

# Photon PBL

Concept Mapping “101”  
Tutorial & Scoring Rubric

# Concept Mapping “101”

---

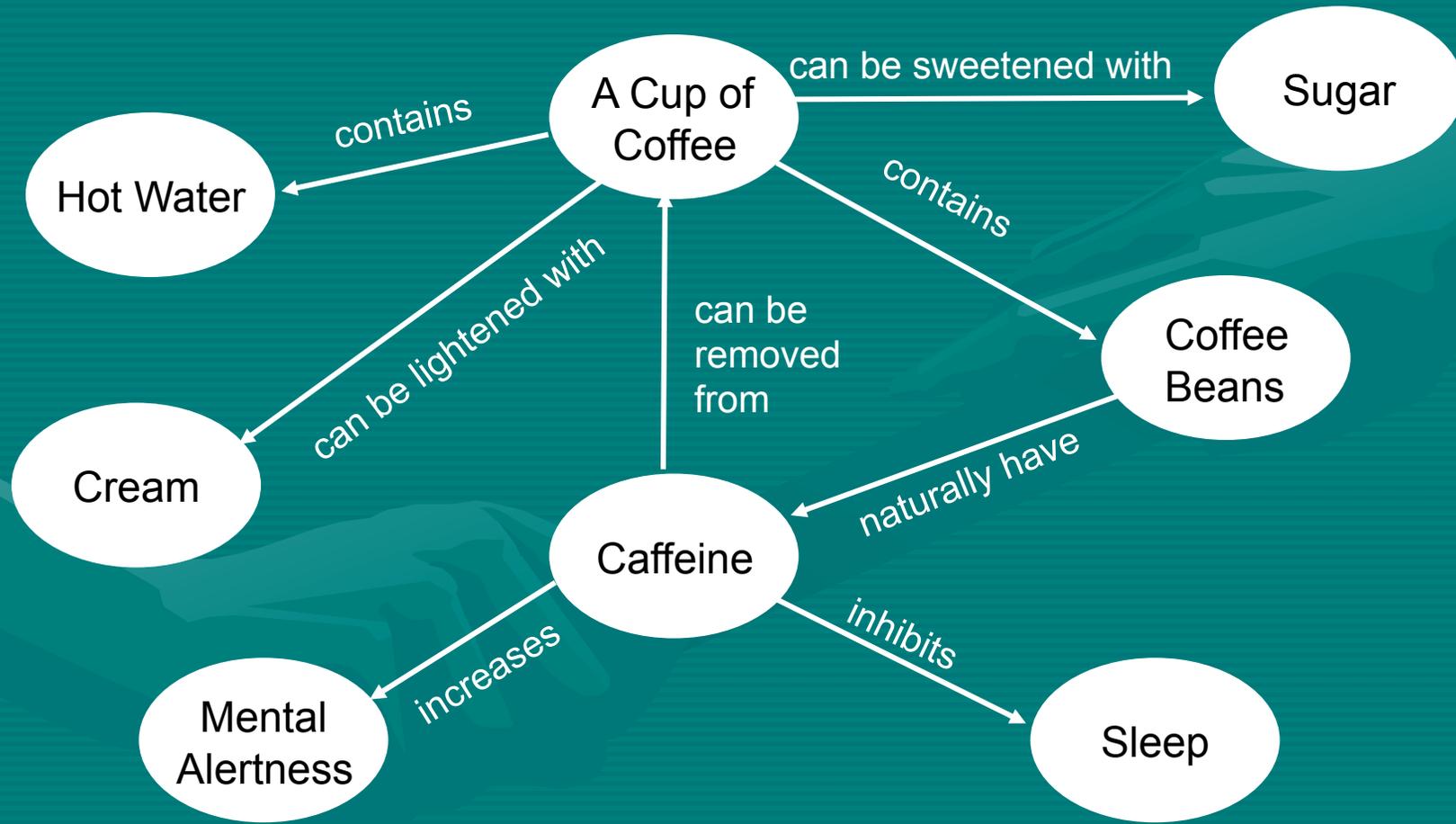
## What is a concept map?

- Developed in the early '70s by Joseph Novak at Cornell University as a graphical way for science students to show how well they understand concepts taught in the classroom.
- Concept mapping is a technique for visualizing the relationships among different concepts.
  - Nodes represent concepts
  - Lines represent relations between concepts, arrowheads indicate direction
  - Labels on the lines describe the nature of the relationship
- These three components create propositions or units of meaning

# Concept Mapping "101"

---

## Example: What is in a cup of coffee?



# Concept Mapping “101”

---

## Constructing a Concept Map

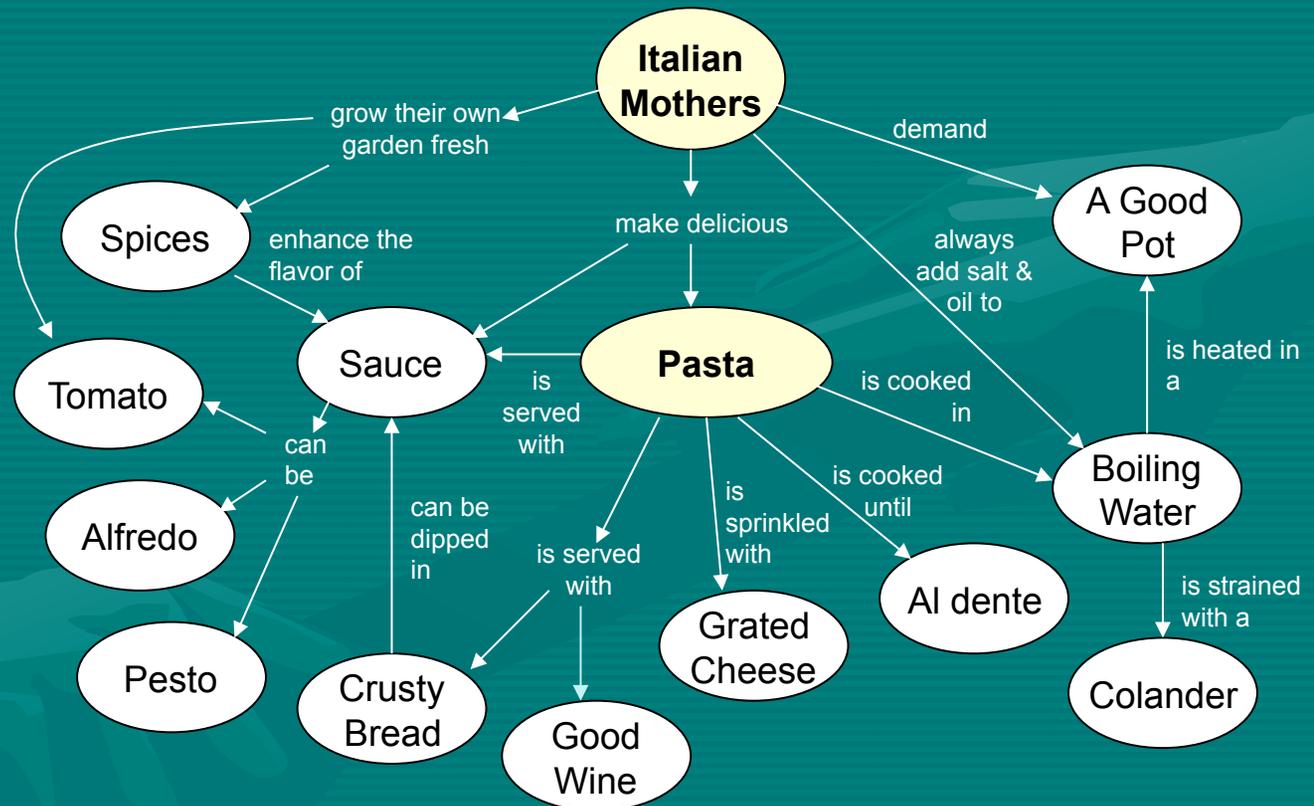
1. Generate a question relating to a particular topic of interest
2. List all concepts or items related to that topic
3. Write each concept or item on a *Post-It*<sup>®</sup> note – one word or phrase per note
4. On a white board or table, group related concepts or items together in a hierarchal manner
5. Connect concepts or items using lines and arrows with words or short phrases that describe the relationship between them
6. Examine the linkages to make sure each relationship forms a valid proposition.
7. Rearrange and/or remove concepts to simplify and clarify the concept map
8. When you are satisfied with your concept map, convert it to a permanent graph on a piece of paper

# Concept Mapping "101"

## Example: How to make pasta like an Italian mother

### Concepts & Items Related to Making Pasta

Pasta  
Boiling Water  
A Good Pot  
Sauce  
Spices  
Grated Cheese  
Al dente  
Colander  
Good Wine  
Crusty Bread  
Italian Mother

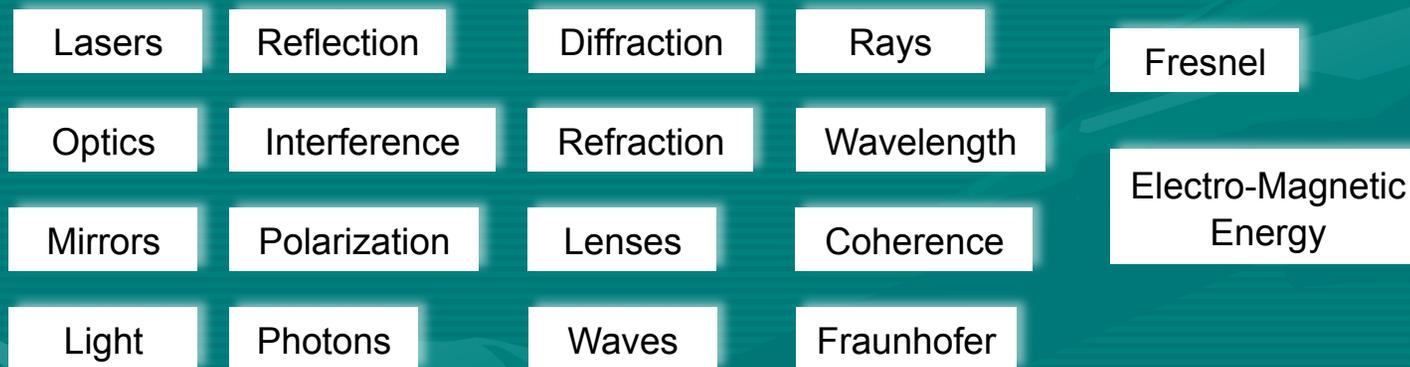


# Concept Mapping “101”

---

## Concept Map Exercise: What is Light?

1. Break students into groups of 3-4 people
2. Construct a concept map for the following photonics-related concepts (Use Post-Its and a White Board)



- *Add additional concepts if necessary*
- *Show as many connections as possible*
- *Label each connection*



# Concept Mapping "101"

## Photon PBL Concept Map Scoring Rubric

Challenge Title \_\_\_\_\_

Student Name(s) \_\_\_\_\_

Assessment Criteria	Excellent = 4	Good = 3	Fair = 2	Poor = 1	Score
<b>Concept Validity</b>	<ul style="list-style-type: none"> <li>Student correctly identifies all relevant concepts and items related to the topic.</li> </ul>	<ul style="list-style-type: none"> <li>Student correctly identifies most relevant concepts and items related to the topic</li> </ul>	<ul style="list-style-type: none"> <li>Student correctly identifies some relevant concepts and items related to the topic</li> </ul>	<ul style="list-style-type: none"> <li>Student correctly identifies few or no relevant concepts and items related to the topic</li> </ul>	
<b>Proposition Validity</b>	<ul style="list-style-type: none"> <li>All propositions are complete and valid.</li> <li>Linking lines connect related terms and point in correct direction.</li> <li>Linking words accurately describe relationship between concepts.</li> <li>Student shows a deep understanding of the relationship between concepts.</li> <li>All or most concepts are linked to more than one related concept.</li> </ul>	<ul style="list-style-type: none"> <li>Most propositions are complete and valid.</li> <li>Most linking lines connect properly.</li> <li>Most linking words accurately describe the relationship between concepts</li> <li>Student shows a good understanding of the relationship between concepts.</li> <li>Most concepts are linked to more than one related concept.</li> </ul>	<ul style="list-style-type: none"> <li>Correct but incomplete propositions.</li> <li>Linking lines not always pointing in correct direction.</li> <li>Linking words are absent or don't clarify relationships between concepts.</li> <li>Student shows a partial understanding of the relationship between concepts.</li> <li>Some concepts are linked to more than one related concept.</li> </ul>	<ul style="list-style-type: none"> <li>Few or no valid propositions.</li> <li>Linking lines do not point in correct direction.</li> <li>Linking words are absent or incorrectly identify relationships between concepts.</li> <li>Student shows a lack of understanding of the relationship between concepts.</li> <li>Some concepts are not linked to more than one related concept.</li> </ul>	
<b>Presentation</b>	<ul style="list-style-type: none"> <li>Concept map is neat, clear, legible, and has easy to follow links.</li> <li>No spelling or grammatical errors.</li> </ul>	<ul style="list-style-type: none"> <li>Concept map is neat, clear, legible, and has easy to follow links.</li> <li>Has some spelling or grammatical errors.</li> </ul>	<ul style="list-style-type: none"> <li>Concept map is messy and has somewhat difficult to follow links.</li> <li>Has many spelling or grammatical errors.</li> </ul>	<ul style="list-style-type: none"> <li>Concept map is sloppy and links are difficult or impossible to understand.</li> <li>Has many spelling or grammatical errors.</li> </ul>	
<b>Total Score</b>					