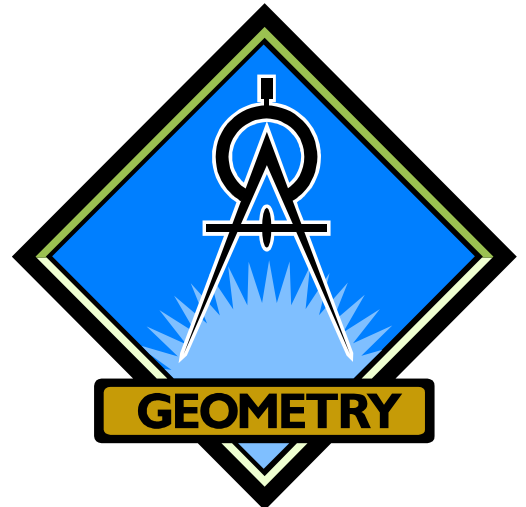# Ch 2 Proofs Packet

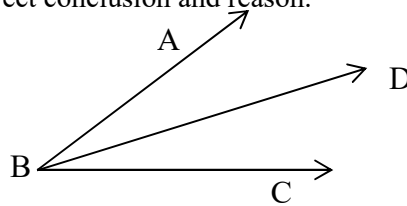**2-4**

1) Write a two-column proof, supplying your own correct conclusion and reason.

   Given: $\overline{BD}$ bisects ∠ABC
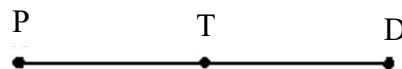
   Conclusion:

Statements	Reasons

2) Given: T is the midpoint of $\overline{PD}$

Conclusion: _____

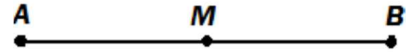| Statements	Reasons

2-4

Proof of Theorem 2.1:

If a point is the midpoint of a segment, then it divides it into 2 ≅ segments **.**

3) Given: M is the midpoint of $\overline{AB}$

A   M   B

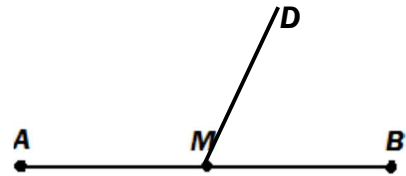Prove: $\overline{AM} \cong \overline{MB}$

statements	reasons

4) Given: $\overline{DM}$ bisects $\overline{AB}$

Prove: M is the midpoint of $\overline{AB}$

D

A   M   B

Statements	Reasons

Algebraic Proof:

An **<u>algebraic proof</u>** uses a group of algebraic steps to solve problems and justify each step.

5)   Given: $\frac{5x+1}{2} - 8 = 0$
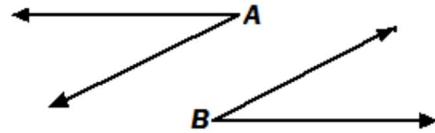
Prove: $x = 3$

Statements	Reasons

6)   Given: $6x + 3 = 9(x - 1)$

Prove: $x = 4$

Statements	Reasons

7)   Given: $\angle A \cong \angle B$ and $m\angle A = 37°$

    Prove: $m\angle B = 37°$

Statements	Reasons

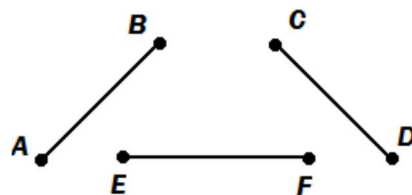**Proof of Theorem 2.2 (Transitive Property of Segment Congruence):**
If 2 segments are $\cong$ to the same shape (or to $\cong$ shapes), then they are $\cong$ to each other.
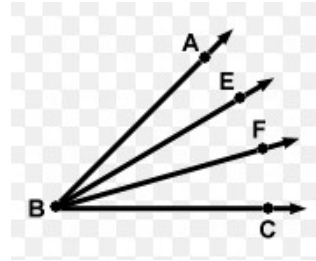
8) Given: $\overline{AB} \cong \overline{CD}, \overline{CD} \cong \overline{EF}$

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

Statements	Reasons

9) Given: $\overline{BE}$ bisects $\angle ABF$; $\overline{BF}$ bisects $\angle EBC$
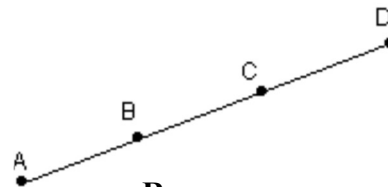   **Prove:** $\angle ABE \cong \angle FBC$;

Statements	Reasons

2-5

10) Given: $\overline{AB} \cong \overline{CD}$
      Prove: $\overline{AC} \cong \overline{BD}$

Statements	Reasons

**Directions: Use the following statements and reasons,
and put them in the correct places to complete the proof.**

Segment Addition   Given

AB + BC = AC ; CD + BC = BD $\overline{AB} \cong \overline{CD}$
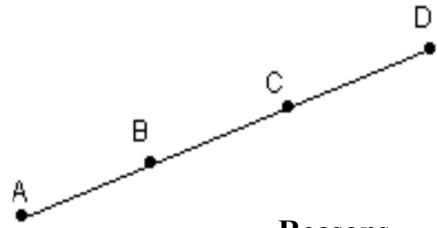
$\overline{AC} \cong \overline{BD}$ Addition Prop. of Equality

$\overline{AB} + \overline{BC} \cong \overline{CD} + \overline{BC}$ Substitution (_____ into _____)

5

11) Given: B is the midpoint of $\overline{AC}$.
         C is the midpoint of $\overline{BD}$.

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

Statements	Reasons

Directions: Use following statements and reasons to complete the proof.

If a point is a midpoint, then it creates two congruent segments	Given
B is the midpoint of $\overline{AC}$. C is the midpoint of $\overline{BD}$.	$\overline{AB} \cong \overline{CD}$
$\overline{AB} \cong \overline{BC}$ and $\overline{BC} \cong \overline{CD}$	Transitive

12) Given: $\overline{RT} \cong \overline{WY}$
              $\overline{ST} \cong \overline{WX}$

Prove: $\overline{RS} \cong \overline{XY}$

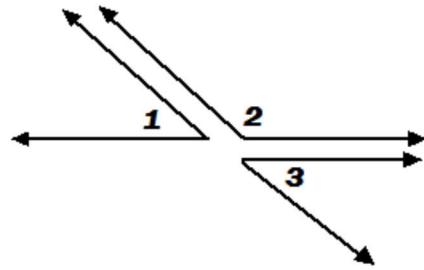| 1)	1) Given
2) $RT = RS + ST;\ \ WY = WX + XY$	2)
3) $\overline{RS} + \overline{ST} \cong \overline{WX} + \overline{XY}$	3)
4) $\overline{RS} + \overline{ST} = \overline{ST} + \overline{XY}$	4)
5) $\overline{RS} \cong \overline{XY}$	5)

6

2-6

Proof of Theorem 2.6 (Congruent Supplements Theorem):
    If 2 ∠'s are supplementary to the same ∠ (or to ≅ ∠'s), then there are ≅ to each other.

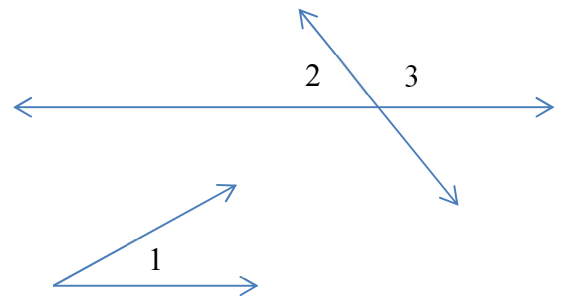**13)** Given: ∠1 is supplementary to ∠2.
              ∠3 is supplementary to ∠2.

        Prove: ∠1 ≅ ∠3

statements	reasons

14) Given: ∠1 is supp to ∠2.
        Prove: ∠1 is congruent to ∠3.

Statements	Reasons

7

Proof of Theorem 2.8 (Vertical Angle Theorem):
      If 2 angles are vertical angles, then they are ≅.
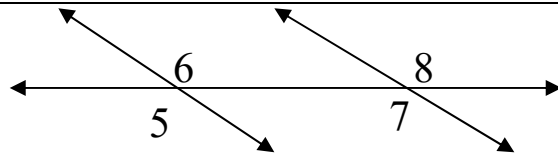
   15) Given: ∠1 and ∠3 are vertical angles

      Prove: ∠1 ≅ ∠3
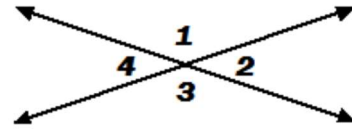
Statements	Reasons

16. Given: $\angle 6 \cong \angle 7$

Prove: $\angle 5 \cong \angle 8$
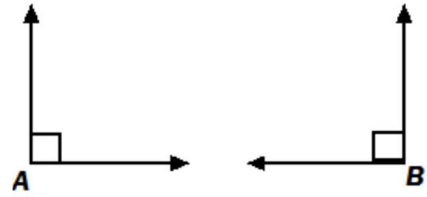
Statements	Reasons
1. $\angle 6 \cong \angle 7$	1.
2.	2.
3. $\angle 7 \cong \angle 8$; $\angle 5 \cong \angle 6$	3.
4. $\angle 5 \cong \angle 8$	4.

Formal Geometry 2022-2023   **Name:** _____

Proof of Theorem 2.10 (Right Angle Congruence Theorem):
 If 2 ∠'s are right ∠'s, then they are ≅.

   17)   Given: ∠A and ∠B are right ∠'s

             Prove: ∠A ≅ ∠B

Statements	Reasons

18)
    Given: ∠A and ∠B are right ∠'s; ∠B ≅ ∠C

    Prove: ∠A ≅ ∠C

Statements	Reasons

19) Given: ∠F is comp. to ∠FGJ
∠H is comp. to ∠HGJ
$\overrightarrow{GJ}$ bisects ∠FGH
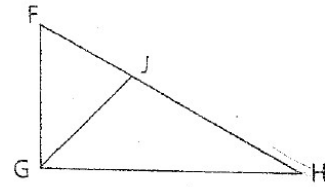
Prove: ∠F ≅ ∠H

Statements	**Reasons**

**Directions: Use the following statements and reasons,
and put them in the correct places to complete the proof.**

∠F is comp. to ∠FGJ   ∠FGJ ≅ ∠HGJ
∠H is comp. to ∠HGJ
$\overrightarrow{GJ}$ bisects ∠FGH

If 2 ∠'s are comp. to ≅ ∠'s, then they   ∠F ≅ ∠H
≅ .

Given   If a ray bisects an ∠, then it creates
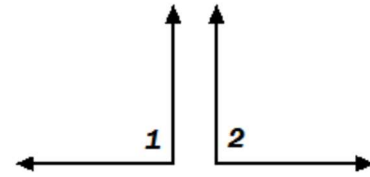   2 ≅ ∠'s.

Proof of Theorem 2.12 (Congruent and Supplementary Theorem):
     If 2 ∠'s are both ≅ and supplementary, then they are right angles.

   20) Given: ∠1 ≅ ∠2
                    ∠1 is supplementary to ∠2

          Prove: ∠1 and ∠2 are right ∠'s

Statements	Reasons

22) Given : ∠1 comp to ∠2
                ∠1 ≅ ∠3
                ∠2 ≅ ∠4
       Prove : ∠3 comp to ∠4

Statements	Reasons