

Inductive and Deductive Reasoning

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What is a Conjecture?

The conclusion drawn from observations, examples and pattern is called conjecture.

What is an Argument?

An argument is a series of statements intended to determine the truth of another statement.

What is Inductive Reasoning?

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- ▶ uses specific examples to arrive at a general rule, generalizations or conclusions
- ▶ a process of observing data, recognizing patterns, and making generalizations from observations
- ▶ is judging by experience
- ▶ involves uncertainty in making conclusions

Example 1

Draw a conclusion from each given situation.

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1. 3, 10, 17, 24, 31. The next number is

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2. S, M, T, W, T, _____, S. The letter in the blank should be

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1. 3, 10, 17, 24, 31. The next number is 38.
2. S, M, T, W, T, _____, S. The letter in the blank should be F.
3. My Math teacher is strict. My previous Math teachers were strict. Therefore,

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4. $1 \times 10 = 10$, $2 \times 10 = 20$, $3 \times 10 = 30$, $24 \times 10 = 240$, $2345 \times 10 =$

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5. It has rained every day for the past six days, and it is raining today as well. Therefore,

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5. It has rained every day for the past six days, and it is raining today as well. Therefore, it may rain tomorrow.

Example 2

Determine whether the conjecture is *True* or *False* based on the given information.

1. *Given*

The ages of the students in a Grade 8 class are 12, 13, 12, 12, 14, 13, 13, 13, 12, and 13.

Example 2

Determine whether the conjecture is *True* or *False* based on the given information.

1. *Given*

The ages of the students in a Grade 8 class are 12, 13, 12, 12, 14, 13, 13, 13, 12, and 13.

Conjecture

All the students in the class are at least 12 years old.

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D , E , and F are distinct points.

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2. *Given*

D , E , and F are distinct points.

Conjecture

D , E , and F are collinear.

Example 2

3. *Given*

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4. *Given* $\angle P$ and $\angle R$ are right angles.
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- ▶ a type of reasoning which makes use of accepted rules of logic

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2. Conclusion: the statement drawn from the hypothesis

What is the Law of Detachment (Modus Ponens)?

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Minor Premise: p is true.

What is the Law of Detachment (Modus Ponens)?

Major Premise: If p is true, then q is true.

Minor Premise: p is true.

Conclusion: Therefore, q is true.

Example 3

Draw a conclusion from each given situation using deductive reasoning.

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Major Premise: If you are an 18-year old Filipino citizen, then you can vote.

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Minor Premise: Pete is an 18-year old Filipino.

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Conclusion: Therefore,

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Minor Premise: Pete is an 18-year old Filipino.

Conclusion: Therefore, Pete can vote.

Example 4

Draw a conclusion from each given situation using deductive reasoning.

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Major Premise: If a person has a driver's license, then he is allowed to drive.

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Minor Premise: Arturo has a driver's license.

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Major Premise: If a person has a driver's license, then he is allowed to drive.

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Conclusion: Therefore,

Example 4

Draw a conclusion from each given situation using deductive reasoning.

Major Premise: If a person has a driver's license, then he is allowed to drive.

Minor Premise: Arturo has a driver's license.

Conclusion: Therefore, Arturo is allowed to drive.

What is the Law of Syllogism (Chain Rule)?

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Major Premise: If p is true, then q is true.

Minor Premise: If q is true, then r is true.

What is the Law of Syllogism (Chain Rule)?

Major Premise: If p is true, then q is true.

Minor Premise: If q is true, then r is true.

Conclusion: If p , then r .

Example 5

Draw a conclusion from each given situation using deductive reasoning.

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Major Premise: If it is May, then there are many flowers.

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Major Premise: If you drive a smaller car, then you will use less gasoline.

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Major Premise: If you drive a smaller car, then you will use less gasoline.

Minor Premise: If you use less gasoline, then you save money.

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Draw a conclusion from each given situation using deductive reasoning.

Major Premise: If you drive a smaller car, then you will use less gasoline.

Minor Premise: If you use less gasoline, then you save money.

Conclusion: Therefore, if you drive a smaller car, then you save money.

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- ▶ The next number is 25.
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2. Coplanar points are points on the same plane. X , Y , Z are coplanar.

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Draw a conclusion from each given situation and identify the kind of reasoning used.

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- ▶ Therefore, X, Y, Z are on the same plane.

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1. 5, 10, 15, 20
 - ▶ The next number is 25.
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2. Coplanar points are points on the same plane. X, Y, Z are coplanar.
 - ▶ Therefore, X, Y, Z are on the same plane.
 - ▶ Deductive reasoning
3. A regular polygon is equilateral. $ABCD$ is a regular quadrilateral.

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 - ▶ Therefore, $ABCD$ is equilateral.

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 - ▶ Deductive reasoning

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Draw a conclusion from each given situation and identify the kind of reasoning used.

4. Filipinos are peace-loving people. Eloisa is a Filipino.

- ▶ Therefore, Eloisa is a peace-loving person.
- ▶ Deductive reasoning

5. J, F, M, A, M, _____, J.

Example 7

Draw a conclusion from each given situation and identify the kind of reasoning used.

4. Filipinos are peace-loving people. Eloisa is a Filipino.
 - ▶ Therefore, Eloisa is a peace-loving person.
 - ▶ Deductive reasoning
5. J, F, M, A, M, _____, J.
 - ▶ The letter in the blank should be

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Draw a conclusion from each given situation and identify the kind of reasoning used.

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 - ▶ Deductive reasoning
5. J, F, M, A, M, _____, J.
 - ▶ The letter in the blank should be J.
 - ▶ Inductive reasoning
6. Niku is Danica's cousin. Donna is Danica's twin sister.

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5. J, F, M, A, M, _____, J.
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6. Niku is Danica's cousin. Donna is Danica's twin sister.
 - ▶ Therefore, Niku is also Donna's cousin.

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 - ▶ Therefore, Eloisa is a peace-loving person.
 - ▶ Deductive reasoning
5. J, F, M, A, M, _____, J.
 - ▶ The letter in the blank should be J.
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Example 7

7. If a person does not get enough sleep, that person will be tired. Marcos does not get enough sleep.

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8. 4, 8, 16, 32, _____, _____

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 - ▶ Deductive reasoning
8. 4, 8, 16, 32, _____, _____
- ▶ The next two numbers are

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- ▶ Therefore, Marcos will be tired.
 - ▶ Deductive reasoning
8. 4, 8, 16, 32, _____, _____
- ▶ The next two numbers are 64 and 128.

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8. 4, 8, 16, 32, _____, _____
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9. All piano players are musicians. Fred is a piano player.

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 - ▶ Therefore, Fred is a musician.
 - ▶ Deductive reasoning
10. 1, 2, 4, 7, 11, _____

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 - ▶ Therefore, Marcos will be tired.
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8. 4, 8, 16, 32, _____, _____
 - ▶ The next two numbers are 64 and 128.
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 - ▶ Therefore, Fred is a musician.
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 - ▶ The next number should be

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8. 4, 8, 16, 32, _____, _____
 - ▶ The next two numbers are 64 and 128.
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9. All piano players are musicians. Fred is a piano player.
 - ▶ Therefore, Fred is a musician.
 - ▶ Deductive reasoning
10. 1, 2, 4, 7, 11, _____
 - ▶ The next number should be 16.

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7. If a person does not get enough sleep, that person will be tired. Marcos does not get enough sleep.
 - ▶ Therefore, Marcos will be tired.
 - ▶ Deductive reasoning
8. 4, 8, 16, 32, _____, _____
 - ▶ The next two numbers are 64 and 128.
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9. All piano players are musicians. Fred is a piano player.
 - ▶ Therefore, Fred is a musician.
 - ▶ Deductive reasoning
10. 1, 2, 4, 7, 11, _____
 - ▶ The next number should be 16.
 - ▶ Inductive reasoning

Thank you for watching.