

- "If-Then" statements are called conditionals.

the portion following the "if" is called the hypothesis.

the portion following the "then" is called the conclusion.
- By switching the above, the converse statement is formed.

Statements that prove claims to be false are called counterexamples.
- If all of the statements are true, a biconditional or definition can be formed.

Instead of "if-then" statements, these have the form if and only if.

Use the following statement for questions #4 - #8.

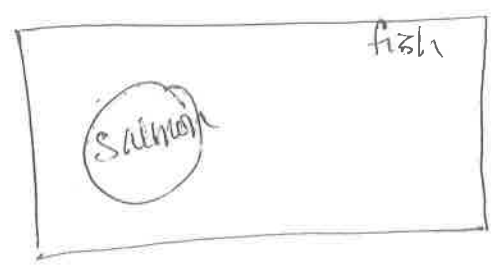
Hypothesis: It is a salmon
Conclusion: It is a fish

- Write a conditional based on the above:

If it is a salmon, then it is a fish.
- Write the converse of the above conditional:

If it is a fish, then it is a salmon
- Is the converse true? Yes or No: No
- If it is true, write the biconditional. If it is false, give a counter example.

False, a trout is a fish and not a salmon
- Create a Euler Diagram for the conditional:



Use the following statement for questions #9 - #12.

A no parking sign is a street sign with a "p" crossed out.

9. Write a conditional based on the above:

If a street sign is a no parking sign, then it has a "p" crossed out.

10. Write the converse of the above conditional:

If a street sign has a "p" crossed out, then it is a no parking sign.

11. Is the converse true? (Yes or No: Yes)

12. If it is true, write the biconditional. If it is false, give a counter example.

A street sign is a no parking sign if and only if it has a "p" crossed out.

13. List the following conditionals in order so they make a logical chain.

3 If I am able to ask questions, I will understand more.

2 If I complete the homework, then I will be able to ask questions.

4 If I understand more, I will do well on the test.

1 If Mrs. Fucsko assigns homework, I will complete it.

14. Write the summary conditional:

If Mrs. Fucsko assigns homework, then I will do well on the test.

Prove #14 and #15 in two-column format.

15. Given: $2x + 1 = 11$

Prove $x = 5$

Work	Reasons
$2x + 1 = 11$	Given
$2x = 10$	Subtraction POE
$x = 5$	Division POE ///

16. Given: $3x + y = 19$

and $y = 7$

Prove $x = 4$

Work	Reasons
$3x + y = 19$	Given
$y = 7$	Given
$3x + 7 = 19$	Substitution
$3x = 12$	Subtraction POE
$x = 4$	Division POE

Name the relationship: complementary, linear pair, vertical, or adjacent.

17)

complementary

18)

vertical

Find the measure of angle b.

19)

90
 $- 30$
 60°

20)

180
 $- 151$
 29°

21)

300
 $+ 26$
 326
 360
 $- 326$
 34°

22)

68°

23)

240
 $+ 52$
 292
 360
 $- 292$
 68°

24)

52°

Find the value of x.

25)

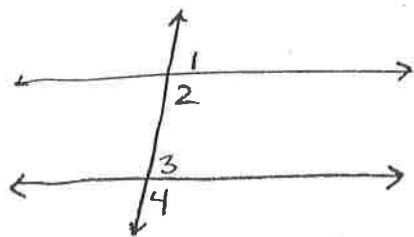
$(4x + 47)^\circ$
 60°
 $(2x - 23)^\circ$
 $x = 46$

$4x + 47 + 2x - 23 + 60 = 360$
 $6x + 84 = 360$
 $-84 \quad -84$
 $6x = 276$
 $\frac{6x}{6} = \frac{276}{6}$

26)

54°
 $(10x - 6)^\circ$
 $54 = 10x - 6$
 $+6 \quad +6$
 $60 = 10x$
 $\frac{60}{10} = \frac{10x}{10}$
 $x = 6$

27. Fill in the missing parts of the proof. Hint: you may have to use the picture to help you find your reasons.

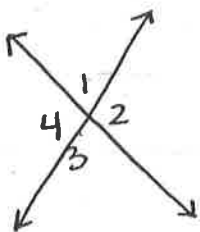


Given: $\angle 1 \cong \angle 3$.

Prove: $\angle 2 \cong \angle 4$.

Statements	Reasons
1. $m\angle 1 + m\angle 2 = 180^\circ$	Linear Pair Property
2. $m\angle 3 + m\angle 4 = 180^\circ$	Linear Pair Property
3. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$	Transitive POE
4. $m\angle 1 = m\angle 3$	Given
5. $m\angle 2 = m\angle 4$	Subtraction POE///

28.



Given: $m\angle 1 = 90^\circ$

Prove: $m\angle 3 = 90^\circ$

Statements	Reasons
1. $m\angle 1 + m\angle 2 = 180^\circ$	Linear Pair Property
2. $m\angle 1 = 90^\circ$	Given
3. $90^\circ + m\angle 2 = 180^\circ$	Substitution
4. $m\angle 2 = 90^\circ$	Subtraction POE
5. $m\angle 1 + m\angle 4 = 180^\circ$	Linear Pair Property
6. $90^\circ + m\angle 4 = 180^\circ$	Substitution
7. $m\angle 4 = 90^\circ$	Subtraction POE
8. $m\angle 1 = m\angle 3$	Vertical Angles
9. $m\angle 3 = 90^\circ$	Transitive POE QED

Key

Find the error in each proof and explain how to correct it.

A. Given: $2(3x+1) = 5x+14$
Prove: $x=12$

1. $2(3x+1) = 5x+14$ Given
2. $6x+2 = 5x+14$ Distributive Property
3. $11x+2 = 14$ Addition Property
4. $11x = 12$ Subtraction Property
5. $x = \frac{12}{11}$ Division Property

#3 Should have subtracted

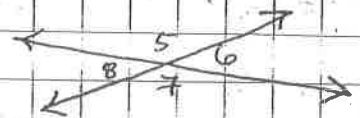
B. Given: Q is the midpoint of \overline{PR}
Prove: $\overline{PR} = 2 \cdot \overline{PQ}$



1. Q is the midpoint of \overline{PR} Given
2. $\overline{PQ} = \overline{QR}$ Definition of midpoint
3. $\overline{PQ} + \overline{QR} = \overline{PR}$ ~~Substitution property of equality~~
4. $\overline{PQ} + \overline{PQ} = \overline{PR}$ Substitution Property of equality
5. $2 \cdot \overline{PQ} = \overline{PR}$ Addition Property
6. $\overline{PR} = 2 \cdot \overline{PQ}$ Symmetric Property

Segment addition postulate

C. Given: $\angle 5$ and $\angle 6$ are a linear pair
Prove: $\angle 5 \cong \angle 7$



1. $\angle 5$ and $\angle 6$ are a linear pair Given
2. $m\angle 5 + m\angle 6 = 180^\circ$ Linear Pair Property
3. $m\angle 6 + m\angle 7 = 180^\circ$ Linear Pair Property
4. $m\angle 5 + m\angle 6 = m\angle 6 + m\angle 7$ Transitive Property
5. $m\angle 5 = m\angle 7$ Subtraction Property
6. $\angle 5 \cong \angle 7$ Angle Congruence Postulate

No errors

Before using #3 you need to say $\angle 6$ and $\angle 7$ are a linear pair (given)

Key

PRACTICE AND APPLICATIONS

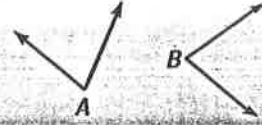
STUDENT HELP

Extra Practice to help you master skills is on p. 806.

10. **PROVING THEOREM 2.2** Copy and complete the proof of the Symmetric Property of Congruence for angles.

GIVEN $\angle A \cong \angle B$

PROVE $\angle B \cong \angle A$



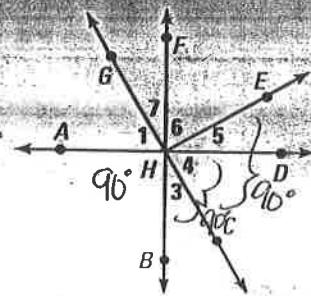
Statements	Reasons
1. $\angle A \cong \angle B$	1. ? Given
2. $m\angle A = m\angle B$	2. Definition of congruent angles
3. $m\angle B = m\angle A$	3. ? symmetric property
4. $\angle B \cong \angle A$	4. ? Definition of congruence of Angle Congruence Postulate

11. **PROVING THEOREM 2.2** Write a two-column proof for the Reflexive Property of Congruence for angles.

FINDING ANGLES In Exercises 12–17, complete the statement given that $m\angle EHC = m\angle DHB = m\angle AHB = 90^\circ$

13. $121 - 90 = 31$
 14. If $m\angle 3 = 34$
 $m\angle 4 = 90 - 34 = 56$
 and $m\angle 5 = 90 - 56 = 34$
 16. If $m\angle 7 = 31$
 $m\angle 3 = 31$
 Then $m\angle 4 = 59$
 $m\angle 5 = 31$
 Then $m\angle 6 = 59$
 since $m\angle 6 + m\angle 5 = 90$

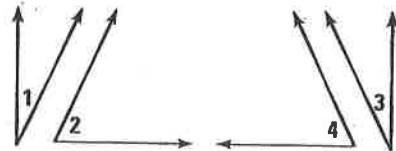
12. If $m\angle 7 = 28^\circ$, then $m\angle 3 = ? 28^\circ$
 13. If $m\angle EHB = 121^\circ$, then $m\angle 7 = ? 31^\circ$
 14. If $m\angle 3 = 34^\circ$, then $m\angle 5 = ? 34^\circ$
 15. If $m\angle GHB = 158^\circ$, then $m\angle FHC = ? 158^\circ$
 16. If $m\angle 7 = 31^\circ$, then $m\angle 6 = ? 59^\circ$
 17. If $m\angle GHD = 119^\circ$, then $m\angle 4 = ? 119^\circ$



18. **PROVING THEOREM 2.5** Copy and complete the proof of the Congruent Complements Theorem.

GIVEN $\angle 1$ and $\angle 2$ are complements,
 $\angle 3$ and $\angle 4$ are complements,
 $\angle 2 \cong \angle 4$

PROVE $\angle 1 \cong \angle 3$



Statements	Reasons
1. $\angle 1$ and $\angle 2$ are complements, $\angle 3$ and $\angle 4$ are complements, $\angle 2 \cong \angle 4$	1. ? Given
2. $m\angle 1 + m\angle 2 = 90$	2. Def. of complementary angles
3. $m\angle 3 + m\angle 4 = 90$	3. Transitive property of equality
4. $m\angle 2 = m\angle 4$	4. ? Angle Congruence Postulate
5. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 2$	5. ? Substitution
6. $m\angle 1 = m\angle 3$	6. ? Subtraction
7. $\angle 1 \cong \angle 3$	7. Definition of congruent angles.

STUDENT HELP

HOMEWORK HELP

- Example 1: Exs. 10, 11
- Example 2: Exs. 12–17
- Example 3: Exs. 12–17
- Example 4: Exs. 19–22
- Example 5: Exs. 23–28
- Example 6: Exs. 23–28