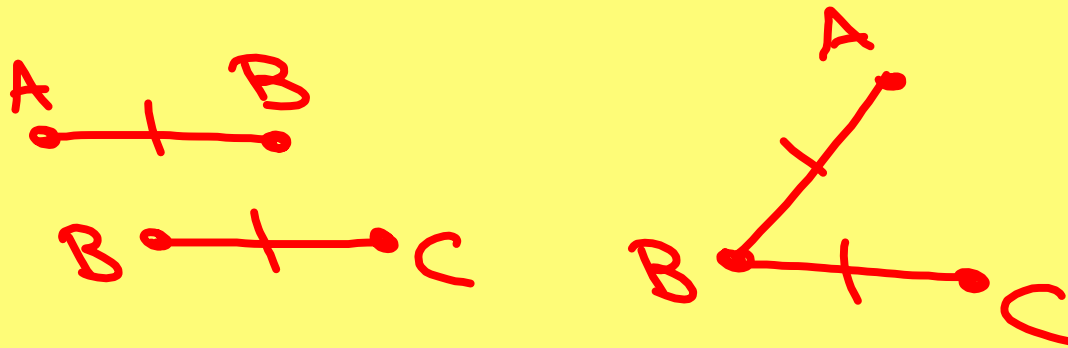


## 10/1/19 - Warm Up Problem

**GIVEN:**  $m = n$ ,  $n + p = 2r$ ,  $r = m$

**PROVE:**  $p = r$

Statements	Justifications
1. $m = n$	given
2. $n + p = 2r$	g. v. h
3. $r = m$	g. v. h
4. $r = n$	Substitution Prop.
5. $r + p = 2r$	substitution Prop.
6. $p = r$	Subtraction Prop.



**Assignment:**

finish Concept 6 WS #1 - due by Monday 10/7

Identify the property that is being shown in each statement.

7. Given that  $m\angle BCA = m\angle DBC$  and  $m\angle BCA = m\angle ADB$ , we can conclude that  $m\angle DBC = m\angle ADB$ .

8. Given that  $\overline{HI} \cong \overline{JK}$ , we can conclude that  $\overline{JK} \cong \overline{HI}$ .

9. Given that  $\angle 3 \cong \angle 4$  and  $\angle 4 \cong \angle 5$ , we can conclude that  $\angle 3 \cong \angle 5$ .

10. Given that  $XY = MN$  and  $XY + YZ = XZ$ , we can state that  $MN + YZ = XZ$ .

*Substitution Prop.*

Fill in the missing justifications in each proof.

5. Given:  $a = 2b + 6$   
 $a = 9b - 8$   
 Prove:  $b = 2$

6. Given:  $3b + d = f$   
 $d = 2b$   
 $f = g$   
 Prove:  $g = 5b$

Statement	Justification
1. $a = 2b + 6$	
2. $a = 9b - 8$	
3. $2b + 6 = 9b - 8$	
4. $6 = 7b - 8$	
5. $14 = 7b$	
6. $2 = b$	
7. $b = 2$	<i>Symmetric Prop of =</i>

Statement	Justification
1. $3b + d = f$	
2. $d = 2b$	
3. $f = g$	
4. $3b + 2b = f$	
5. $5b = f$	
6. $5b = g$	
7. $g = 5b$	

Complete each proof. You may not need all of the rows.

5. Given:  $m = n + 5$   
 $2m = n$   
 Prove:  $m = -5$

6. Given:  $g = 2h$   
 $g + h = k$   
 $k = m$   
 Prove:  $m = 3h$

Statement	Justification
1. $m = n + 5$	<i>given</i>
2. $2m = n$	<i>given</i>
3. $m = 2m + 5$	<i>Substitution Prop.</i>
4. $-m = 5$	<i>Subtraction Prop.</i>
5. $m = -5$	<i>Division Prop.</i>
6.	
7.	

Statement	Justification
1.	
2.	
3.	
4.	
5.	
6.	
7.	

## Concept 6 - Proofs using Postulates and Definitions

**Goals:** Complete proofs about geometric figures using postulates and definitions with the properties of equality and congruence

In order to write proofs about geometric figures, we are going to need to incorporate some definitions and postulates from previous concepts to use as justifications.

### Using Postulates in Proofs

**Postulates** (accepted statements of fact)

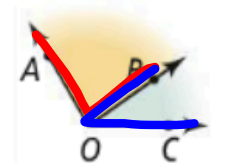
**Segment Addition Postulate**

If three points A, B, and C are collinear and B is between A and C, then  $\underline{AB} + \underline{BC} = AC$ .



**Angle Addition Postulate**

If point B is in the interior of  $\angle AOC$ , then  $m\angle AOB + m\angle BOC = m\angle AOC$ .



**Linear Pair Postulate**

If two angles for a linear pair, then they are supplementary.

(180)

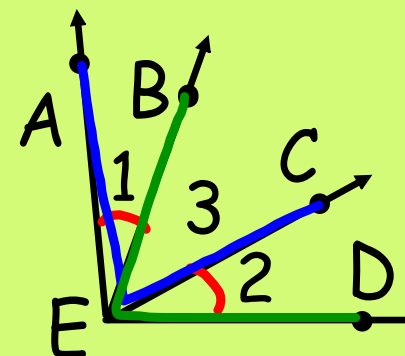


- postulates are used to introduce new equations into your proof that you can combined with the given information.

## Using Postulates in a Proof

Given:  $m\angle 1 = m\angle 2$

Prove:  $m\angle AEC = m\angle BED$



Statements	Justifications
1. $m\angle 1 = m\angle 2$	Given
2. $m\angle 1 + m\angle 3 = m\angle AEC$	Angle Addition Postulate
3. $m\angle 2 + m\angle 3 = m\angle BED$	Angle Addition Postulate
4. $m\angle 2 + m\angle 3 = m\angle AEC$	Substitution (1,2)
5. $m\angle AEC = m\angle BED$	Transitive Prop. of = (3,4)

## Using Definitions in a Proof

**Definitions** (use these to convert a given statement into an equation)

Definition of Congruent

Definition of Bisect

Definition of Midpoint

Definition of Right Angle

Definition of Complementary

Definition of Supplementary

- changes = to  $\cong$  or  $\cong$  to =

Statements	Justifications
1. B is the midpoint of $\overline{AC}$	Given
2. $AB = BC$	Def. of Midpoint

Statements	Justifications
1. $\angle ABC$ and $\angle CBD$ are <u>supplementary</u>	Given
2. $m\angle ABC + m\angle CBD = 180$	Def. of Supp.

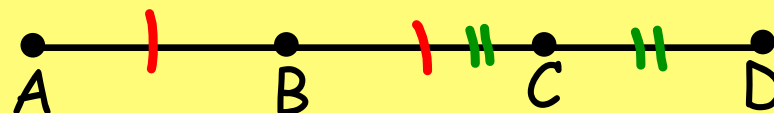
Statements	Justifications
1. $\angle 1 \cong \angle 2$	Given
2. $m\angle 1 = m\angle 2$	Def. of Congruent

## Using Definitions in a Proof

Given: B is the midpoint of  $\overline{AC}$

C is the midpoint of  $\overline{BD}$

Prove:  $\overline{AB} \cong \overline{CD}$



Statements	Justifications
1. B is the midpoint of $\overline{AC}$	Given
2. C is the midpoint of $\overline{BD}$	Given
3. <u>AB</u> = <u>BC</u>	Def. of Midpoint
4. <u>BC</u> = <u>CD</u>	Def. of Midpoint
5. AB = CD	Transitive Prop. of = (3,4)
6. $\overline{AB} \cong \overline{CD}$	Def. of Congruent

It takes practice to know what step to do next when writing a proof. There is a general pattern you can follow...

STEPS FOR WRITING A TWO-COLUMN PROOF

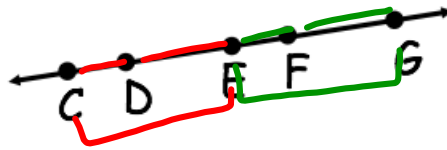
1. **GIVENS** - Copy all given information.
2. **DEFINITIONS** - If your given information is not in equation form, make it an equation using a definition.
3. **POSTULATES / THEOREMS** - Add new equations into your proof using postulates and theorems.
4. **PROPERTIES** - Manipulate and combine your equations to arrive at the statement you are proving.  
- **TRANSITIVE PROPERTY AND SUBSTITUTION ARE USED TO COMBINE 2 EQUATIONS TOGETHER.**

**Assignment:****Concept 6 Worksheet #2 - due Monday 10/7  
(1-5)****PROOFS USING POSTULATES AND DEFINITIONS**

Complete each 2-column proof.

1. Given:  $\overline{CD} \cong \overline{EF}$   
 $\overline{DE} \cong \overline{FG}$

Prove:  $\overline{CE} \cong \overline{EG}$



Statements	Justifications
1. $\overline{CD} \cong \overline{EF}$	given
2. $\overline{DE} \cong \overline{FG}$	given
3. $CD = EF$	Def of Congruent
4. $DE = FG$	Def of Congruent
5. $CD + DE = CE$	Segment Add. Postulate
6. $EF + FG = EG$	Segment Add. Postulate
7. $CD + FG = EG$	Substitution Prop. (3,6)
8. $CD + DE = EG$	Substitution Prop. (4,7)
9. $CE = EG$	Transitive Prop. of = (5,8)
10. $\overline{CE} \cong \overline{EG}$	Def. of Congruent