

# Unit 2 Test Study Guide

## (Logic & Proof)

Name: \_\_\_\_\_

Date: \_\_\_\_\_ Per: \_\_\_\_\_

### Topic #1: Conjectures & Counterexamples

**Directions:** Determine if the conjecture is true or false. If false, provide a counterexample.

1. The product of any two prime numbers is always odd.

2. If two angles are complementary, then both angles must be acute.

3. The square of a number is always larger than the number.

4. Two lines always intersect at a point.

### Topic 2: Compound Statements & Truth Tables

**Conjunction:**

**Read as:** \_\_\_\_\_

**True when:** \_\_\_\_\_ statements are \_\_\_\_\_.

**Disjunction:**

**Read as:** \_\_\_\_\_

**True when:** \_\_\_\_\_ statement is \_\_\_\_\_.

**Use the following statements to write compound statements. Determine the truth value.**

*p*: All vegetables are green.

*q*: Vertical angles are congruent.

*r*: All integers are natural numbers.

5.  $p \vee q$ : \_\_\_\_\_

Truth Value: \_\_\_\_\_

6.  $q \wedge r$ : \_\_\_\_\_

Truth Value: \_\_\_\_\_

7.  $p \vee \sim q$ : \_\_\_\_\_

Truth Value: \_\_\_\_\_

8.  $q \wedge \sim r$ : \_\_\_\_\_

Truth Value: \_\_\_\_\_

**Directions:** Complete each truth table.

9.  $\sim p \vee \sim q$


10.  $\sim r \vee (\sim p \wedge q)$


**Topic 3: Conditional Statements**

<b>Conditional:</b> <input type="text"/>	<b>Inverse:</b> <input type="text"/>	<b>Converse:</b> <input type="text"/>	<b>Contrapositive:</b> <input type="text"/>
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**Use the following statements to write conditional statements. Determine the truth value.**

$p$ : two angles form a linear pair;  $q$ : they are adjacent angles

11. Conditional: \_\_\_\_\_  
 \_\_\_\_\_ Truth Value: \_\_\_\_\_

12. Inverse: \_\_\_\_\_  
 \_\_\_\_\_ Truth Value: \_\_\_\_\_

13. Converse: \_\_\_\_\_  
 \_\_\_\_\_ Truth Value: \_\_\_\_\_

14. Contrapositive: \_\_\_\_\_  
 \_\_\_\_\_ Truth Value: \_\_\_\_\_

**Topic 4: Biconditional Statements**

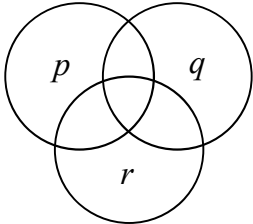
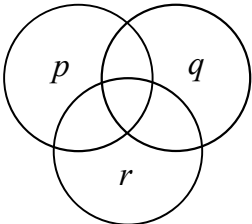
<p><b>Biconditional:</b></p> <div style="border: 1px solid black; border-radius: 10px; width: 100%; height: 40px;"></div>	<p><b>Read as:</b> _____</p> <p><b>True when both conditional (<math>p \rightarrow q</math>) and converse (<math>q \rightarrow p</math>) are true!</b></p>
<p><b>Use the given statements to write the conditional, converse, and biconditional. Determine the truth value of the biconditional. Explain.</b></p> <p><b>15. <math>p</math>:</b> a quadrilateral is a square; <b><math>q</math>:</b> it has four congruent sides</p> <p>Conditional: _____</p> <p>Converse: _____</p> <p>Biconditional: _____</p> <p>Truth Value: _____</p>	

**Topic 5: Deductive Reasoning**

<p><b>Law of Detachment:</b></p> <div style="border: 1px solid black; border-radius: 15px; width: 100%; height: 80px;"></div>	<p><b>Law of Syllogism:</b></p> <div style="border: 1px solid black; border-radius: 15px; width: 100%; height: 80px;"></div>
<p><b>Use the Law of Detachment or Law of Syllogism to make a conclusion. If a conclusion cannot be made, write "no valid conclusion".</b></p>	
<p><b>16. Given:</b> If it is Thursday, then Emma has drama club. If Emma has drama club, then she must take the late bus.</p> <p><b>Conclusion:</b> _____</p>	
<p><b>17. Given:</b> If two angles are vertical, then they are congruent. Two angles are congruent.</p> <p><b>Conclusion:</b> _____</p>	
<p><b>18. Given:</b> If the football team raises at least \$5000, then they can buy new uniforms. The football team raised \$5800.</p> <p><b>Conclusion:</b> _____</p>	
<p><b>19. Given:</b> If you return a book to the library late, then you will pay a fee. If you do not pay your library fees, then you may lose your library card.</p> <p><b>Conclusion:</b> _____</p>	

**Topic 6: Venn Diagrams**

<b>Draw a Venn diagram to represent each relationship.</b>		
<b>20.</b> All linear pairs are adjacent.	<b>21.</b> No rectangles are trapezoids.	<b>22.</b> Some multiples of 3 are also multiples of 4.

<b>Shade the indicated region on the Venn diagram given by the compound statement.</b>			
<b>23.</b> $\sim r \wedge (p \vee q)$		<b>24.</b> $(p \wedge \sim r) \vee (q \wedge r)$	

**Topic 7: Algebraic Proof**

**KNOW THE FOLLOWING PROPERTIES OF EQUALITY:** Addition, Subtraction, Multiplication, Division, Distributive, Substitution, Reflexive, Symmetric, and Transitive

**25. Given:**  $8(x - 1) = 5x - 35$ ; **Prove:**  $x = -9$

Statements	Reasons

**26. Given:**  $4c - d = f, d = c - e, f = d + e$ ; **Prove:**  $3c = d$

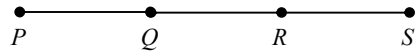
Statements	Reasons

**Topic 8: Segment Proofs**

**KNOW THE FOLLOWING:**

Segment Addition Postulate, Definition of Midpoint, Definition of Congruence, all Properties of Equality, and Properties of Congruence (Reflexive, Symmetric, and Transitive)

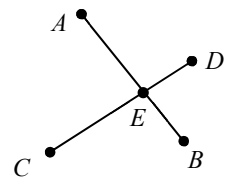
- 27. Given:**  $Q$  is the midpoint of  $\overline{PR}$   
 $R$  is the midpoint of  $\overline{QS}$



**Prove:**  $PQ = \frac{1}{2}QS$

Statements	Reasons
1. $Q$ is the midpoint of $\overline{PR}$	1.
2. $R$ is the midpoint of $\overline{QS}$	2.
3. $PQ = QR$ ; $QR = RS$	3.
4. $PQ = RS$	4.
5. $PQ + PQ = PQ + RS$	5.
6. $2PQ = PQ + RS$	6.
7. $2PQ = QR + RS$	7.
8. $QR + RS = QS$	8.
9. $2PQ = QS$	9.
10. $PQ = \frac{1}{2}QS$	10.

- 28. Given:**  $\overline{AB} \cong \overline{CD}$ ;  $\overline{CE} \cong \overline{AE}$   
**Prove:**  $\overline{ED} \cong \overline{EB}$



Statements	Reasons
1. $\overline{AB} \cong \overline{CD}$ ; $\overline{CE} \cong \overline{AE}$	1.
2. $AB = CD$ ; $CE = AE$	2.
3. $AE + EB = AB$ ; $CE + ED = CD$	3.
4. $CE + EB = CD$	4.
5. $CE + ED = CE + EB$	5.
6. $ED = EB$	6.
7. $\overline{ED} \cong \overline{EB}$	7.

**Topic 9: Angle Proofs**

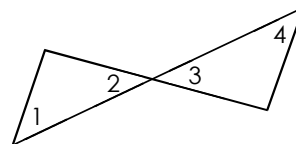
**KNOW THE FOLLOWING:**

Definition of Congruence  
 Definition of Angle Bisector  
 Definition of Complementary Angles  
 Definition of Supplementary Angles

Definition of Perpendicular  
 Definition of Right Angle  
 Angle Addition Postulate  
 Vertical Angles Theorem

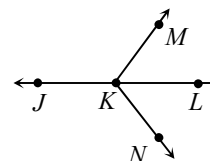
Complement Theorem  
 Linear Pair (Supplement) Theorem  
 Congruent Complements Theorem  
 Congruent Supplements Theorem

**29. Given:**  $\angle 1$  and  $\angle 2$  are complementary;  $\angle 1 \cong \angle 4$   
**Prove:**  $\angle 3$  and  $\angle 4$  are complementary



Statements	Reasons
1. $\angle 1$ and $\angle 2$ are complementary	1.
2. $m\angle 1 + m\angle 2 = 90^\circ$	2.
3. $\angle 1 \cong \angle 4$	3.
4. $m\angle 1 = m\angle 4$	4.
5. $\angle 2 \cong \angle 3$	5.
6. $m\angle 2 = m\angle 3$	6.
7. $m\angle 4 + m\angle 3 = 90^\circ$	7.
8. $\angle 3$ and $\angle 4$ are complementary	8.

**30. Given:**  $\angle JKM$  and  $\angle MKL$  form a linear pair;  
 $\angle JKM$  and  $\angle LKN$  are supplementary  
**Prove:**  $\angle MKL \cong \angle LKN$



Statements	Reasons
1. $\angle JKM$ and $\angle MKL$ form a linear pair	1.
2. $\angle JKM$ and $\angle MKL$ are supplementary	2.
3. $\angle JKM$ and $\angle LKN$ are supplementary	3.
4. $\angle MKL \cong \angle LKN$	4.