Section 2.2: Inductive and Deductive Reasoning

Bellwork:

Find the common difference of the arithmetic sequence.
Find the next two terms.

1. 0.09, 0.15, 0.21, ...

2. 3.36, 1.14, −1.08, ...

3. 8, 3, −2, ...

4. 2.4, 2.9, 3.4, ...

Essential Question

How can you use reasoning to solve problems?

Learning Objectives

1) Students will use inductive reasoning
2) students will use deductive reasoning

VOCABULARY:

Inductive Reasoning: To reason based on strong _____ or _____ - not actual _____

Conjecture: An opinion or conclusion based on _____ reasoning.

Deductive Reasoning: To form a conclusion based on _____

Counterexample: An example that _____ a statement _____

Work with a partner. Write a conjecture about the pattern. Then use your conjecture to draw the 10th object in the pattern.

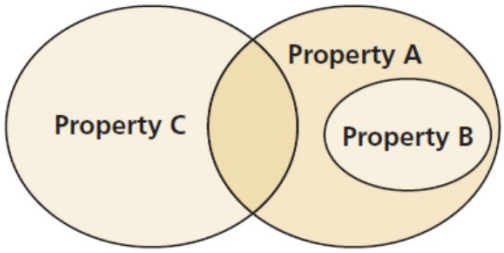
1 2 3 4 5 6 7

a.

b.

c.

Work with a partner. Use the Venn diagram to determine whether the statement is true or false. Justify your answer. Assume that no region of the Venn diagram is empty.



a. If an item has Property B, then it has Property A.
b. If an item has Property A, then it has Property B.
c. If an item has Property A, then it has Property C.
d. Some items that have Property A do not have Property B.
e. If an item has Property C, then it does not have Property B.
f. Some items have both Properties A and C.
g. Some items have both Properties B and C.

THINK:

a) Numbers such as 3, 4, and 5 are called *consecutive integers* . Make and test a conjecture about the sum of any three consecutive integers.

b) A student makes the following conjecture about the sum of two numbers. Find a **counterexample** to disprove the student's conjecture.

Conjecture The sum of two numbers is always more than the greater number.

Find a counterexample to show that the conjecture is false.

The value of x^2 is always greater than the value of x.

The sum of two numbers is always greater than their difference.

$x^2 = 4$ if and onlly if $x = 2$

Core Concept

Deductive Reasoning

Deductive reasoning uses facts, definitions, accepted properties, and the laws of logic to form a logical argument. This is different from *inductive reasoning*, which uses specific examples and patterns to form a conjecture.

Laws of Logic

Law of Detachment

If the hypothesis of a true conditional statement is true, then the conclusion is also true.

Law of Syllogism

If hypothesis p, then conclusion q.
If hypothesis q, then conclusion r.
If hypothesis p, then conclusion r.

If these statements are true, then this statement is true.

If two segments have the same length, then they are congruent. You know that $BC = XY$. Using the Law of Detachment, what statement can you make?

If possible, use the Law of Syllogism to write a new conditional statement that follows from the pair of true statements.

If $x^2 > 25$, then $x^2 > 20$.
If $x > 5$, then $x^2 > 25$.

Decide whether inductive reasoning or deductive reasoning is used to reach the conclusion. Explain your reasoning.

a. Each time Monica kicks a ball up in the air, it returns to the ground. So, the next time Monica kicks a ball up in the air, it will return to the ground.

b. All reptiles are cold-blooded. Parrots are not cold-blooded. Sue's pet parrot is not a reptile.

8. If $90° < m\angle R < 180°$, then $\angle R$ is obtuse. The measure of $\angle R$ is 155°. Using the Law of Detachment, what statement can you make?

9. Use the Law of Syllogism to write a new conditional statement that follows from the pair of true statements.
If you get an A on your math test, then you can go to the movies.
If you go to the movies, then you can watch your favorite actor.

Writing Prompt: Compare and contrast inductive reasoning and deductive reasoning.

Homework:

GST: pg. 80: 2, 10-34e, 40, 41, 47-50 all

H. GST: pg. 80: 2, 10-34e, 40, 41, 43, 44, 46