

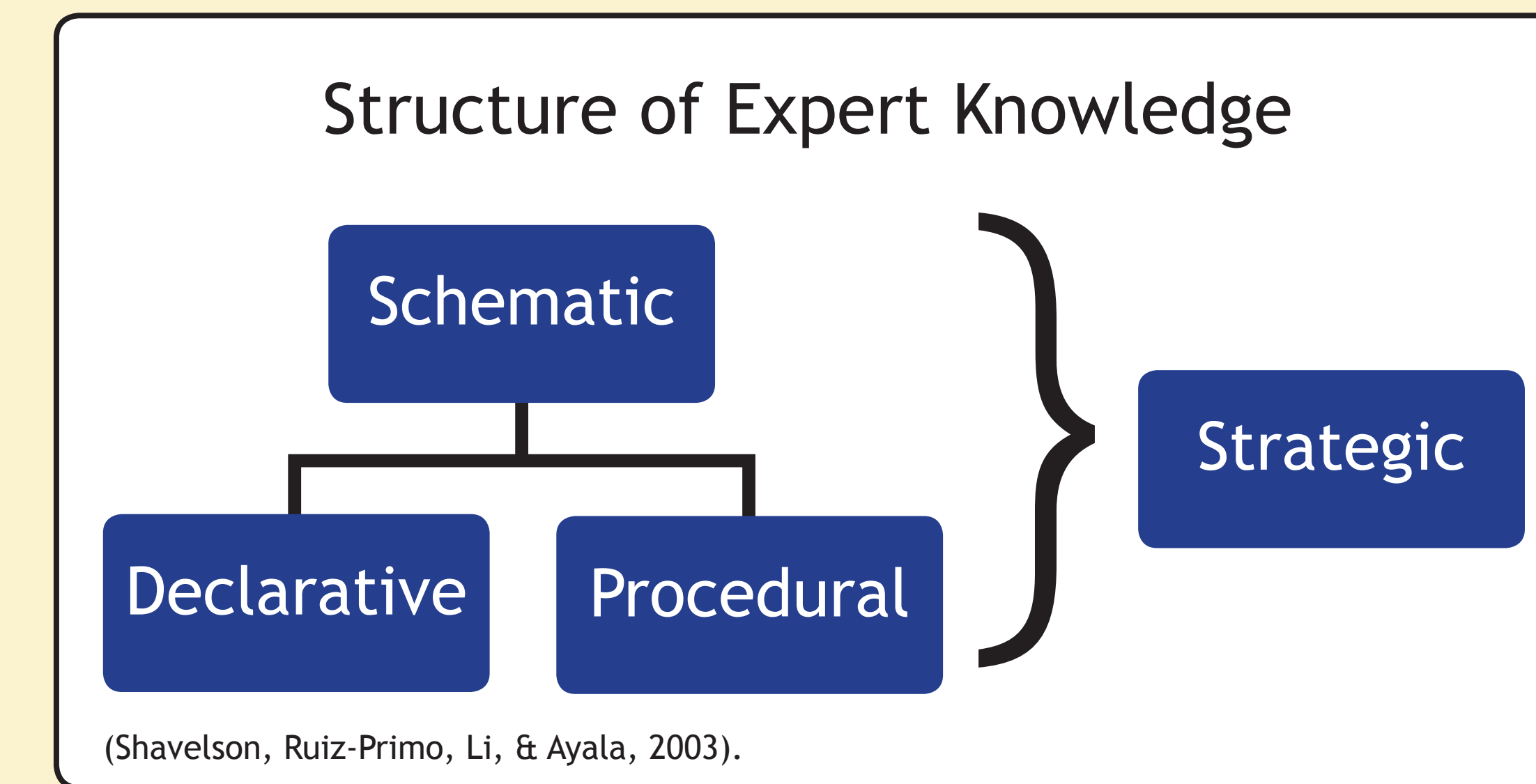
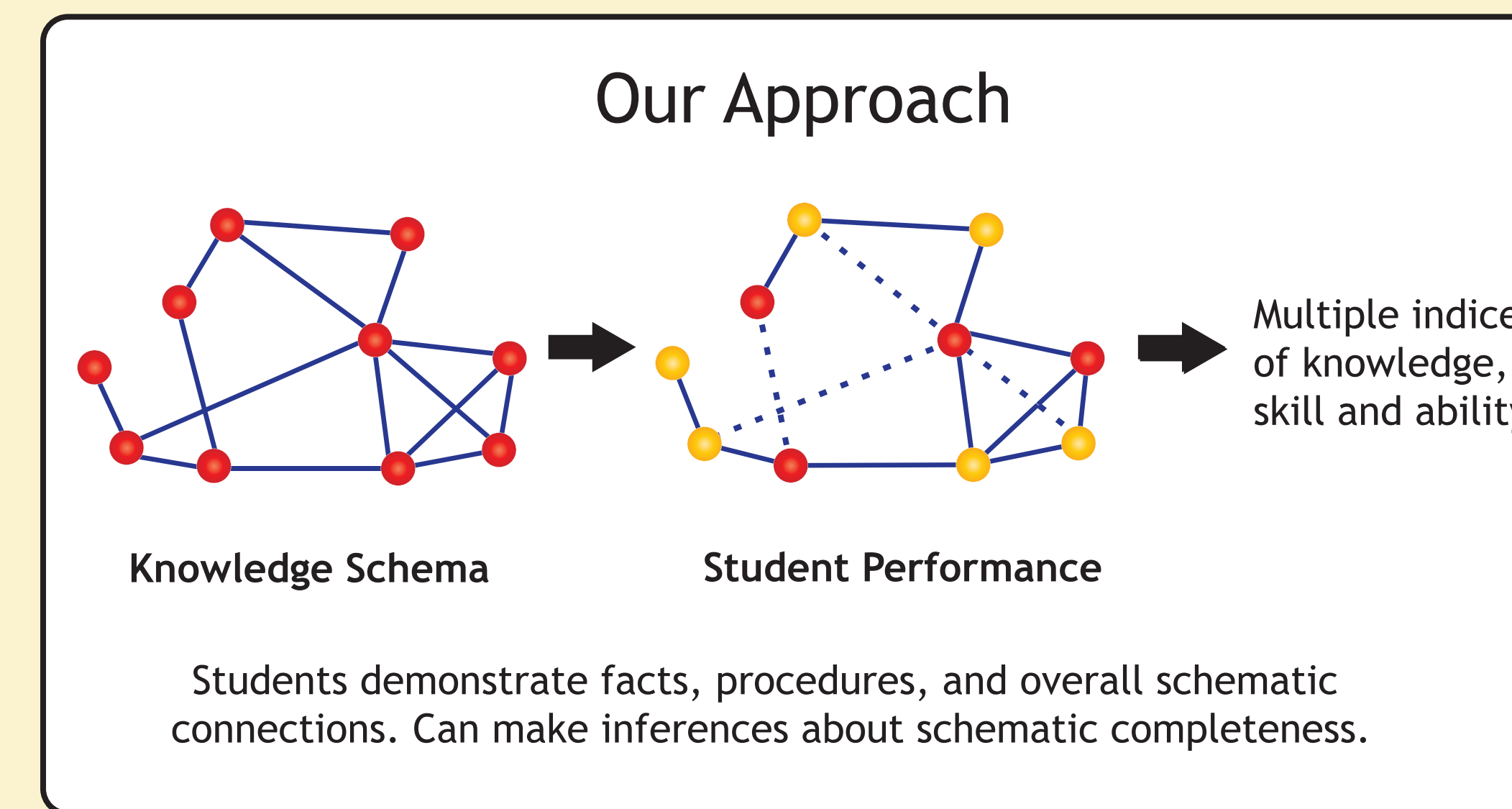
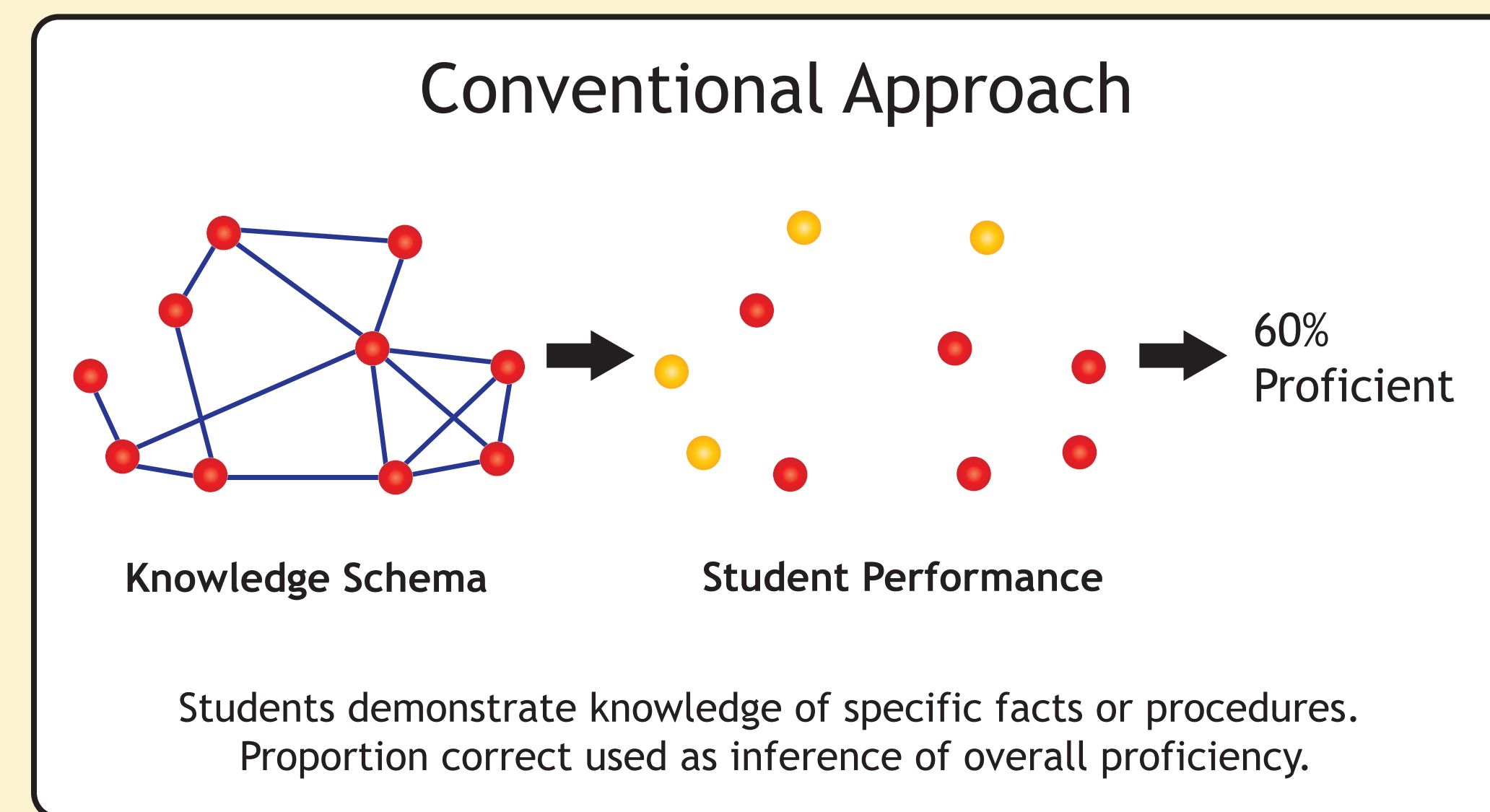


# Assessment Research to Inform Community College Instructional Goals



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<b>Goals:</b>	To make visible, by means of assessment, the important, foundational knowledge in domain areas.
<b>Practical Use:</b>	Provides a way to identify and test the most important knowledge and skills that students will need to apply their college learning in the workplace or higher education.
<b>Conventional Approach:</b>	Sample factual knowledge and then ask multiple discrete, decontextualized questions in a test.
<b>Our Approach:</b>	Assessment tasks require making connections among ideas, and using the ideas to understand and solve problems in real world scenarios.



## Research Questions

- Alignment Substudy:** To what degree do content experts believe the tasks from the new assessments also align with forms of knowledge relevant to each domain?
- Cognitive Analysis Substudy:** Do the new assessment tasks elicit evidence of students' use of schematic and strategic knowledge, key big ideas, and other domain knowledge types—procedural and declarative?
- Instructional Sensitivity Substudy:** Are there significant differences in the amount of learning achieved between students who have completed courses in a domain with those who have not?
- Correlational Substudy:** Do the assessments measure distinct or similar constructs compared to existing tests, and do they correlate with other measures of student performance?

## Design

- Year 1:** Domain analysis with experts. Domain modeling with community college instructors.
- Year 2:** Prototyping, piloting, and revision. Formal testing.
- Year 3:** Validity analysis to answer research questions.

## Task Creation Support

- Design patterns help test developers craft performance tasks around big ideas of the domain
- Sample tasks at right were developed using the design patterns from the project

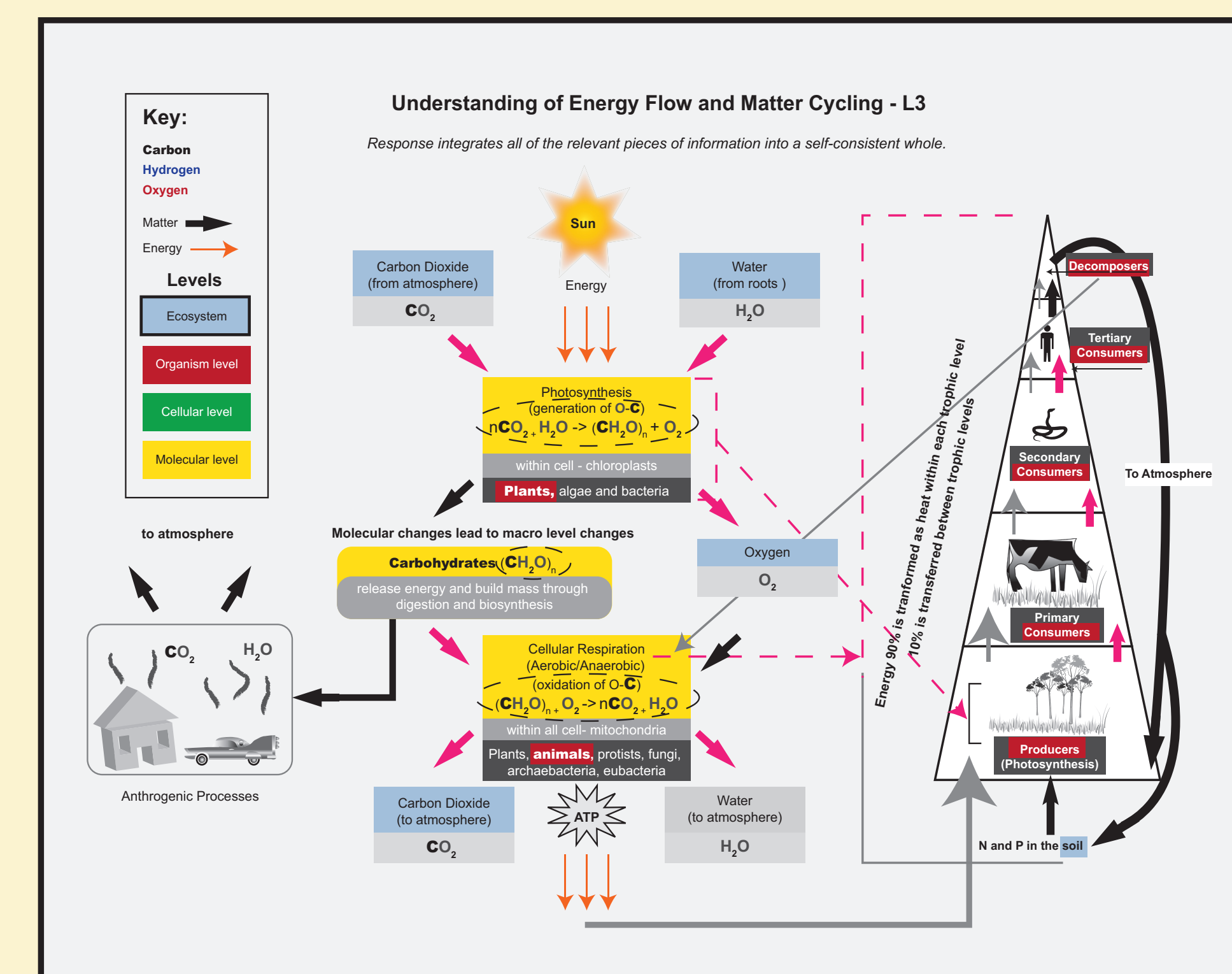
### Economics Design Patterns

- Using economic reasoning in decision making,
- Reasoning about market interactions,
- Evaluating efficiency of government policies

### Biology Design Patterns

- Using biological principles to analyze and explain current issues,
- Using biological principles to predict outcomes,
- Using scientific method to critique study findings

## Level 3. Singular: Use of 1 normative concept



### Item

What biological process does the following formula represent? [...]

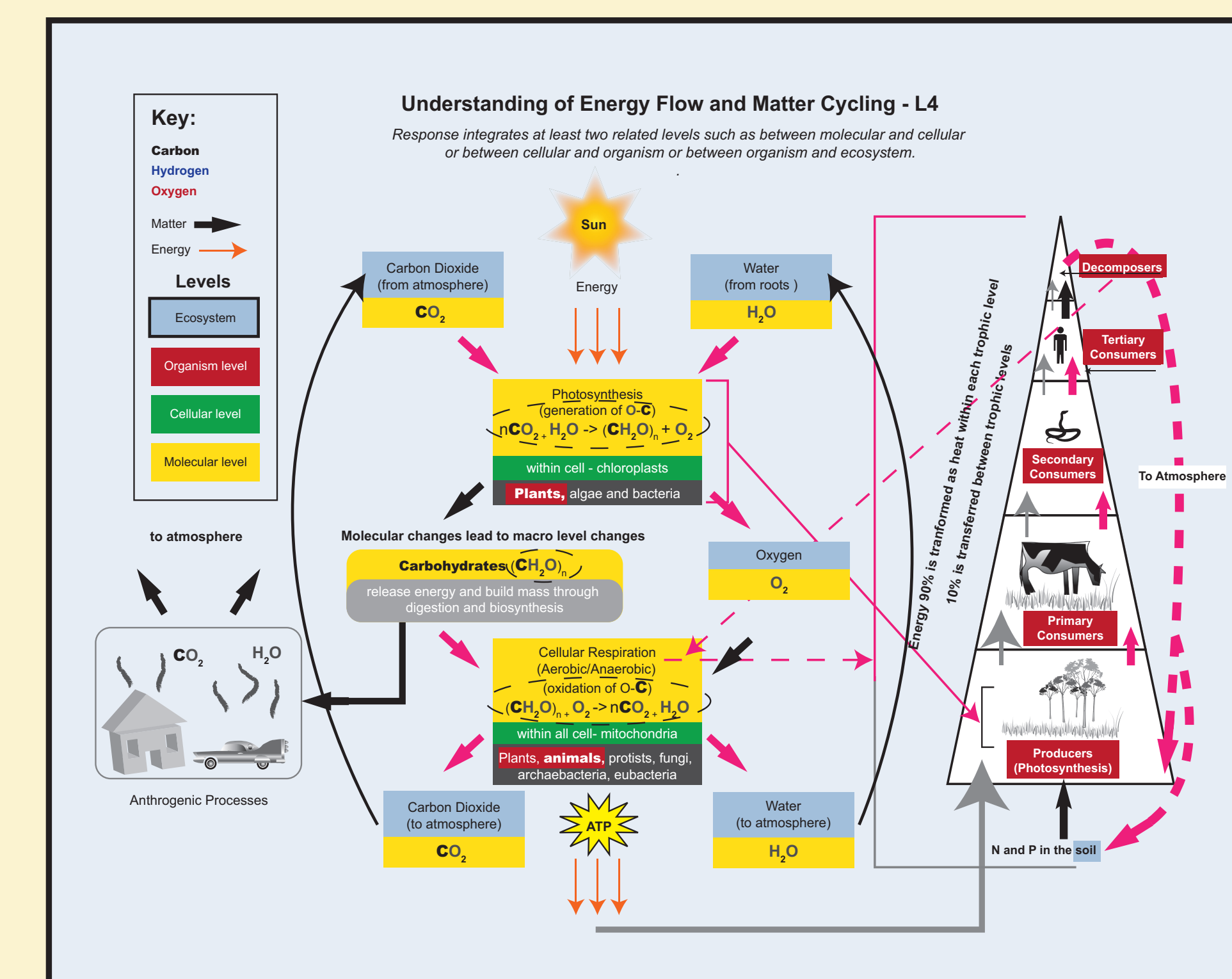
### KSA

Ability to understand that the products of photosynthesis are oxygen and a carbohydrate, the carbon building block of life.

### Student Response

[The picture shows how **molecules** take in CO<sub>2</sub> during **photosynthesis**.

## Level 4. Relational: Use of 2 normative concepts



### Item

As part of his presentation, Dr. Harris presented the photograph below depicting living and dead trees. Using the photograph, describe the processes that living trees (A) and dead trees (B) perform in the carbon cycle.

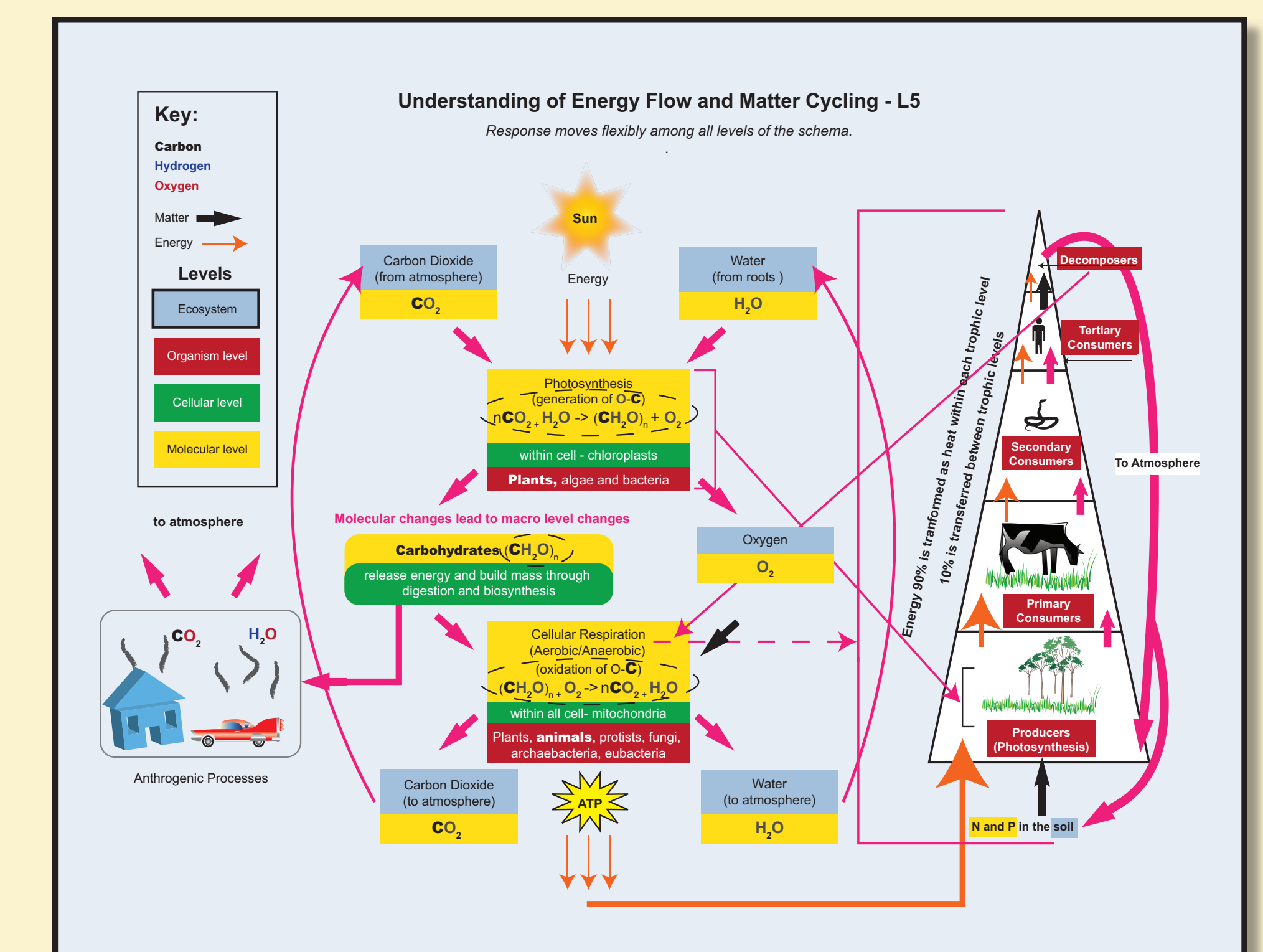
### KSA

Ability to understand the molecular process of photosynthesis captures energy and/or builds mass at the organism level.

### Student Response

I think **trees** can do better job if it is a matter of increasing **O** in the **air** because trees are better **photosynthesizers** due to abundant leaves that helps this process. But if increasing **carbon** in soil is the case, **crops** is a good idea since they **decompose** easily, providing **C** in **soil**.

## Level 5. Combined: Use of 3+ normative concepts



### Item

Using the principles of the carbon cycle, predict the likely effect of the tree destruction on the amount of atmospheric carbon dioxide released over the next year into the region's ecosystem.

### KSA

Ability to understand that molecular changes lead to macro-level changes. Ability to understand that in addition to carbon dioxide, oxygen, and water are assimilated into all forms of biomass. Then animals and plants respire and put more carbon into the atmosphere/water.

### Student Response

If you are going to sequester carbon you are going to want to have **perennial plants** versus **annual plants**, because annual plants you grow them, pick the food and they **decompose**...and the **carbon** goes right back out through **cellular respiration**. If you are growing apple trees, that could help because of **photosynthesis** fixing the carbon in the body of the tree and less carbon released via the trees' **cellular respiration**. If you do deep **tilling**, you also **release carbon** that's trapped in the **soil**. How often are you going to till? What kind of **farm machinery**? If you are going to use a big old diesel tractor **burning fossil fuels** to do the deep tilling every three months, I don't know how much carbon you are saving.