**Inductive reasoning** is a type of reasoning in which you look at a pattern and then make some type of prediction based on the pattern.

These predictions are also called **conjectures.**

**A conjecture** is a statement about what you think will happen based on the pattern you observed.

**Sample Problem 1**: **Make a conjecture about the next figure in the pattern. Then draw the figure.**

|  |  |
| --- | --- |
| **a.** | **1 2 3 4** |
|  | **Observation:** The direction of the arrow rotates by 45° clockwise each time.  **Conjecture:** Next figure is: |
| **b.** | **1 2 3 4** |
|  | **Observation:** Each next figure has two more triangles than previous.  **Conjecture:** Next figure is: |
| **c.** | **1 2 3 4** |
|  | **Observation:** **Each next figure has two more pink circles than previous.**  **Conjecture:**  **Next figure is:** |

**Sample Problem 2**: **Write a rule for each number pattern, and find the next number.**

|  |  |
| --- | --- |
| **a.** |  |
|  | Start with each number is obtained by adding 4 to the previous number.  The next number is |
| **b.** |  |
|  | Each number is two times the previous number.  The next number is |
| **c.** |  |
|  | Each number is of the previous number.  The next number is. |

One way to show that a conjecture is not true is to find a counterexample.

**A counterexample** is an instance in which the conjectured pattern does not work.

Only one counterexample is needed to prove a conjecture false. A counterexample can be a drawing, a statement, or a number.

**Sample Problem 3**: **Find one counterexample to show that each conjecture is false.**

|  |  |  |
| --- | --- | --- |
| **a.** | The difference between two integers is always positive. | **Counterexample** |
| **b.** | All prime numbers are odd integers. | **Counterexample**  is prime number but it is even. |
| **c.** | If the product of two numbers is positive, then the two numbers must both be positive. | **Counterexample** |

***Finding the n term***

**Sample Problem 4**: **Find the n term.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a.** | |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  | |
| **b.** | |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  | |