THINKING MAPS: Tools for Cognitive Development

Thinking Maps: PURPOSE

Common visual language in your learning community for:

- **Transferring thinking processes;**
- **Integrating learning; and**
- **Continuously assessing student progress**

THINKING MAPS: DEFINITION

Thinking Maps are eight visual-verbal learning tools, each based on a fundamental thinking process and used together as a set of tools for showing relationships.

THINKING MAPS
For Meaningful, Integrated Learning

Thinking Maps give all students and teachers a common language for meaningful learning. The consistency and flexibility of each of the Thinking Maps promotes student-centered and cooperative learning, concept development, reflective thinking, creativity, clarity of communication, and continuous cognitive development.

Effective and Efficient Use of THINKING MAPS

Thinking Maps are most effective when used together as tools in response to the purpose of the learning objective, outcome, or performance task. This supports learners as they interactively and efficiently construct knowledge, much like carpenters working together using a common set of tools to build a new structure.

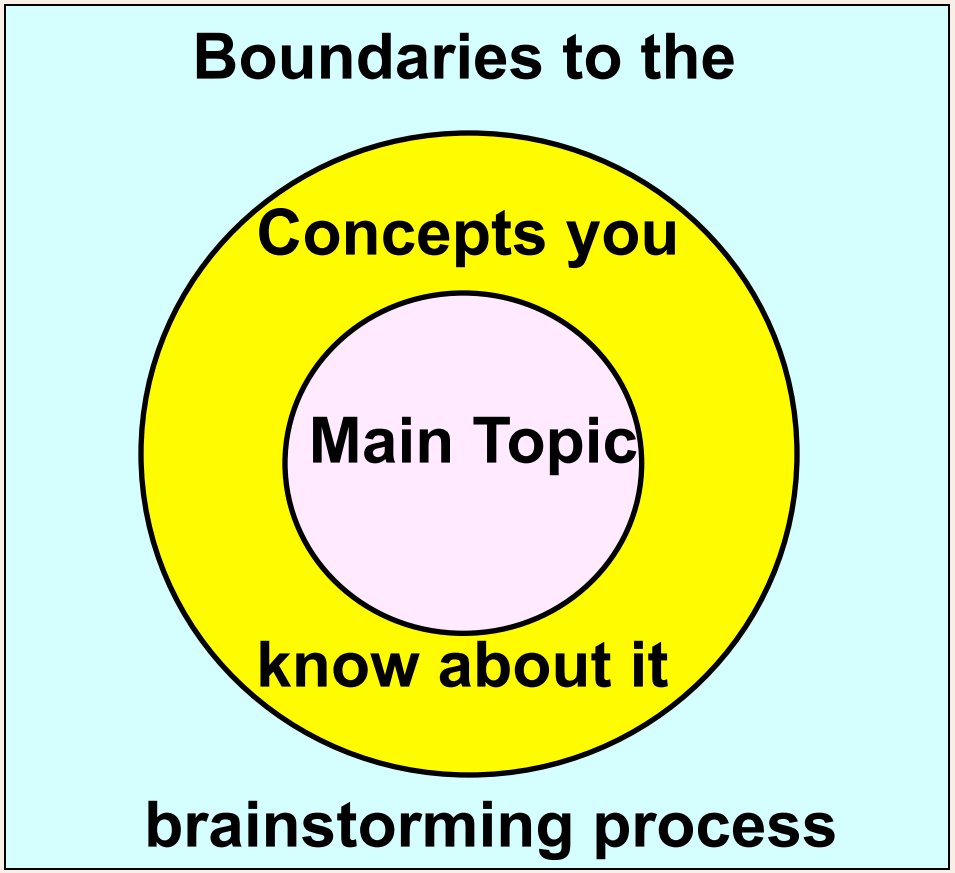
Five Key Characteristics about Thinking Maps as a Language for Learning

1. Consistent Graphics
   - ✓ A specific map for each cognitive skill
   - ✓ Consistency facilitates cognitive development for an individual over their lifetime
2. Flexibility of Forms
   - ✓ Teachers and students have control over constructing different configurations using each graphic organizer
3. Developmental Use
   - ✓ Because the Maps are based on fundamental, human, cognitive processes, these tools may be used by pre-K students through adults for life-long learning

Five Key Characteristics about Thinking Maps as a Language for Learning

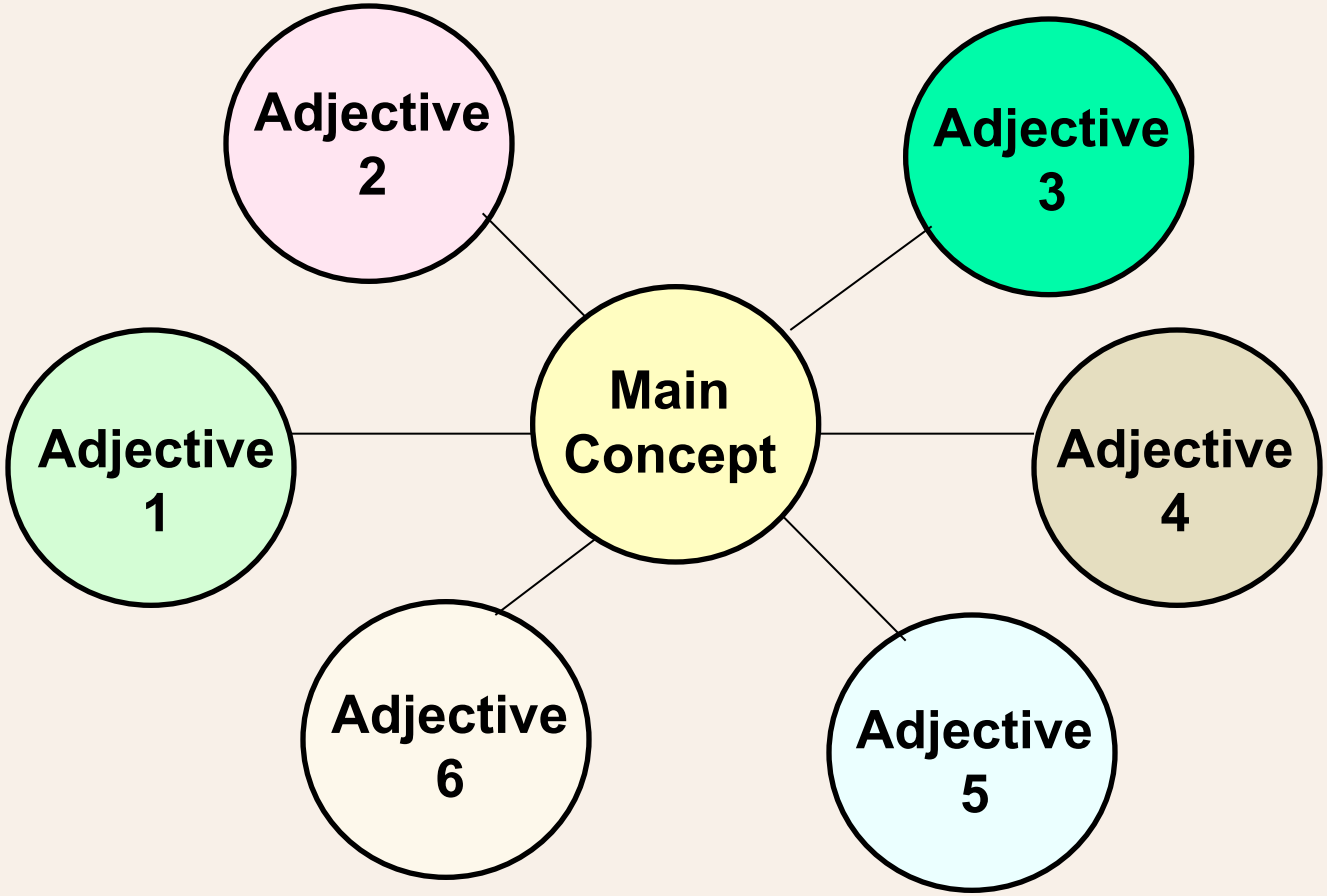
4. Integrated and Interdisciplinary Use
   - ✓ Thinking Maps enable students to transfer (apply) thinking skills within and across disciplines
6. Reflectiveness, Metacognition, Assessment
   - ✓ Maps constructed by learners provide an in-the-moment display of evolving understanding
   - ✓ Multiple Maps constructed by learners facilitate self-assessment of retention of information and conceptual understanding
   - ✓ The “frame” is a meta-tool, a conscious cue for learners as they focus on how they have constructed knowledge

CIRCLE MAP
for Defining in Context



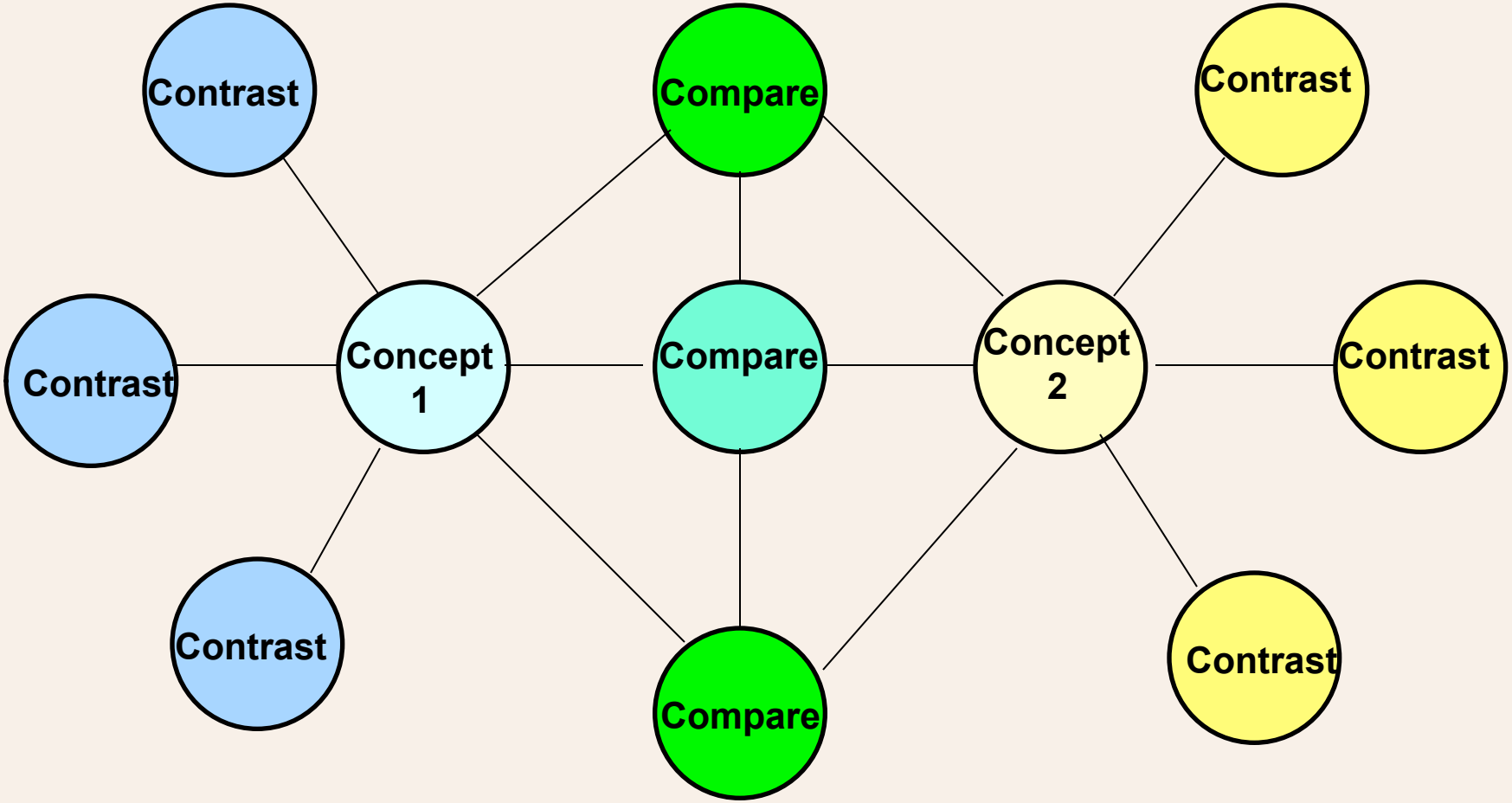
Reading Skills: ***Context clues; identifying bias***

BUBBLE MAP
for describing, using adjectives



Reading Skills: ***Vocabulary growth; identifying properties***

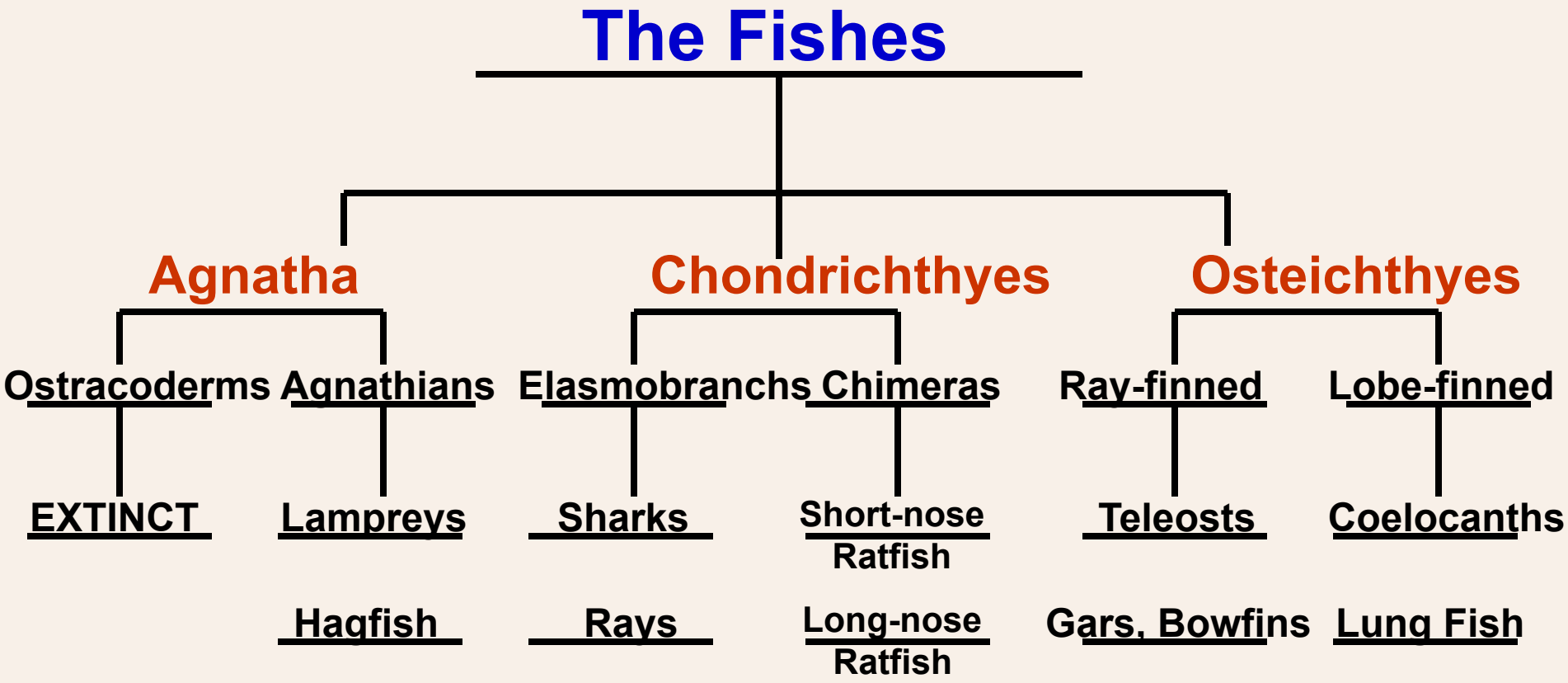
DOUBLE BUBBLE MAP
for Comparing & Contrasting



Reading Skills: ***comparing critical properties & emphasis***

TREE MAP

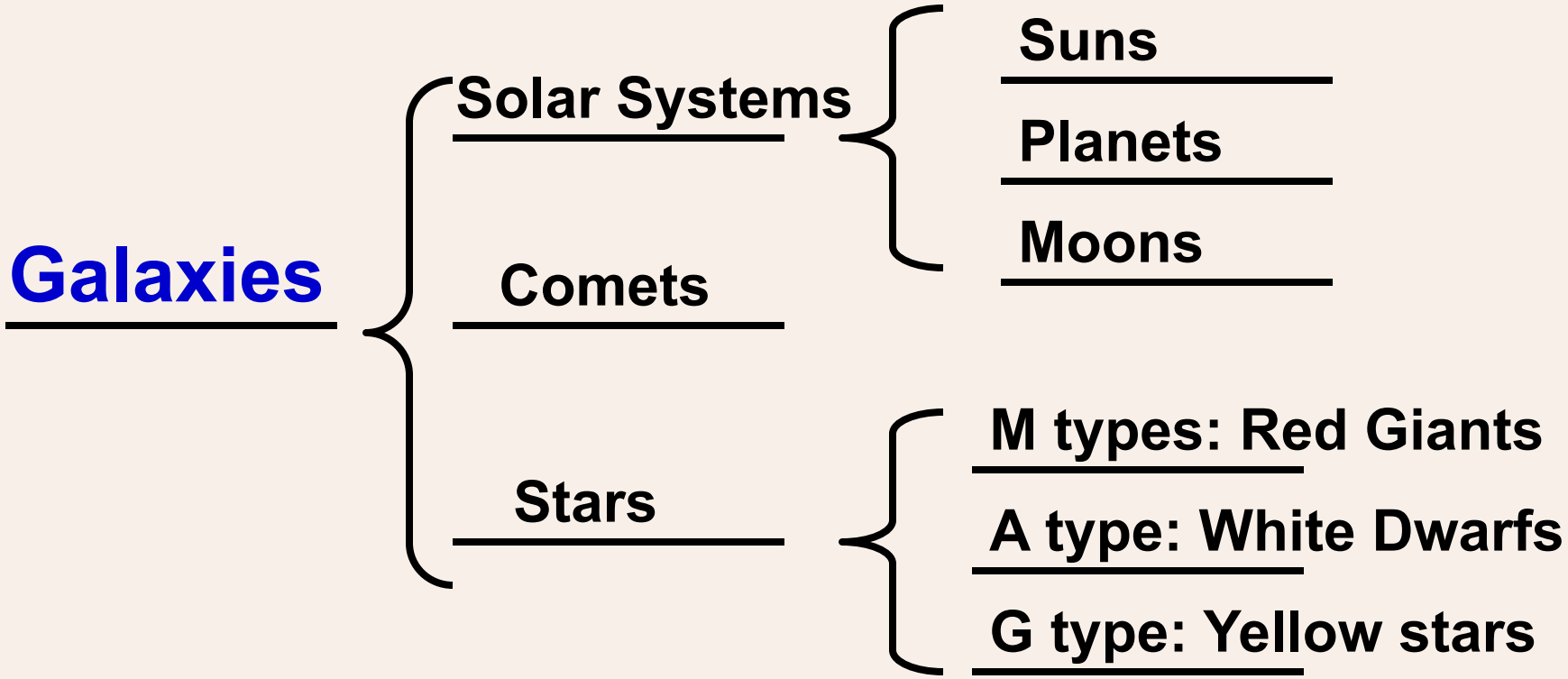
For Classifying and Grouping



Reading Skills: *Main Ideas & Details; Taxonomy*

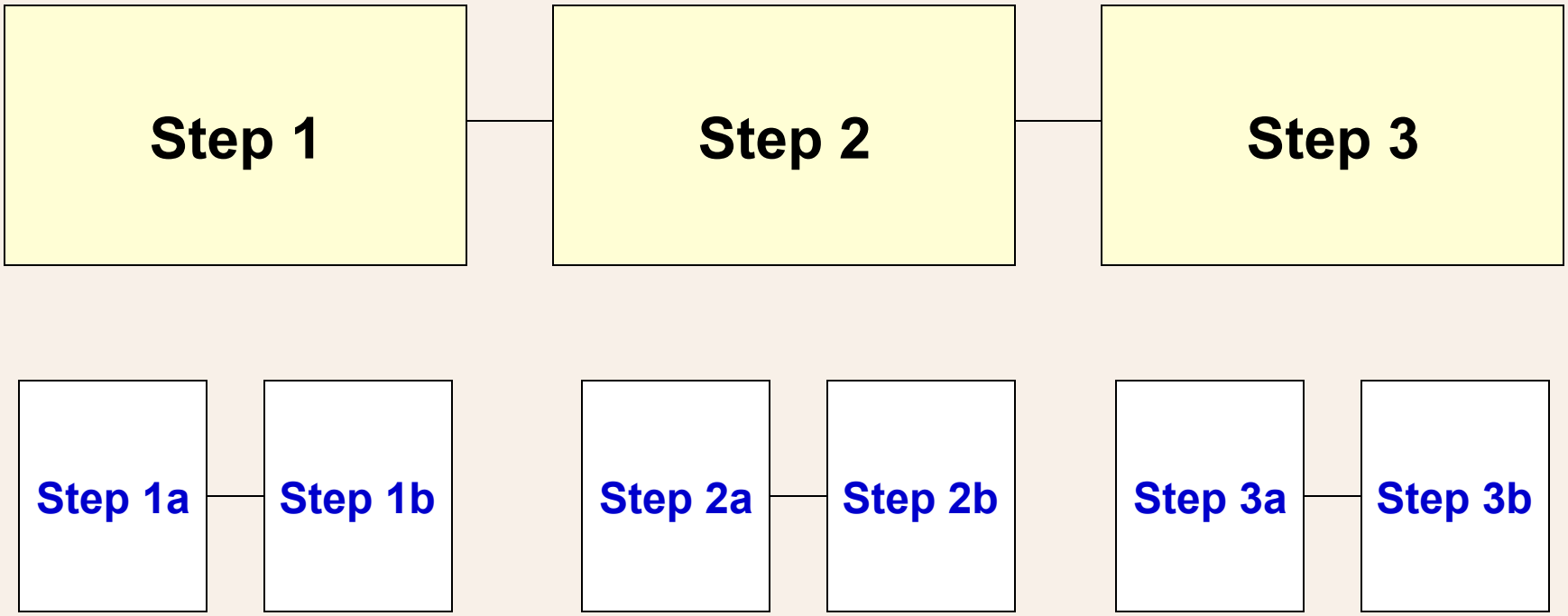
BRACE MAP

For Analyzing Objects and Parts



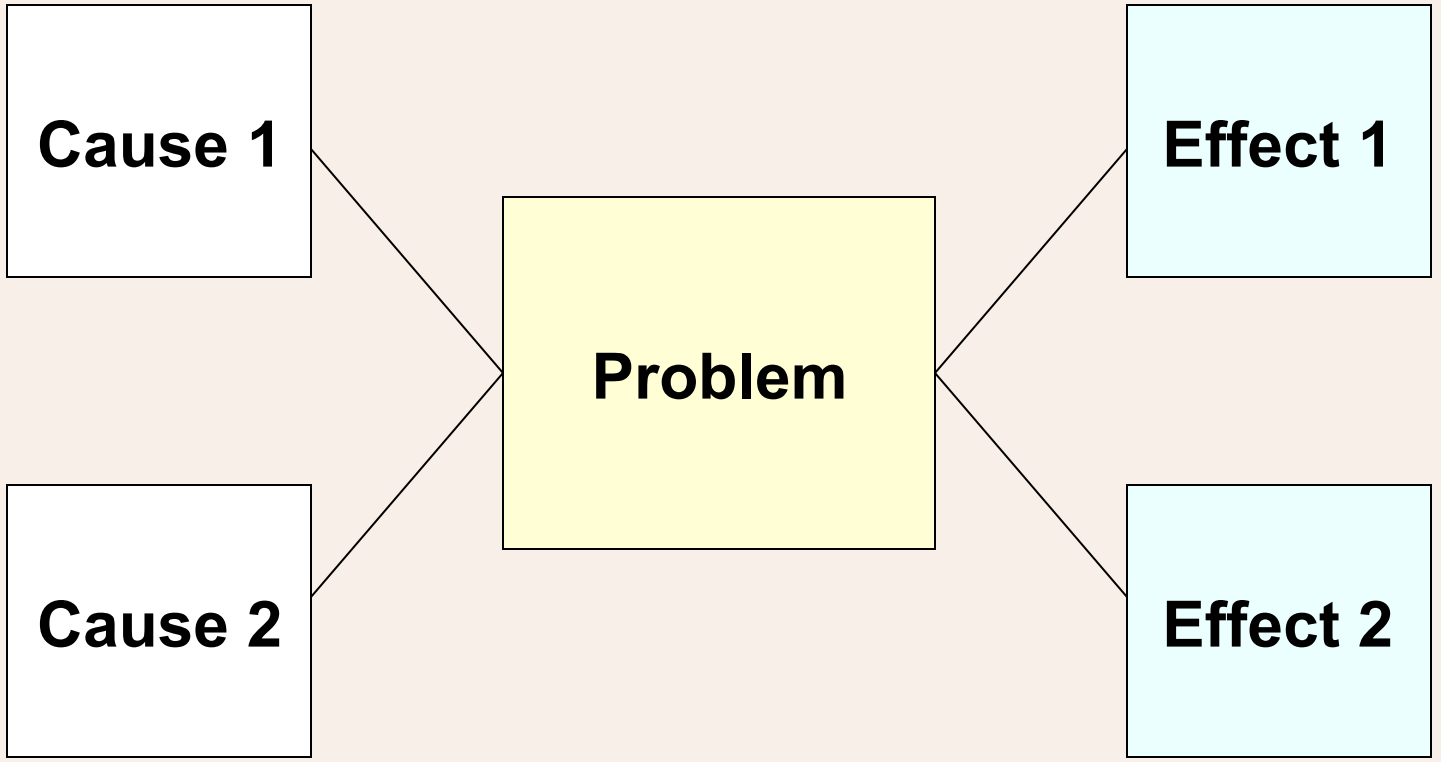
Reading Skills: ***Spatial Descriptions & Anatomy***

FLOW MAP
For Sequencing & Ordering



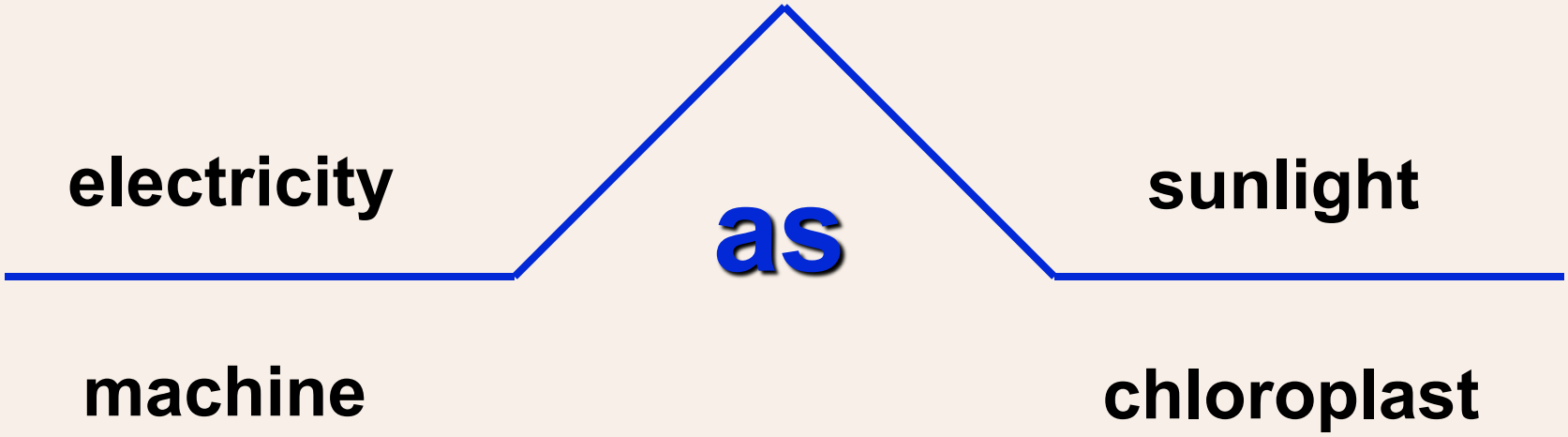
Reading Skills: *Descriptions of Order & Physiology*

MULTI-FLOW MAP
For Causes and Effects



Reading Skills: *Reason/Consequence & Prediction*

BRIDGE MAP
For Seeing Analogies



Reading Skills: ***Vocabulary & Analogical development***

GUIDED PRACTICE

GUIDED PRACTICE
Circle Map

1. Biology
   - What do you know about eucaryotic cells?
2. Chemistry
   - What do you know about kinetic molecular theory?
3. Physics
   - What do you know about Newton's Laws of Motion?
4. Earth
   - What do you know about the formation of metamorphic rocks?

GUIDED PRACTICE
Bubble Map

1. Biology
   - ➢ Pick a particular protist and describe it.
2. Chemistry
   - ➢ Describe an exothermic reaction.
3. Physics
   - ➢ Describe a car as it relates to Newton's First Law.
4. Earth
   - ➢ Describe Mars.

GUIDED PRACTICE
Double Bubble Map

1. Biology
   - What are the similarities and differences between eucaryotic and procaryotic cells?
2. Chemistry
   - What are the similarities and differences between exothermic and endothermic reactions?
3. Physics
   - What are the similarities and differences between refraction and diffraction of light?
4. Earth
   - What are the similarities and differences between the inner and outer planets?

GUIDED PRACTICE
Tree Map

1. Biology
   - ➢ Classify the two main categories of cells: eucaryotic and procaryotic.
2. Chemistry
   - ➢ Classify the three (four) states of matter.
3. Physics
   - ➢ Classify the different forms of energy.
4. Earth
   - ➢ Classify the 3 different types of rocks based on how they are formed.

GUIDED PRACTICE
Brace Map

1. Biology
   - Pick a particular body system and define the elements composing that system, from organ to cellular components.
2. Chemistry
   - Define the building blocks and elements composing each of the four organic macromolecules composing a cell (carbohydrates, proteins, fats, nucleic acids)
3. Physics
   - Define the component parts of an electric circuit.
4. Earth
   - Define the life cycle of a star.

GUIDED PRACTICE
Flow Map

1. Biology
   - ➢ Develop a “food chain” that includes decomposers, producers and consumers.
2. Chemistry
   - ➢ Sequence the steps in the conversion of reactants to products for the following chemical reaction: $2H_20$--> $2H_2 + O_2$
3. Physics
   - ➢ Develop a “Rube Goldberg Model” showing at least four different energy transformations.
4. Earth
   - ➢ Sequence the steps in the carbon cycle.

GUIDED PRACTICE
Multi-Flow Map

1. Biology
   - Given a particular species of mammal, what will happen to the mammal population when: (a)prey becomes a primary limiting factor? AND (b)the reproductive rate of this mammalian species increases significantly?
2. Chemistry
   - Given a specific concentration of reactant A and B, what will happen to the product formation when: (a)there is an increase in the activation energy AND (b)there is a catalyst added to the system?
3. Physics
   - Given a moving object, what will happen to that object when an equal and opposite force is applied to that object?
4. Earth
   - Given a glacier, what would happen over the next 50 years if the average temperature increases over 15°C?

GUIDED PRACTICE
Bridge Map

Biology,Chemistry, Physics, Earth

- Using “ENERGY” as the relating factor, develop an analogy between a cell and a machine.