# CONCEPT MAP

FORM 4

## LOGICAL REASONING

### Statements

Statement is a sentence such that we can determine whether it is true or false.

### Quantifier

- 'All' means each object or case satisfies a certain condition.
- 'Some' means a few and not all objects or cases satisfy a certain condition.

### Negating a Statement

The word 'not' or 'no' will change a true statement to become false and vice versa.

### Truth Value of a Compound Statement using the Word 'and'

| *p* | *q* | *p* and *q* |
|---|---|---|
| True | True | True |
| True | False | False |
| False | True | False |
| False | False | False |

### Truth Value of a Compound Statement using the Word 'or'

| *p* | *q* | *p* or *q* |
|---|---|---|
| True | True | True |
| True | False | True |
| False | True | True |
| False | False | False |

### Implications

- The statement 'if *p*, then *q*' is an implication with *p* as the antecedent and *q* as the consequent.
- For the statement '*p* if and only if *q*', two implications can be written as follows:
  Implication 1: If *p*, then *q*.
  Implication 2: If *q*, then *p*.
- The converse of the implication 'if *p*, then *q*' is 'if *q*, then *p*'.
- The inverse of the implication 'if *p*, then *q*' is 'if not *p*, then not *q*'.
- The contrapositive of the implication 'if *p*, then *q*' is 'if not *q*, then not *p*'.

### Arguments

An argument is a process of making a 'conclusion' based on two or more statements known as 'premises'.

### Deductive Arguments

Deductive argument is an argument such that its premise is definitely true to guarantee that the conclusion is true.

### Inductive Arguments

In an inductive argument, the premises are made such that they are as convincing as possible in order that if they are cogent enough, then its conclusion is strong.

### Valid Deductive Argument

**Argument form I**
Premise 1: All *A* is *B*.
Premise 2: *C* is *A*.
Kesimpulan: *C* is *B*.
**Argument form II**
Premise 1: If *p*, then *q*.
Premise 2: *p* is true.
Conclusion: *q* is true.
**Argument form III**
Premise 1: If *p*, then *q*.
Premise 2: Not *q* is true.
Conclusion: Not *p* is true.

### Strong and Weak Inductive Argument

- A strong inductive argument has firm premises with high level of trustworthiness such that a logical and reliable conclusion can be made
- A weak inductive argument has doubtful premises causing the conclusion that is made becomes illogical and unconvincing.

### Solving Problems

- Deductive reasoning is a process of making a specific conclusion based on a general statement.
- Inductive reasoning is a process of making a general conclusion based on specific cases.
- Inductive and deductive reasoning can be used to solve problems in our daily real-life situations.

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