

Ch 2- Basic Concepts and Proofs

Agenda:

2.4- Congruent Supplements and Complements

Objective:

- Prove angles congruent by means of four new theorems

1) Take out Glossary to be checked

2) DO NOW

- draw a picture for the theorems

- share and explain drawing with partner

- edit your drawings if you need to

3) JIGSAW: Prove the theorems!

- group solve

- group present

HW: Add the six new theorems for 2.5 to your glossary

p. 69 - 71, # 22, 25

p. 79 - 81, # 1, 3, 9, 13, 15, 19

Quiz on 2.4 - 2.6 in "three" classes

Theorems 1 - 7 you can use from now on.

**Write down a picture or explanation to justify for each.
These theorems should be memorized!**

1. If two angles are right angles,
then they are congruent.

2. If two angles are straight angles,
then they are congruent.

3. If a conditional statement is true,
then the contrapositive of the
statement is also true.
(if p then q \Leftrightarrow if $\sim q$ then $\sim p$)

4. If angles are supplementary to the
same angle, then they are congruent.

5. If angles are supplementary to
congruent angles, then they are
congruent.

6. If angles are complementary to the
same angle, then they are congruent.

7. If angles are complementary to
congruent angles, then they are congruent.

1. Theorem: If two angles are right angles, then they are congruent.

Given: $\sphericalangle A$ is a right \sphericalangle .

$\sphericalangle B$ is a right \sphericalangle .

Prove: $\sphericalangle A \cong \sphericalangle B$

Statements	Reasons
1. a) $\sphericalangle A$ is a right \sphericalangle . b) $\sphericalangle B$ is a right \sphericalangle .	1. given
2. a) b)	2.
3.	3.

2. Theorem: If two angles are straight angles, then they are congruent.

Given: $\sphericalangle ABC$ is a straight \sphericalangle .

$\sphericalangle DEF$ is a straight \sphericalangle .

Prove: $\sphericalangle ABC \cong \sphericalangle DEF$

Statements	Reasons
1. a) $\sphericalangle ABC$ is a straight \sphericalangle . b) $\sphericalangle DEF$ is a straight \sphericalangle .	1. given
2. a) b)	2.
3.	3.

1. Theorem: If two angles are right angles, then they are congruent.

Given: $\angle A$ is a right \angle .

$\angle B$ is a right \angle .

Prove: $\angle A \cong \angle B$

Statements	Reasons
1. a) $\angle A$ is a right \angle . b) $\angle B$ is a right \angle .	1. given
2. a) $\angle A = 90$ b) $\angle B = 90$	2. If an angle is a right angle, then its measure is 90 degrees (by definition)
3. $\angle A \cong \angle B$	3. If two angles have the same measure, then they are congruent (by definition)

2. Theorem: If two angles are straight angles, then they are congruent.

Given: $\angle ABC$ is a straight \angle .

$\angle DEF$ is a straight \angle .

⊕ Prove: $\angle ABC \cong \angle DEF$

Statements	Reasons
1. a) $\angle ABC$ is a straight \angle . b) $\angle DEF$ is a straight \angle .	1. given
2. a) $\angle ABC = 180$ b) $\angle DEF = 180$	2. If an angle is a straight angle, then its measure is 180 degrees (by definition)
3. $\angle ABC \cong \angle DEF$	3. If two angles have the same measure, then they are congruent (by definition)

4. Theorem: If angles are supplementary to the same angle, then they are congruent.

Given: $\angle 3$ is supplementary to $\angle 4$

$\angle 5$ is supplementary to $\angle 4$

Prove: $\angle 3 \cong \angle 5$

Statements	Reasons
1. a) $\angle 3$ is supplementary to $\angle 4$ b) $\angle 5$ is supplementary to $\angle 4$	1. given
2. a) b)	2.
3. a) b)	3.
4.	4.

5. Theorem: If angles are supplementary to congruent angles, then they are congruent.

Given: $\angle F$ is supplementary to $\angle G$

$\angle H$ is supplementary to $\angle J$

$\angle G \cong \angle J$

Prove: $\angle F \cong \angle H$

Statements	Reasons
1. a) $\angle F$ is supplementary to $\angle G$ b) $\angle H$ is supplementary to $\angle J$ c) $\angle G \cong \angle J$	1. Given
2. a) b)	2.
3. a) b)	3.
4.	4.
5.	5.

4. Theorem: If angles are supplementary to the same angle, then they are congruent.

Given: $\angle 3$ is supplementary to $\angle 4$

$\angle 5$ is supplementary to $\angle 4$

Prove: $\angle 3 \cong \angle 5$

Statements	Reasons
1. a) $\angle 3$ is supplementary to $\angle 4$ b) $\angle 5$ is supplementary to $\angle 4$	1. given
2. a) $\angle 3 + \angle 4 = 180$ b) $\angle 5 + \angle 4 = 180$	2. If two angles are supplementary, then their sum is 180 degrees (by definition)
3. a) $\angle 3 = 180 - \angle 4$ b) $\angle 5 = 180 - \angle 4$	3. Subtraction property of equality
4. $\angle 3 \cong \angle 5$	4. Transitive property of equality

5. Theorem: If angles are supplementary to congruent angles, then they are congruent.

Given: $\angle F$ is supplementary to $\angle G$

$\angle H$ is supplementary to $\angle J$

$\angle G \cong \angle J$

Prove: $\angle F \cong \angle H$

Statements	Reasons
1. a) $\angle F$ is supplementary to $\angle G$ b) $\angle H$ is supplementary to $\angle J$ c) $\angle G \cong \angle J$	1. Given
2. a) $\angle F + \angle G = 180$ b) $\angle H + \angle J = 180$	2. If two angles are supplementary, their sum is 180 degrees (by definition)
3. a) $\angle F = 180 - \angle G$ b) $\angle H = 180 - \angle J$	3. Subtraction property of equality
4. $\angle H = 180 - \angle G$	4. Substitution property of equality
5. $\angle F \cong \angle H$	5. Transitive property of equality

6. If angles are complementary to the same angle, then they are congruent.

Given: $\angle 3$ is complementary to $\angle 4$

$\angle 5$ is complementary to $\angle 4$

Prove: $\angle 3 \cong \angle 5$

Statements	Reasons
1. a) $\angle 3$ is complementary to $\angle 4$ b) $\angle 5$ is complementary to $\angle 4$	1. given
2. a) b)	2.
3. a) b)	3.
4.	4.

7. Theorem: If angles are complementary to congruent angles, then they are congruent.

Given: $\angle F$ is supplementary to $\angle G$

$\angle H$ is supplementary to $\angle J$

$\angle G \cong \angle J$

Prove: $\angle F \cong \angle H$

Statements	Reasons
1. a) $\angle F$ is complementary to $\angle G$ b) $\angle H$ is complementary to $\angle J$ c) $\angle G \cong \angle J$	1. Given
2. a) b)	2.
3. a) b)	3.
4.	4.
5.	5.

6. If angles are complementary to the same angle, then they are congruent.

Given: $\angle 3$ is complementary to $\angle 4$

$\angle 5$ is complementary to $\angle 4$

Prove: $\angle 3 \cong \angle 5$

Statements	Reasons
1. a) $\angle 3$ is complementary to $\angle 4$ b) $\angle 5$ is complementary to $\angle 4$	1. given
2. a) $\angle 3 + \angle 4 = 90$ b) $\angle 5 + \angle 4 = 90$	2. If two angles are complementary, then their sum is 90 degrees (by definition)
3. a) $\angle 3 = 90 - \angle 4$ b) $\angle 5 = 90 - \angle 4$	3. Subtraction property of equality
4. $\angle 3 \cong \angle 5$	4. Transitive property of equality

7. Theorem: If angles are complementary to congruent angles, then they are congruent.

Given: $\angle F$ is supplementary to $\angle G$

$\angle H$ is supplementary to $\angle J$

$\angle G \cong \angle J$

Prove: $\angle G \cong \angle H$

Statements	Reasons
1. a) $\angle F$ is complementary to $\angle G$ b) $\angle H$ is complementary to $\angle J$ c) $\angle G \cong \angle J$	1. Given
2. a) $\angle F + \angle G = 90$ b) $\angle H + \angle J = 90$	2. If two angles are complementary, then their sum is 90 degrees (by definition)
3. a) $\angle F = 90 - \angle G$ b) $\angle H = 90 - \angle J$	3. Subtraction property of equality
4. $\angle H = 90 - \angle G$	4. Substitution property of equality
5. $\angle G \cong \angle H$	5. Transitive property of equality