Practice with Proof

1. Conditional statements are used often in geometry but are not always written in the if-then form that is needed for constructing a proof.

   a. For the conditional below, rewrite the statement in if-then form, and then label the hypothesis and the conclusion.

      In a linear pair where one angle measures 45 , the other measures 135 .

   b. The second step in writing a proof is to draw and label a diagram that represents the given information. Draw and label a diagram for the statement. Remember to label the <u>names</u> of the angles, not just write their measures.

   c. The third step is to label the given and prove in terms of the diagram. Use the names of the angles in your statements.

      Given:

      Prove:

   d. Write a paragraph to explain to someone else why you know the conditional is true. Include the reason why you know each statement is true.

   e. Now complete the proof based on the explanation from part d.

Statement	**Reason**
1.	1. given
2.	2. given
3.	3.
4.	4.
5.	5.

Practice with Proof (Continued)

2. a. For the conditional, rewrite the statement in if-then form, and then label the hypothesis and the conclusion.

Supplements of the same angle are congruent.

b. Draw and label a diagram for the statement. Remember to label the <u>names</u> of the angles.

c. Write the given and prove in terms of the diagram. Use the names of the angles in your statements. Hint: There are two given statements.

Given:

Prove:

d. Write a paragraph to explain to someone else why you know the conditional is true. Include the reason why you know each statement is true.

e. Now complete the proof based on the explanation from part d.

Statements	**Reasons**
1.	1. Given
2.	2. Given
3.	3. Definition of supplementary
4.	4. Definition of supplementary
5.	5. Substitution property of equality
6.	6. Subtraction property of equality
7.	7. Definition of congruence

Practice with Proof (Continued)

3. a. For the conditional, rewrite the statement in if-then form, and then label the hypothesis and the conclusion.

   The complements of congruent angles are congruent.

   b. Draw and label a diagram for the statement. Remember to label the <u>names</u> of the angles.

   c. Write the given and prove in terms of the diagram. Use the names of the angles in your statements. Hint: There are three given statements.

   Given:

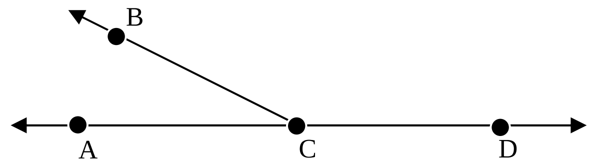
   Prove:

   d. Write a paragraph to explain to someone else why you know the conditional is true. Include the reason why you know each statement is true.

   e. Now complete the proof based on the explanation from part d.

Statements	**Reasons**
1.	1. Given
2.	2. Definition of congruence
3.	3. Given
4.	4. Given
5.	5. Definition of complementary
6.	6. Definition of complementary
7.	7. Transitive property of equality
8.	8. Substitution property of equality
9.	9. Subtraction property of equality
10.	10. Definition of congruence

Answers: 1. a. If a linear pair includes one angle of 45º, then the other angle measures 135º

b. 

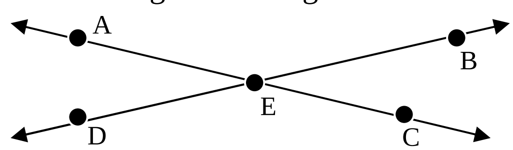
c. Given: $\angle ACB = 45º$
Prove: $\angle BCD = 135º$

d. Given the fact that a linear pair is defined as two angles that add up to 180º. Since the two angles, $\angle ACB$ and $\angle BCD$ are a linear pair, they add up to 180º. Since we are told that $\angle ACB$ is 45º, then by subtraction we know that $\angle BCD$ must be 135º.

e.

Statement	Reason
1. $\angle ACB$ and $\angle BCD$ are a linear pair	1. Given
2. $\angle ACB = 45º$	2. Given
3. $\angle ACB + \angle BCD = 180º$	3. Def. of linear pair
4. $45º + \angle BCD = 180º$	4. Substitution prop.
5. $\angle BCD = 135º$	5. Subtraction prop.

2. a. If two angles are supplements to the same angle, then the two angles are congruent.

b. 

c. Given: $\angle DEA$ is supplementary to $\angle AEB$
$\angle CEB$ is supplementary to $\angle AEB$
Prove: $\angle DEA \cong \angle CEB$

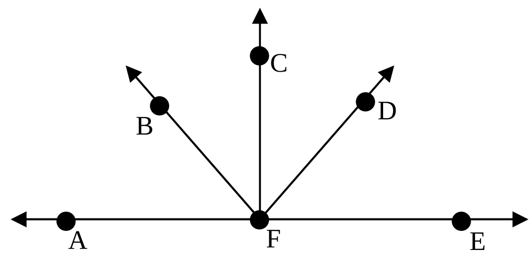
d. Two angles being supplementary to the same angle means that $\angle DEA + \angle AEB = 180º$ and that $\angle CEB + \angle AEB = 180º$. By the transitive property, $\angle DEA + \angle AEB = \angle CEB + \angle AEB$. Since we know that $\angle AEB = \angle AEB$ by the reflexive property, then $\angle DEA = \angle CEB$ by the subtraction property and $\angle DEA \cong \angle CEB$ by the definition of angle congruence.

e. Statements

1. $\angle DEA$ is supplementary to $\angle AEB$
2. $\angle CEB$ is supplementary to $\angle AEB$
3. $\angle DEA + \angle AEB = 180^{o}$
4. $\angle CEB + \angle AEB = 180^{o}$
5. $\angle DEA + \angle AEB = \angle CEB + \angle AEB$
6. $\angle DEA = \angle CEB$
7. $\angle DEA \cong \angle CEB$

3. a. If two angles are complements to congruent angles, then they themselves are congruent.

b.



c. Given: $\angle AFB$ is complementary to $\angle BFC$
$\angle EFD$ is complementary to $\angle DFC$
$\angle BFC \cong \angle DFC$
Prove: $\angle AFB \cong \angle EFD$

d. Since the two pair of given angles are complementary, then they each add up to 90^{o} by the definition of complementary angles. By use of the transitive property, we can say that each pair of angle sums is equal to one another. Since one of each of the pair of angles are already congruent, then by the subtraction property, the other angle in each pair is also congruent.

e. Statements

1. $\angle BFC \cong \angle DFC$
2. $m\angle BFC = m\angle DFC$
3. $\angle AFB$ is complementary to $\angle BFC$
4. $\angle EFD$ is complementary to $\angle DFC$
5. $\angle AFB + \angle BFC = 90^{o}$
6. $\angle EFD + \angle DFC = 90^{o}$
7. $\angle AFB + \angle BFC = \angle EFD + \angle DFC$
8. $\angle AFB + \angle BFC = \angle EFD + \angle BFC$
9. $\angle AFB = \angle EFD$
10. $\angle AFB \cong \angle EFD$