

Creative Thinker's Toolkit

Sample Examples from Business

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- a. Conflict: These situations arise in everyday workplace situations and do not need special knowledge for discussion. They can be discussed again in MAN 314 (Organizational Behavior) and framed in the context of discussions on workplace diversity, motivation and conflict resolution.
 1. Between employees in workplace: example in restaurant – should tips be pooled or not?
 2. Manager and team members – scheduling work assignment when some employees are parents and others are not; should parent employees be entitled to special treatment?
- b. Empowerment: This topic is discussed in MAN 200 (Introduction to Management and Business) in the context of managerial jobs and delegation. At that point the discussion also includes the advantages of delegation and why managers are often reluctant to delegate and the advantages of empowerment (motivation of employees)
 1. Employees not familiar with task assignment - how should the manager ensure that the employee feels confident to learn skills and complete the task.
- c. Construct persuasive arguments:
 1. Pitching a business idea – why a bank officer or an investor should support a new business. Reasons should be based on data and argument for it is objective.
 2. Choice of strategy for business – adding new products.
- d. Decision making – take on a new partner, hiring employees
- e. Complex problems – This issue is discussed briefly in MAN 200 (Introduction to Management) and in more detail in MAN 316 (Human Resource Management)
 1. Performance appraisal and decision whether to terminate an employee or not.
Should personal reasons play a role or should it be only performance oriented ?
What are ethics and possible conflicts of interest?
- f. Solve systems of equations –This topic is discussed in detail in MAN 416 (Management Science) in Linear programming
 1. Product Mix – how many units of each product to make given resource limitations. A classic starter example is – “how many tables and chairs should a furniture manufacturer make, given labor hour requirements and availability and raw material requirements and availability?”

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Sample Examples from Natural Science and Mathematics

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a. Problem Solving: The main goal in Mathematics is to solve problems of either logical non-numerical- deductive or inductive, or numerical nature: Whatever the nature the problem, it has a set of assumptions and a conclusion or a set of conclusions. Starting with the set of assumptions and a set of known facts one must logically come to a conclusion. The deductive method discussed in Chapter 2 "What to change?" using "if...then logic" generalizing from the common patterns in specific examples in the course, the student is trained to develop a logical chain of statements from assumptions to the conclusion/s.

Solving Word Problems - A mathematical word problem is usually well-defined and involves necessary and sufficient conditions. The steps to solve a word problem are as follows and depend on "if...then" logic, in other words based on assumptions or given information.

1. Read the problem, verbalize it in your words to comprehend what is given and what is asked, labeling the unknowns in letters (variables) if they exist.
2. Translate the given information into a mathematical equation or inequality using given.
3. Check the examples 4.6.2 using the "Transition Tree" tool to solve the equation so that there is no logical gap in the solution.
4. Once you solve the equation, translate back the values of variables in terms of the values of the quantities.

Thus a problem is solved going one step at a time from 'what is known' (given) to 'what is unknown'. An example of how to solve a problem involving a system of equations is discussed in the course that uses a thinking tool called a transition tree.

b. Empowerment: This topic is discussed in Chapter 2 of the text book of the course.

A student who feels that s/he is not capable of doing mathematics, but needs to take some mathematics courses can be empowered by challenging the student's negative assumptions and providing the payoff of learning and a conducive learning environment that exists in the Department of Mathematics.

c. Construct persuasive arguments:

1. Why should a student select a certain STEM career? – The choice of careers depends upon talents the student possesses and the mentors, undergraduate research opportunities, internships, and role models available for motivation and pursuit. The student should be able to write a persuasive objective essay as a result of the training in the course
2. Choice of strategy – Taking a curriculum and course track as a long project and a course as a semester long project, apply techniques of how to devise a plan and finish the project at hand satisfactorily on time using resources (help of the support team) available for the course.

d. Decision making – 1. How to balance a course load with science/business and liberal arts courses. 2. Whether an opportunity to make money while taking courses hinders or promotes progress to the goal. Check with a logical chain of arguments the pros and cons.

Complex problems – How to prove a theorem? This is discussed in **MTH 206 Introduction to Proof**. Most mathematics concepts are comprehended and transferable to applied topics once the logical connection between the related concepts instead of remembering isolated formulas. This is an application of item a. The logical connections of concepts with real life situations make the concepts interesting and devoid of such connections make mathematics sterile.

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Sample Examples from the Philosophy Program

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- a. Conflict Resolution: Seemingly intractable ethical conflicts arise regularly in the course of human interaction, yet they must be resolved. Here are several examples that might be discussed in the course:
 1. Does an unemployed man with a family have a right to steal food to feed his children?
 2. Must a lawyer who is a public defender represent a terrorist?
 3. Should a politician support legislation that she knows to be flawed if it benefits her constituency but inflicts hardship on other citizens?
- b. Empowerment: Students who use the reasoning skills in the Toolkit are able to analyze conflicts (such as the above) and arrive at solutions that optimize benefits and minimize undesirable effects. As they practice the skills, students develop proficiency and gain self-confidence.
- c. Construct persuasive arguments: Students in the course will understand the relationship between evidentiary statements (premises) and evaluative recommendations (conclusions) in the framework of argumentation. They will use argument maps to diagram and visually display inferential relationships. Further, they will reconstruct arguments taken from media sources and editorial pages, identifying premises/conclusions and characterizing the justification strategies that the argument employs. For example, a typical classroom exercise in a philosophy class will require students to reconstruct and critique Op-Ed columns on topical and controversial issues.
- d. Decision making: As a consequence of using the Toolkit, students will be better equipped to arrive at sound courses of action in both their personal and professional lives, and immediately in their academic careers.
- e. Complex problems: Most problems that humans encounter are not single-solution issues. The Toolkit shows students how to identify the opposing constraints and assumptions that lead to undesirable effects, to specify core conflicts, and to address the conflicts through feasible and effective action. For example, in a philosophical discussion of retributive justice, what are the assumptions that underlie a belief in capital punishment? What are the possible undesirable effects? Is there a core conflict between the desire for revenge and the need to equitably apply the law? What is the most reasonable course of action necessary to ensure justice?

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Sample examples from the Psychology Program

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a. Logic:

To truly understand behavior in the scientific sense, psychologists strive to understand all the necessary and sufficient causes of that behavior. Students learn the difference between necessary and sufficient causes (or necessity condition and sufficient condition logic), e.g., Does abuse in childhood cause aggression in adulthood (sufficient by itself), or is it just one of many factors which together with abuse are required (necessary) to cause aggression in adults? This will provide the foundation for discussing the experimental method in detail.

Using the Toolkit, students create their own short logic branches to illustrate the two types of logic as it applies to their own behavior, e.g., if I yell at my child, then she will cry; if she cries, then I will have to stop what I am doing and deal with her; if I deal with her, then I won't get my own work done, etc.... ; or, in order to get along with my boss, I must first act in a friendly manner toward him; in order to act in a friendly manner toward him, I must respect him, etc.

b. Conflict resolution:

Psychologists sometimes find themselves faced with ethical dilemmas, e.g., I want to study depression in monkey babies in order to help children, but to do so, I have to remove them from their mothers for several weeks. This would interfere with their normal emotional development. What should I do? Using the Toolkit, students will learn how to discover the underlying assumptions in this situation and to come up with creative, win-win solutions to resolve it.

c. Empowerment:

Psychologists study human development, from birth to death. Maturation is a slow process, characterized by increasing levels of physical, cognitive and emotional competence. Students will be led to reflect on their own functioning as they master the cognitive strategies of the Toolkit, tools that enable them to plan better, make better decisions and resolve their own conflicts.

d. Decision Making:

Students will learn about the Bystander effect through the famous case of Kitty Genovese, murdered while many of her neighbors watched. No one helped. Using the Toolkit, they will discover for themselves what social psychologists now know —what obstacles stand in the way of helping, what intermediate objectives are needed to overcome the obstacles, and what order they have to be in to lead someone to decide to help (“the decision tree”).

e. Problem Solving:

The field of cognitive psychology deals in part with how we solve problems. Students will learn about creativity, convergent and divergent thinking, heuristics, algorithms, as well as inductive and deductive reasoning. They will learn to identify the constraints in a problem situation, the assumptions that are implicit in it, and the conflicts that block the solution. Using the Toolkit, they will identify possible solutions and their probable positive and negative consequences.