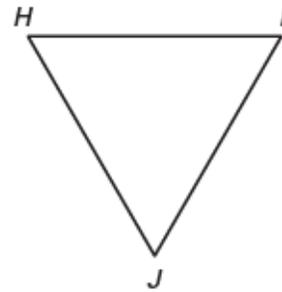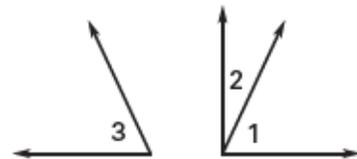Name _____   Date _____

Prove Statements about Segments and Angles Practice Sheet

In Exercises 1–4, complete the proof.

1. **GIVEN:** $HI = 9$, $IJ = 9$, $\overline{IJ} \cong \overline{JH}$

   PROVE: $\overline{HI} \cong \overline{JH}$

Statements	Reasons
1. $HI = 9$	1. __?__
2. $IJ = 9$	2. __?__
3. $HI = IJ$	3. __?__
4. __?__	4. Definition of congruent segments
5. $\overline{IJ} \cong \overline{JH}$	5. __?__
6. $\overline{HI} \cong \overline{JH}$	6. __?__

2. **GIVEN:** $\angle 3$ and $\angle 2$ are complementary.
       $m\angle 1 + m\angle 2 = 90°$

   PROVE: $\angle 1 \cong \angle 3$

Statements	Reasons
1. $\angle 3$ and $\angle 2$ are complementary.	1. __?__
2. $m\angle 1 + m\angle 2 = 90°$	2. __?__
3. $m\angle 3 + m\angle 2 = 90°$	3. __?__
4. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 2$	4. __?__
5. $m\angle 1 = m\angle 3$	5. __?__
6. $\angle 1 \cong \angle 3$	6. __?__

3. **GIVEN:** $AL = SK$

   PROVE: $AS = LK$

Statements	Reasons
1. $AL = SK$	1. __?__
2. $LS = LS$	2. __?__
3. $AL + LS = SK + LS$	3. __?__
4. $AL + LS = AS$	4. __?__
5. $SK + LS = LK$	5. __?__
6. $AS = LK$	6. __?__

In Exercises 1 and 2, complete the proof.

1. GIVEN: $\angle ABC \cong \angle CBD$, $m\angle CBD = 50°$,
$m\angle CBE = 100°$

PROVE: $\angle ABC \cong \angle DBE$
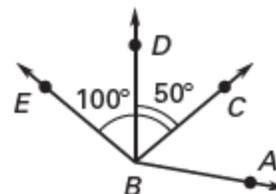
Statements	Reasons
1. $\angle ABC \cong \angle CBD$, $m\angle CBD = 50°$, $m\angle CBE = 100°$	1. _?_
2. _?_ $= m\angle CBE$	2. Angle Addition Postulate
3. $50° + m\angle DBE = 100°$	3. _?_
4. $m\angle DBE = 50°$	4. _?_
5. $m\angle CBD = $ _?_	5. Substitution Property of Equality
6. _?_	6. Definition of congruent angles
7. $\angle ABC \cong \angle DBE$	7. _?_

2. The lengths of the sides of quadrilateral $ABCD$ are equal. Prove that the perimeter of $ABCD$ is equal to $4AB$.

GIVEN: $\overline{AB} \cong \overline{BC}, \overline{BC} \cong \overline{CD}, \overline{CD} \cong \overline{AD}$

PROVE: Perimeter of $ABCD = 4AB$
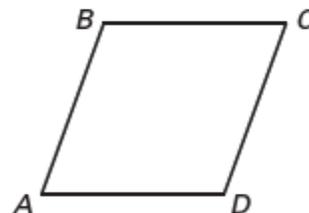
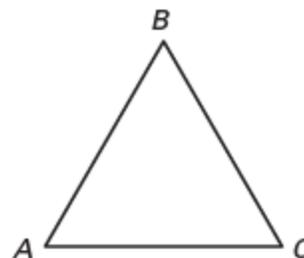| Statements	Reasons
1. $\overline{AB} \cong \overline{BC}, \overline{BC} \cong \overline{CD}, \overline{CD} \cong \overline{AD}$	1. _?_
2. $AB = BC, BC = CD, CD = AD$	2. _?_
3. $AB = CD, AB = AD, BC = AD$	3. _?_
4. Perimeter of $ABCD = AB + BC + CD + AD$	4. _?_
5. _?_	5. Substitution Property of Equality
6. _?_	6. Simplify.

Use the property to complete the statement.

3. Transitive Property of Congruence: If $\angle 1 \cong \angle 5$ and _?_ , then $\angle 1 \cong \angle 7$.

4. Symmetric Property of Congruence: If $\angle 1 \cong \angle 2$ and $\angle 3 \cong \angle 4$, then _?_ .

2

In Exercises 1–3, complete the proof.

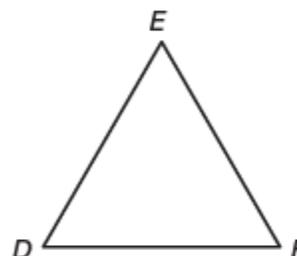1. **GIVEN:** $m\angle A = m\angle B$, $m\angle B = m\angle C$

   PROVE: $\angle A \cong \angle C$

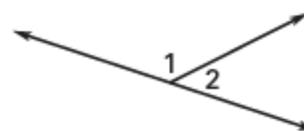| Statements	Reasons
1. $m\angle A = m\angle B$, $m\angle B = m\angle C$	1. Given
2. $m\angle A = m\angle C$	2. _?_
3. _?_	3. Definition of congruent angles

2. **GIVEN:** $DE = EF$, $EF = DF$

   PROVE: $\overline{DF} \cong \overline{DE}$

Statements	Reasons
1. $DE = EF$, $EF = DF$	1. _?_
2. _?_	2. Transitive Property of Equality
3. $DF = DE$	3. _?_
4. _?_	4. Definition of congruent segments

3. **GIVEN:** $\angle 1$ and $\angle 2$ are a linear pair.

   PROVE: $m\angle 1 = 180° - m\angle 2$

Statements	Reasons
1. _?_	1. Given
2. _?_	2. The angles in a linear pair are supplementary angles.
3. $m\angle 1 + m\angle 2 = 180°$	3. _?_
4. _?_	4. Subtraction Property of Equality

3

Use the property to complete the statement.

4. Reflexive Property of Congruence: ___?___ ≅ ∠4

5. Symmetric Property of Congruence: If ___?___ ≅ ___?___, then $\overline{CD} \cong \overline{DX}$.

In Exercises 6–9, name the property illustrated by the statement.

6. If ∠1 ≅ ∠2 and ∠2 ≅ ∠4, then ∠1 ≅ ∠4.   7. $\overline{XY} \cong \overline{XY}$

8. If ∠CDE ≅ ∠RST, then ∠RST ≅ ∠CDE.   9. If $\overline{AB} \cong \overline{BC}$, then $\overline{BC} \cong \overline{AB}$.

10. Sketch a diagram that represents the following information.

    ∠ABC and ∠CBD are adjacent angles.
    ∠ABD and ∠DBE are a linear pair.

11. Use the given information and the diagram to prove the statement.

    GIVEN: $2m\angle ABC = m\angle ABD$

    PROVE: ∠ABC ≅ ∠CBD

Statements	Reasons