Section 2.1:

Find the next item in each pattern.

1. 2, 4, 6, 8, . . . _____
2. Z, Y, X, . . . _____
3. fall, winter, spring, . . . _____
4. When several examples form a pattern and you assume the pattern will continue, you are applying _____.
5. A statement you believe to be _____ based on inductive reasoning is called a conjecture.

Section 2.2:

Match the correct term to complete each sentence.

1. A conditional statement is a statement that can be written in the form "_____ *p*, _____ *q*."
2. The _____ is the part *p* of a conditional statement following the word *if*.
3. The _____ is the part *q* of a conditional statement following the word *then*.
4. The _____ is the statement formed by negating the hypothesis and the conclusion.
5. The _____ is the statement formed by exchanging the hypothesis and the conclusion.
6. The contrapositive is the statement formed by both _____ and _____ the hypothesis and the conclusion.

A. hypothesis
B. converse
C. conclusion
D. if; then
E. inverse
F. negating; exchanging

Use the following conditional statement for Exercises 7–12.

If it is a bicycle, then it has two wheels.

7. Give the hypothesis of the conditional statement. _____
8. Give the conclusion of the conditional statement. _____
9. "If it has two wheels, then it is a bicycle." Tell whether this is the converse, the inverse, or the contrapositive of the given conditional. _____
10. "If it does not have two wheels, then it is not a bicycle." Tell whether this is the converse, the inverse, or the contrapositive of the given conditional. _____
11. "If it is not a bicycle, then it does not have two wheels." Tell whether this is the converse, the inverse, or the contrapositive of the given conditional. _____
12. Tell which of the original statements, the converse, the inverse, and the contrapositive are true statements. (*Hint:* Can you think of another two-wheeled vehicle?)

_____

Use the following statements for Exercises 13 and 14.

Ella says, "When it rains, I go indoors." Casey replies, "I play in the rain if there is no lightning."

13. Rewrite Ella's statement as an "if, then" statement.

_____

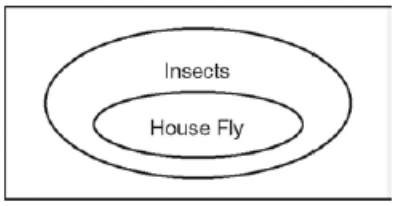
14. Rewrite Casey's statement as an "if, then" statement.

Write the information in this Venn diagram as a conditional statement.

_____

_____

_____



Section 2.3:

State the hypothesis (*p*) and conclusion (*q*) of each given conditional. Then tell whether the conjecture is valid or not valid by the Law of Detachment.

5. Given: If a person sees penguins, then the person is in Antarctica. Carlos sees penguins.

   Conjecture: Carlos is in Antarctica.

   Hypothesis: _____

   Conclusion: _____

   The conjecture is _____ .

6. Given: If a person sees a polar bear, then the person is in the Arctic. James is in the Arctic.

   Conjecture: James sees a polar bear.

   Hypothesis: _____

   Conclusion: _____

   The conjecture is _____ .

7. The L aw of _____ states that if $p \rightarrow q$ and $q \rightarrow r$ are true statements, then $p \rightarrow r$ is a true statement.

For Exercise 8, use these statements:

p: You are a clown. *q*: You wear big shoes. *r*: Your feet hurt.

8. Use the Law of Syllogism to complete a valid conjecture.

   Given: If you are a clown, then you wear big shoes. If you wear big shoes, then your feet hurt.

   Conjecture: If you are a clown, then _____ .

Determine if the conjecture is valid by the Law of Syllogism.

Given: The radio is distracting when I am studying. If it is 7:30 P.M. on a weeknight, I am studying.

Conjecture: If it is 7:30 P.M. on a weeknight, the radio is distracting. _____

Section 2.4

1. A biconditional statement combines a conditional and its _____.
2. A biconditional statement can be written in the form "*p* if and only if *q*," which means "if *p*, then *q*, and if _____, then _____."

Write the converse from each given biconditional.

3. Biconditional: A cat is happy if and only if it is purring.

   Conditional: If a cat is happy, then it is purring.

   Converse: _____

4. Biconditional: A figure is a segment if and only if it is straight and has two endpoints.

   Conditional: If a figure is a segment, then it is straight and has two endpoints.

   Converse: _____

Write a biconditional from each given conditional and converse.

5. Conditional: If two angles share a side, then they are adjacent.

   Converse: If two angles are adjacent, then they share a side.

   Biconditional: _____

6. Conditional: If your temperature is normal, then your temperature is 98.6°F.

   Converse: If your temperature is 98.6°F, then your temperature is normal.

   Biconditional: _____

Section 2.4 continued:

Write the conditional statement and converse within each biconditional.

1. The tea kettle is whistling if and only if the water is boiling.

   Conditional: _____

   Converse: _____

2. A biconditional is true if and only if the conditional and converse are both true.

   Conditional: _____

   Converse: _____

For each conditional, write the converse and a biconditional statement.

3. Conditional: If n is an odd number, then $n - 1$ is divisible by 2.

   Converse: _____

   Biconditional: _____

4. Conditional: An angle is obtuse when it measures between 90° and 180°.

   Converse: _____

   Biconditional: _____

Determine whether a true biconditional can be written from each conditional statement. If not, give a counterexample.

5. If the lamp is unplugged, then the bulb does not shine.

   _____

6. The date can be the 29th if and only if it is not February.

   _____