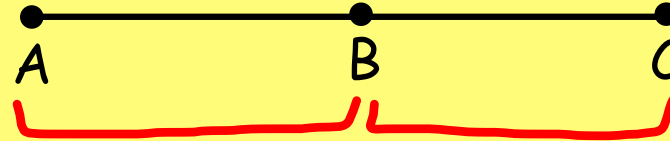


10/3/19 - Warm Up Problem

Given: $AB = BC$

Prove: $AB = \frac{1}{2}(AC)$

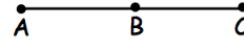


Statements	Justifications
1. $AB = BC$	GIVEN
2. $AB + \underline{BC} = AC$	SEGMENT ADDITION
3. $AB + \underline{AB} = AC$	SUBSTITUTION
4. $\underline{2}AB = \underline{2}AC$	Simplify
5. $\underline{2}AB = \underline{2} \cdot \frac{1}{2}(AC)$	Division

Concept 6 Worksheet #2

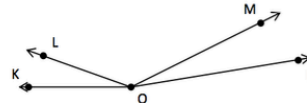
PROOFS USING POSTULATES

5. Given: $2AB = AC$
Prove: $AB = BC$



Statements	Justifications
1. $2AB = AC$	
2. $AB + BC = AC$	
3. $AB + BC = 2AB$	
4. $BC = AB$	
5. $AB = BC$	

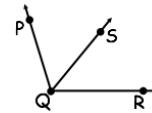
6. Given: $m\angle KOL = m\angle MON$
Prove: $m\angle KOM = m\angle LON$



Statements	Justifications
1. $m\angle KOL = m\angle MON$	
2. $m\angle KOL + m\angle LOM = m\angle KOM$	
3. $m\angle LOM + m\angle MON = m\angle LON$	
4. $m\angle KOL + m\angle MON = m\angle LON$	Substitution Prop.
5. $m\angle KOM = m\angle LON$	Transitive Prop. of =

PROOFS USING POSTULATES AND DEFINITIONS

7. Given: \overline{QS} is an angle bisector of $\angle PQR$.
Prove: $m\angle PQS = \frac{1}{2}m\angle PQR$



Statements	Justifications
1. \overline{QS} is an angle bisector of $\angle PQR$.	
2. $m\angle PQS = m\angle SQR$	
3. $m\angle PQS + m\angle SQR = m\angle PQR$	
4. $m\angle PQS + m\angle PQS = m\angle PQR$	
5. $2 \cdot m\angle PQS = m\angle PQR$	
6. $m\angle PQS = \frac{1}{2}m\angle PQR$	

Concept 6 - Using Definitions and Theorems in Proofs

Using Definitions in a Proof

- definitions will be used right after the given statement and sometimes at the end of the 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

— change = to \cong or \cong to =

You will use a definition right after your given statements if the given statements are written with words instead of equations.

Examples of Using Definitions

Statements	Justifications
1. B is the <u>midpoint</u> 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.

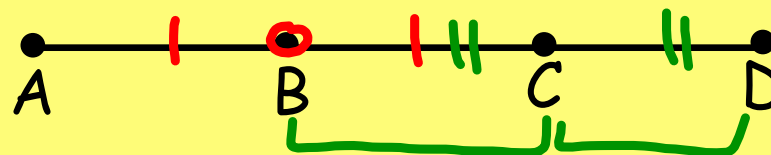
Statements	Justifications
1. $\angle 1 \cong \angle 2$	Given
2. $m\angle 1 = m\angle 2$	Def. of Congruent

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

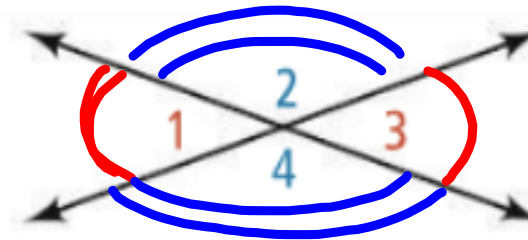
Using Theorems in Proofs

Postulate: an accepted statement of fact

Theorem: a proven statement of fact

Vertical Angles Theorem

Vertical angles are congruent.

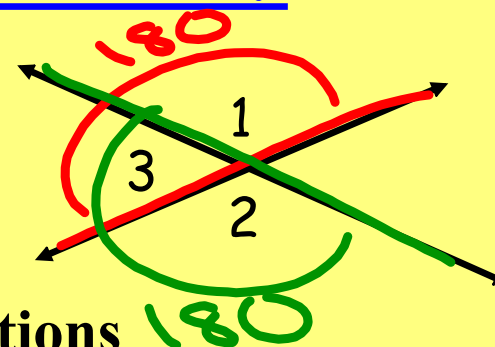


- Theorems are used like postulates in proofs to introduce new equations when the given information is not enough

Proving the Vertical Angles Theorem

Given: $\angle 1$ and $\angle 2$ are vertical angles.

Prove: $\angle 1 \cong \angle 2$

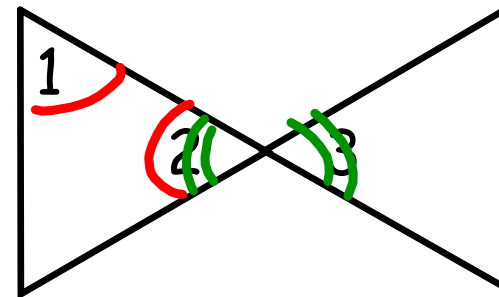


Statements	Justifications
1. $\angle 1$ and $\angle 2$ are vertical	Given
2. $m\angle 1 + m\angle 3 = 180$	Linear Pair Postulate
3. $m\angle 2 + m\angle 3 = 180$	Linear Pair Postulate
4. $m\angle 1 + m\angle 3 = m\angle 2 + m\angle 3$	Transitive Prop. of = (2,3)
5. $m\angle 1 = m\angle 2$	Subtraction Prop.
6. $\angle 1 \cong \angle 2$	Def. of Congruent

Using the Vertical Angles Theorem

Given: $\angle 1 \cong \angle 2$

Prove: $\angle 1 \cong \angle 3$



Statements	Justifications
1. $\underline{\angle 1} \cong \angle 2$	Given
2. $\angle 2 \cong \underline{\angle 3}$	Vertical Angles Theorem
3. $\angle 1 \cong \angle 3$	Transitive Property of \cong

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

ORDER OF STEPS FOR 2-COLUMN PROOFS

1. **Given information** – Mark your given info on the diagram after writing it in the proof
2. **Definitions** – If your given statements are sentences, turn them into equations with a definition.
3. **Postulates/Theorems** – New, needed equations are written in using postulates and theorems.
4. **Properties** – Manipulate and combine equations using properties.
Substitution and **Transitive Properties** are ones to remember!

Assignment:

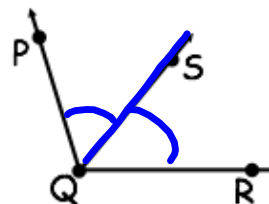
Concept 6 Worksheet #2 - due Wednesday 10/9

work on (7-10) today

PROOFS USING POSTULATES AND DEFINITIONS

7. Given: \overline{QS} is an angle bisector of $\angle PQR$.

Prove: $m\angle PQS = \frac{1}{2}m\angle PQR$



Statements	Justifications
1. \overline{QS} is an <u>angle bisector</u> of $\angle PQR$.	Given
2. $m\angle PQS = m\angle SQR$	Def. of bisector
3. $m\angle PQS + m\angle SQR = m\angle PQR$	Angle Add. Post.
4. $m\angle PQS + m\angle PQS = m\angle PQR$	Substitution Prop.
5. $\frac{2 \cdot m\angle PQS}{2} = \frac{m\angle PQR}{2}$	Simplify
6. $m\angle PQS = \frac{1}{2}m\angle PQR$	Division Prop.