

## Chapter 1 Review: Logic

Textbook p6-62

Summary: p.34,59-60

Practice Questions p.61-62

### Key Concepts:

**Inductive** = Try a bunch of examples and make a \_\_\_\_\_ based on the pattern that you find. Or prove that something is false using a \_\_\_\_\_.

**Deductive** = Prove that something is true using logical steps or algebra. Be careful to avoid common errors such as \_\_\_\_\_ or \_\_\_\_\_.

### Key Example: The Number Trick

Choose a number

Double it

Add 6

Double again

Subtract 4

Divide by 4

Subtract 2

Inductive	Deductive																																										
Try a few numbers  <table border="1"> <tr><td>Choose a number</td><td></td><td></td><td></td></tr> <tr><td>Double it</td><td></td><td></td><td></td></tr> <tr><td>Add 6</td><td></td><td></td><td></td></tr> <tr><td>Double again</td><td></td><td></td><td></td></tr> <tr><td>Subtract 4</td><td></td><td></td><td></td></tr> <tr><td>Divide by 4</td><td></td><td></td><td></td></tr> <tr><td>Subtract 2</td><td></td><td></td><td></td></tr> </table> <i>Based on the pattern, I make a conjecture that...</i>	Choose a number				Double it				Add 6				Double again				Subtract 4				Divide by 4				Subtract 2				Let $n =$ any number  <table border="1"> <tr><td>Choose a number</td><td></td></tr> <tr><td>Double it</td><td></td></tr> <tr><td>Add 6</td><td></td></tr> <tr><td>Double again</td><td></td></tr> <tr><td>Subtract 4</td><td></td></tr> <tr><td>Divide by 4</td><td></td></tr> <tr><td>Subtract 2</td><td></td></tr> </table> <i>If I start with any number <math>n</math>, I have proved deductively that...</i>	Choose a number		Double it		Add 6		Double again		Subtract 4		Divide by 4		Subtract 2	
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**Practice #1:** Sally noticed a pattern when dividing the square of an odd number by 4. Determine the pattern and make a conjecture. (Inductive Reasoning)

**Practice #2:** Jim makes a conjecture that whenever you multiply two whole numbers, the product is always greater than either of the two factors. Do you agree or disagree? (Can you find a counter-example?)

**Practice #3:** All dogs are mammals. All mammals are vertebrates. Shaggy is a dog. What can be deduced about Shaggy?

**Practice #4:** Prove that the product of an even integer and an odd integer is always even.

Inductive Reasoning	Deductive Reasoning

**Practice #5:** Consider the following number-trick:

Choose any number

Multiply by 4.

Add 10.

Divide by 2.

Subtract 5.

Divide by 2.

Add 3.

Use inductive reasoning to make a conjecture about the result and then prove it using deductive reasoning.

Inductive Reasoning	Deductive Reasoning

**Practice #6:** According to this proof,  $2 = 1$ . Determine the error in reasoning.

$$\begin{aligned} \text{Let } a &= b \\ a^2 &= ab \\ a^2 + a^2 &= a^2 + ab \\ 2a^2 &= a^2 + ab \\ 2a^2 - 2ab &= a^2 - ab \\ 2(a^2 - ab) &= 1(a^2 - ab) \\ 2 &= 1 \end{aligned}$$

**Practice #7:** Prove that the sum of four consecutive natural numbers is always even. (Deductive Reasoning)