Examples of inductive reasoning in math pdf

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If you're seeing this message, it means we're having trouble loading external resources on our website. If you're behind a web filter, please make sure that the domains *.kastatic.org and *.kasandbox.org are unblocked. Generally, we subconsciously make decisions based on our past observations and experiences. For example, if you leave for work and it's raining outside, you reasonably assume that it will rain the whole way and decide to carry an umbrella. This decision is an example of inductive reasoning. Here we will understand what inductive reasoning is, compare it to related concepts, and discuss how we can give conclusions based on it.Definition of inductive reasoningInductive reasoning is a reasoning method that recognizes patterns and evidence from specific occurrences to reach a general conclusion. The general unproven conclusion we reach using inductive reasoning is called a conjecture or hypothesis. With inductive reasoning, the conjecture is supported by truth but is made from observations about specific situations. So, the statements may not always be true in all cases when making the conjecture. Inductive reasoning is often used to predict future outcomes. Conversely, deductive reasoning is more certain and can be used to draw conclusions about specific circumstances using generalized information or patterns.Deductive reasoning is a reasoning method that makes conclusions based on multiple logical premises which are known to be true.The difference between inductive reasoning and deductive reasoning is that, if the observation is true, then the conclusion will be true when using deductive reasoning. However, when using inductive reasoning, even though the statement is true, the conclusion won't necessarily be true. Often inductive reasoning is referred to as the "Bottom-Up" approach as it uses evidence from specific scenarios to give generalized conclusions. Whereas, deductive reasoning is called the "Top-Down" approach as its draws conclusions about specific information based on the generalized statement.Inductive reasoning vs. Deductive reasoning, slideplayer.comLet's understand it by taking an example.Deductive ReasoningConsider the true statements – Numbers ending with 0 and 5 are divisible by 5. Number 20 ends with 0.Conjecture – Number 20 must be divisible by 5.Here, our statements are true, which leads to true conjecture.Inductive ReasoningTrue statement – My dog is brown. My neighbor's dog is also brown.Conjecture – All dogs are brown.Here, the statements are true, but the conjecture made from it is false.Caution: It is not always the case that the conjecture is true. We should always validate it, as it may have more than one hypothesis that fits the sample set. Example: . This is correct for all integers except 0 and 1.Examples of inductive reasoningHere are some examples of inductive reasoning that show how a conjecture is formed.Find the next number in the sequence by inductive reasoning.Solution: Observe: We see the sequence is increasing.Pattern: Sequence Pattern, Mouli Javia - StudySmarter OriginalsHere the number increases by respectively.Conjecture: The next number will be 16, because The different types of inductive reasonings are categorized as follows:This form of reasoning gives the conclusion of a broader population from a small sample.Example: All doves I have seen are white. So, most of the doves are probably white.Here, the conclusion is drawn based on a statistical representation of the sample set.Example: 7 doves out of 10 I have seen are white. So, about 70% of doves are white.This is similar to statistical induction, but additional information is added with the intention of making the hypothesis more accurate.Example: 7 doves out of 10 in the U.S. are white. So about 70% of doves in the U.S. are white.This type of reasoning forms a causal connection between evidence and hypothesis.Example: I have always seen doves during winter; so, I will probably see doves this winter.This inductive method draws conjecture from similar qualities or features of two events.Example: I have seen white doves in the park. I also have seen white geese there. So, doves and geese are both of the same species.This inductive reasoning predicts a future outcome based on past occurrence(s).Example: There are always white doves in the park. So, the next dove which comes will also be white.Methods of inductive reasoningInductive reasoning consists of the following steps:Observe the sample set and identify the patterns.Make a conjecture based on the pattern.Verify the conjecture.How to make and test conjectures?To find the true conjecture from provided information, we first should learn how to make a conjecture. Also, to prove the newly formed conjecture true in all similar circumstances, we need to test it for other similar evidence.Let us understand it by taking an example.Derive a conjecture for three consecutive numbers and test the conjecture.Remember: Consecutive numbers are numbers that come after another in increasing order. Solution:Consider groups of three consecutive numbers. Here these numbers are integers.To make a conjecture, we first find a pattern.Pattern: As we can see this pattern for the given type of numbers, let's make a conjecture.Conjecture: The sum of three consecutive numbers is equal to three times the middle number of the given sum.Now we test this conjecture on another sequence to consider if the derived conclusion is in fact true for all consecutive numbers.Test: We take three consecutive numbers A conjecture is said to be true if it is true for all the cases and observations. So if any one of the cases is false, the conjecture is considered false. The case which shows the conjecture is false is called the counterexample for that conjecture.It is sufficient to show only one counterexample to prove the conjecture false.The difference between two numbers is always less than its sum. Find the counterexample to prove this conjecture false.Solution: Let us consider two integer numbers say -2 and -3.Sum: Difference: Here the difference between two numbers –2 and –3 is greater than its sum. So, the given conjecture is false.Examples of making and testing conjecturesLet's once again take a look at what we learned through examples.Make a conjecture about a given pattern and find the next one in the sequence.Inductive reasoning sequence example, Mouli Javia - StudySmarter OriginalsSolution: Observation: From the given pattern, we can see that every quadrant of a circle turns black one by one.Conjecture: All quadrants of a circle are being filled with color in a clockwise direction.Next step: The next pattern in this sequence will be: Next figure in sequence, Mouli Javia - StudySmarter OriginalsMake and test conjecture for the sum of two even numbers.Solution:Consider the following group of small even numbers.Step 1: Find the pattern between these groups.From the above, we can observe that the answer of all the sums is always an even number.Step 2: Make a conjecture from step 2.Conjecture: The sum of even numbers is an even number.Step 3: Test the conjecture for a particular set.Consider some even numbers, say, The answer to the above sum is an even number. So the conjecture is true for this given set. To prove this conjecture true for all even numbers, let's take a general example for all even numbers.Step 4: Test conjecture for all even numbers.Consider two even numbers in the form: , where are even numbers and are integers.Hence, it is an even number, as it is a multiple of 2 and is an integer.So our conjecture is true for all even numbers.Show a counterexample for the given case to prove its conjecture false.Two numbers are always positive if the product of both those numbers is positive.Solution: Let us first identify the observation and hypothesis for this case.Observation: The product of the two numbers is positive.Hypothesis: Both numbers taken must be positive.Here, we have to consider only one counterexample to show this hypothesis false.Let us take into consideration the integer numbers. Consider –2 and –5.Here, the product of both the numbers is 10, which is positive. But the chosen numbers –2 and –5 are not positive. Hence, the conjecture is false.Let's take a look at some of the advantages and limitations of inductive reasoning.AdvantagesInductive reasoning allows the prediction of future outcomes.This reasoning gives a chance to explore the hypothesis in a wider field.This also has the advantage of working with various options to make a conjecture true.LimitationsInductive reasoning is considered to be predictive rather than certain.This reasoning has limited scope and, at times, provides inaccurate inferences.Inductive reasoning has different uses in different aspects of life. Some of the uses are mentioned below:Inductive reasoning is the main type of reasoning in academic studies.This reasoning is also used in scientific research by proving or contradicting a hypothesis.For building our understanding of the world, inductive reasoning is used in day-to-day life. Inductive Reasoning — Key takeaways Inductive reasoning is a reasoning method that recognizes patterns and evidence to reach a general conclusion.The general unproven conclusion we reach using inductive reasoning is called a conjecture or hypothesis.A hypothesis is formed by observing the given sample and finding the pattern between observations. A conjecture is said to be true if it is true for all the cases and observations.The case which shows the conjecture is false is called a counterexample for that conjecture. Inductive reasoning is a reasoning method that recognizes patterns and evidence to reach a general conclusion. Inductive reasoning allows the prediction of future outcomes. Inductive reasoning in geometry observes geometric hypotheses to prove results. Inductive reasoning is used in academic studies, scientific research, and also in daily life. Inductive reasoning is considered to be predictive rather than certain. So not all predicted conclusions can be true. Question What is inductive reasoning? Answer A reasoning method that observes patterns and evidence to prove conjecture true. Question Answer Conjecture is the general conclusion which we reached by using induction reasoning. Question Make a conjecture about the next number in the given sequence.1, 4, 7, 10 Question Choose the correct conjecture for the following?1, 8, 27, 64 Question Are inductive and deductive the same type of reasoning? Question What is the difference between inductive and deductive reasoning? Answer In inductive reasoning, true observations might have false conjecture. But true observations by deductive reasoning will lead to true conjecture. Question Which of the following is not a type of inductive reasoning? Answer Question What is a counterexample? Answer An example or case which proves conjecture is called a counterexample. Question What is the answer to the conjecture? - The product of two odd numbers is odd. Answer Question Find a counterexample for: All even numbers are composite. Answer 2 is an even number but not composite, as it is a prime number. Question Complete the conjecture: The square of any negative number is ? Answer

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