1.   Details of Module and its structure

| Module Detail	
Subject Name	Psychology
Course Name	Psychology 02 (Class XI, Part- 2)
Module Name/Title	Thinking – Part 1
Module Id	kepy_10801
Pre-requisites	Awareness of cognitive processes like thinking, imagination, problem solving etc.
Objectives	After going through this lesson, the learners will be able to understand the following: • Nature of thinking • The processes of thinking • Understanding of cognitive processes involved in problem solving, reasoning and decision making
Keywords	Cognition, imagery, prototype, reasoning, analogy, algorithm, heuristics

2.   Development Team

Role	Name	Affiliation
National MOOC Coordinator	Prof. Amarendra P. Behera	CIET, NCERT, New Delhi
Program Coordinator	Dr. Rejaul Karim Barbhuiya	CIET, NCERT, New Delhi
Course Coordinator (CC) / PI	Prof. Prabhat Kumar Mishra Prof. Anjum Sibia	DEPFE, NCERT New Delhi DEPFE, NCERT New Delhi
Course Co-Coordinator / Co-PI	Dr. Nidhi Gusain	CIET, NCERT, New Delhi
Subject Matter Expert (SME)	Dr. Neeti Bisht	D.P.S, Manali, Himanchal Pradesh
Review Team	Ms. Neelam Shrivastava	Vasant Valley School, New. Delhi
Technical Team	Mr. Shobit Saxena Ms. Khushboo Sharma	CIET, NCERT, New Delhi CIET, NCERT, New Delhi

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1.   Introduction

➢ Thinking is the basis of all the mental activities.

➢ It is a core subject area with an independent existence and a meaning of its own.

➢ It is a mental or cognitive activity which is intended for providing solution to the problem, making choices, taking valuable decisions, judging facts and reaching to conclusions.
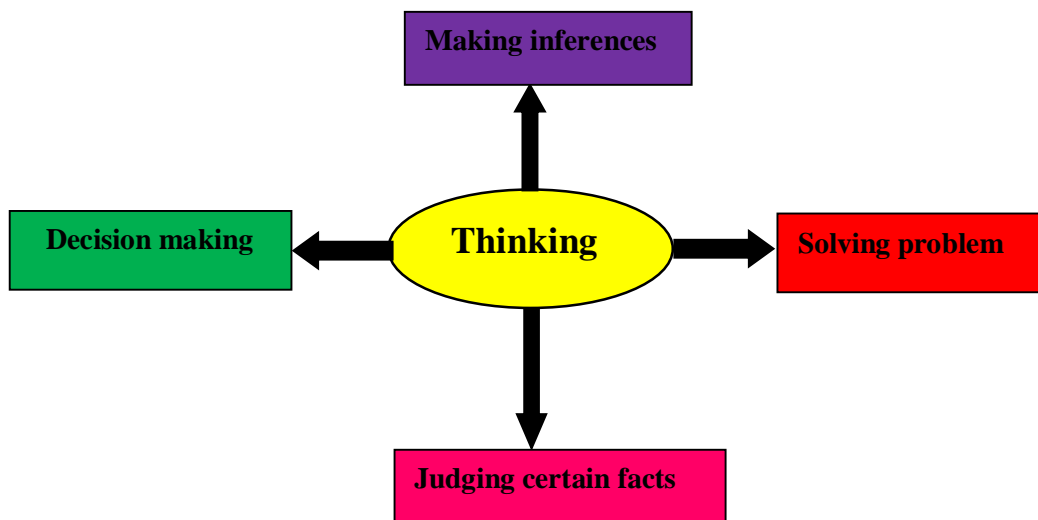
Nature of Thinking

Let us all get together and imagine a world that we want to live in. to answer this question we collect the information that exists in the world today, judge what is right and what is wrong; the reason out the pros and cons. We may also analyse, if the existing problems can be resolved or not and then decide Now in doing this exercise we are doing a number of cognitive activities like abstracting, imagining, problem solvi9ng, decision making etc. In other words, all this is thinking.

What is thinking?

• Thinking is the base of all cognitive activities or processes and is unique to human beings.

• It involves manipulation and analysis of information received from the environment.

- **Thinking is a higher mental process through which we manipulate and analyse the acquired or existing information.**

- Manipulation and analysis is the result of abstracting, reasoning, imagining, problem solving, judging and decision making.

- Thinking is organized and goal directed.

- Thinking is an internal mental process, which can be inferred from overt behaviour. *For example:* if we see a chess player engrossed in thinking for several minutes before making a move, we cannot observe what he is thinking but we can infer what he was thinking or what strategies he was trying to evaluate, from his next move.

2. **Building Blocks of Thought**

- The building blocks of thoughts are mental images and concepts.

   ✓ **Mental images**

   ➢ These are mental representations that stand for objects or events and have a picture like quality.

   ➢ Mental images are mental representations of a sensory experience which can be used to think about places, events and things

   For example: when we park our vehicle at a certain place in the market, we capture the image of that place in our mind and while locating the vehicle we use the mental image formed to find it.

- ✓ **Concepts**
    - ➤ These are mental representation of a category. It refers to a class of objects, ideas or events that share common properties.
    - ➤ When we come across with an object, we try to identify it by matching its characteristics with the already existing category of objects and events and if matching is perfect we call them category.

  For example: when we see an apple, we categorise it as fruit on the basis of its characteristics and by matching it with the other elements of its category.

Why do we form concepts?

- Concept formation helps us in organising our knowledge so that whenever we need to access our knowledge, we can do it with less time and effort.

  For example: if the things in our bookshelf are organised properly, it is easier to find the required book in lesser time.
- To make our thought process quick and efficient, we form concepts and categorise objects and events.

Nature of Concept

- Concepts not only contain the important features of the objects or events people want to think about, but also allow identification of new objects an events that may fit the concept.

  For example: Mangoes come in all shapes, sizes and colour, still we have no trouble in recognizing a mango as mango on the basis of some common features.
- Concepts fall under different hierarchies or levels, which are as follows:
    - ✓ *Superordinate (the highest level):* this is the most general form of a type of concept, such as animal or fruit.
    - ✓ *Basic level (the intermediate level):* a type of concept around which other similar concepts are organized, such as dog, cat or apple.
    - ✓ *Subordinate (the lowest level):* the most specific category of a concept, such as one's pet dog, book in one's hand, alphonso mango etc.
- The concepts usually used in thinking are neither clear nor unambiguous. They overlap on one another and are poorly defined.

  *For example***:** Astool can be either put into the category of chair or table. Thus, to answer such overlapping we construct a model called *prototype*.

- ➢ **Prototype**
  - o **Prototype** is the best representative member of the category. They are the concept that closely matches the defining characteristics of the concept.
  - o In prototype matching, people decide whether an item is a member of a category by comparing it with the most typical item of the category.

Analytical thinking focuses on the object or person and analyses each object separately.

3. **Culture and thinking**
  - ➢ Culture has a great influence in our thinking process.
  - ➢ The beliefs, values, and social practices influence the way we think.
  - ➢ People belonging to different cultures exhibit different types of thinking.

Holistic Vs Analytical thinking

Holistic thinking focuses on properties of objects or people and thinks more about the relationship between objects and backgrounds.

The American students focused on the biggest, brightest, and most outstanding features such as, "the large fish swimming to the right" whereas, the Japanese students focused on the background features such as, "the bottom was rocky" or "the water was blue".

Experiment
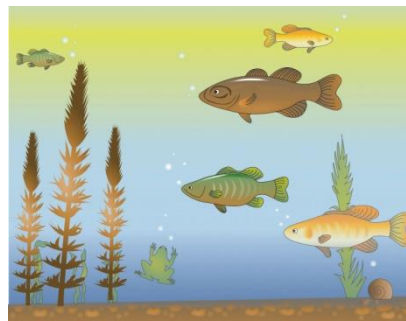
- ➢ A study was conducted on American and Asian students in which pictures (as given above) were used.
- ➢ The subjects were asked to have a look at the scene for a brief period and then were asked to describe what they saw.
- ➢ The American students focused on the biggest, brightest, and most outstanding features such as, "the large fish swimming to the right" whereas, the Japanese students focused on the background features such as, "the bottom was rocky" or "the water was blue".
- ➢ Based on these findings, researchers concluded that Americans usually analyse each object separately thus, projects **"analytical thinking"** while, Asian people (Japanese, Chinese, Koreans) think more about the relationship between objects and backgrounds, and hence projects **"holistic thinking"**.

The study above shows, how culture affects our thinking.

o In the example of stool, we try to compare it with a standard study chair, if we consider it as a chair. We might compare it to a small study table, if we consider it as a table. We then match the properties of the stool with these two concepts and place them according to its characteristics in either of the categories.

The Processes of Thinking

Now let us look at the main processes involved in thinking:

4.   Problem Solving

- A problem is a conflict or difference between one situation and another situation.
- **Problem solving is a process of thinking that occurs when a goal must be reached by thinking and behaving in a certain way.**
- Problem solving is a thinking that is goal directed.
- Problem involves not only hurdles or obstacles that we face, but, it also involves simple activities such as, plucking mango from a high tree.
- In the process of problem solving, there are two states: *initial state* that is the problem, and *end state* that is the goal.
- The two states are connected by means of several step or metal operations.

**Tower of Hanoi Experiment- To understand it better, let us look at a mathematical puzzle.**

- It is a mathematical puzzle invented by French mathematician **Edouard Lucas.**
- The **"Tower of Hanoi"** problem can clarify the above-mentioned states of problem solving. Refer the diagram given above:
- The diagram above shows the Tower of Hanoi puzzle in which the problem is to move one disc at a time from the top of peg A and place them on peg C in the same order as are placed in peg A.
- Thus, initial state or the problem is in which discs are placed in peg A, whereas end state or goal is to place discs in peg C.
- The difference between initial state and end state constitutes the problem.
- The thinking that we do in problem solving is thus goal-directed, and motivated by the need to reduce the discrepancy between one state of affairs and another.

Initial State (problem)	End State (goal)
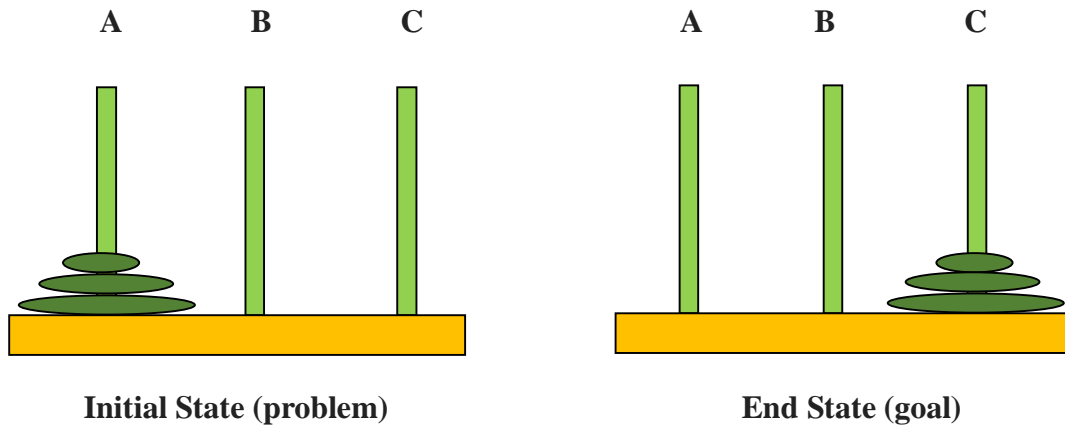
While solving a problem, there are certain steps that take place. Look at the box given below to understand it:

Steps followed in Problem solving Process

The main steps followed in problem solving process have been explained below with the help of an example in which students have been given a task of organizing dance in annual function:
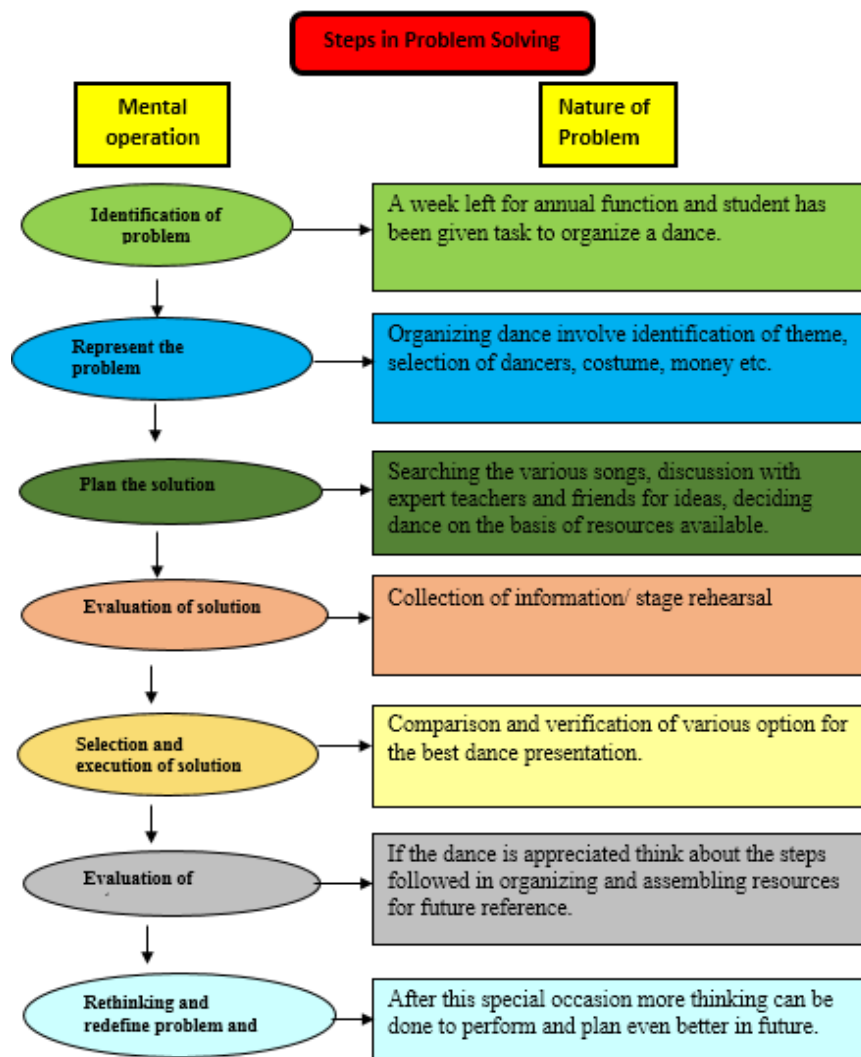
Methods of Problem solving

The different methods followed in problem solving are:

- **Trial and error method (mechanical solution):** It is the method in which one possible solution after another is tried until a successful solution is found.

  For example: A man has a huge bunch of keys and he has forgotten which one fits the lock on the door, hence, he tries all of them one by one until, he finds the right key.

- **Algorithms:** These are specific, step-by-step procedures for solving particular kind of problems.

  For example: A student is given a mathematical problem of division. He starts solving the problem using all the steps required in division. If, he applies the steps correctly, he finds the right solution.

- **Heuristics:** It is a "rule of thumb "that is intended to apply to many situations. These are the strategies based on the past experience with the problem that are likely to reach to the solution but do not guarantee success.

  For example: a student who was helped by his classmate in math exam expects the same response from that student in science exam also a hence do not prepare the whole syllabus.

Obstacles in Solving Problems

The main obstacles in solving problems are as follows:

- **Mental set**
  - ➢ It is the tendency of a person to solve problems using methods which have yielded positive results for him in the past.
  - ➢ The tendency of using same method for solving new problem sometimes leads to mental rigidity and thus inhibits the solver from using new methods or techniques of solving problems.
  - ➢ Where in one situation mental set enhances the quality and speed of problem solving, on the other hand in some situations it hinders the problem solving.

    For example: Suppose, a man's washing machine stopped working. When it stopped working in the past, filter was the culprit. Thus, the man again assumes filter as the cause of the problem and replaces it again. But this time the man failed to repair as he didn't look into the other options before reaching to the conclusion.

  - ➢ **Functional fixedness:** It is a type of mental set that occurs when people fail to solve a problem because they are fixed on a thing's usual function**.**

    For example: A man sees a bug on the floor that he wants to kill, but the only thing in his hand at the moment is a can of air freshener. If the man starts looking around for something in the house to kill the bug instead of realizing that the can of air

freshener could in fact be used and not just focus on its main function as to freshen the air, he is said to be experiencing functional fixedness.

- **Lack of motivation:** Another obstacle in solving problems is lack of motivation. When the person is not motivated enough to solve problem their talent and skills are of no use and hence they encounter failure. Thus, solving problem need persistent efforts.

- **Confirmation bias:** It is another barrier to problem solving process. It is the tendency to search for the evidence that fits one's beliefs while ignoring any evidence to the contrary.

  For example: A teenager girl has formed an opinion about parents that they don't make any effort of understanding her emotions and feeling. Despite of the evidence of parental support in her life, she continues to maintain her belief and ignores the contradictory evidence.

5. Reasoning

- Reasoning is a process of thinking during which the individual is aware of problem which he/she identifies, evaluates, and decides upon a solution.
- It is the process of gathering and analyzing information to arrive at a conclusion.
- It is a form of problem solving, which aims at determining the conclusion that can be drawn from certain given information.
- The different types of reasoning are as follows:
  - ✓ **Deductive reasoning**
    - ➢ The kind of reasoning which begins with an assumption is called deductive reasoning.
    - ➢ It is the ability to draw some logical conclusions from the facts or evidences already known.
    - ➢ It is reasoning from general to particular.
    - ➢ In deductive reasoning we commit mistake of making assumption without knowing its truth.

    For example: People who run on the platform are those who are getting late for the train. On the basis of this assumption, a conclusion can be drawn about a man running on the platform that, he is getting late for the train.
  - ✓ **Inductive reasoning**
    - ➢ The kind of reasoning in which a conclusion is drawn on the basis of a particular observation is known as inductive reasoning.

➢ In this type of reasoning, the analysis of the possible causes of behaviour is based on observation of the behaviour.

For example: Man running on the platform enters into the train compartment and comes out with the bag. Thus, based on this observation the conclusion drawn about the man running on the platform can be that man left his bag in the compartment, hence was running to get it back from the train.

6. Decision Making

- **Decision making**
  - ➢ It is a kind of problem solving in which we are presented with several alternatives; among which we must choose.
  - ➢ In decision making the choices among the options are made on the basis of personal significance.
  - ➢ The decision making is done after evaluation of all the options or alternatives available in the hand of decision maker.

    For example: When a student has the option to choose between two subjects in class XI, the decision of student would be based on the interest of the student, future prospects, availability of books, efficiency of teachers etc.

    Thus, in decision making we have various solutions or choices out of which one has to be selected.

- **Judgement**
  - ➢ It is the conclusion drawn, formation of opinion, evaluation of events, objects, on the basis of knowledge and available evidences.

    For example: A man is very talkative, likes to mix with people, can convince others with ease, hence the employer considers him suitable for the salesperson's job. The judgment is a based on the specific characteristics of the expert salesperson.
  - ➢ Sometimes judgments are automatic and requires no conscious efforts by the person and occurs as a matter of habit.

    For example: Applying brakes on seeing red light.
  - ➢ Judgments are based on our beliefs, attitude and sometimes newly acquired

    For example: A new teacher joins the school, students make on the-spot judgment of the teacher as being very strict. However, in subsequent classes, they closely interact with the teacher and make changes in their evaluation. Now they judge the teacher to be extremely student friendly.