Whitney Point Central Schools Study Group:

Improving Interpretation Skills for Graphs and Diagrams

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Get a C.L.U.E. Overview

The C.L.U.E. strategy will help to improve students interpretation of graphs and diagrams. C.L.U.E. gives students a process to follow when deciphering questions that involve a graph or diagram. Science graphs and diagrams can be very confusing for students. C.L.U.E. gives the students a step by step process to breakdown the graphs and diagrams.

Why C.L.U.E. ?

Students are taught many different types of mnemonic devices. R.A.C.E. is a writing strategy taught in the English Language Arts and Social Studies. R.A.C.E. gives the students a step by step list of how to answer open ended response questions. R.A.C.E. gives the students a mini-graphic organizer to help them to remember steps in answering open ended response questions.

Students are taught S.P.A.M. to help aid in metric conversions. Like R.A.C.E, S.P.A.M. gives students a checklist graphic organizer to follow when converting units. Students can better apply their knowledge when following a graphic organizer. The organizers help students keep their work and writing more focused to the task at hand.

C.L.U.E was developed to help students in science. Many science questions involve students deriving information from a graph or diagram. Students have to connect topics they have learned to diagrams representing some very difficult concepts. Graphs display a lot of information and have a lot of interconnected topics to concepts students learn in class. Many students don't know where to start when tackling a large diagram or graph. C.L.U.E. gives students a starting point and direction to help them in interpreting or analyzing a graph or diagram. This method helps them to get "clued in".

C.L.U.E. and C.E.R.

C.E.R. is science inquiry strategy to help students connect science experiments to evidence or data. Claim, Evidence, and Reasoning helps students to write a more focused claim statement that uses actual evidence they gathered. Students explain their reasoning using data and evidence collected during an experiment.

C.L.U.E. is an extension of C.E.R. C.L.U.E. gives the students a method to follow when applying their science knowledge. C.E.R. is a method for students to focus on explaining their experimental results. C.L.U.E. is a method for students to break down a graph or diagram getting them to connect the science concepts to the images or data shown in a problem.

How C.L.U.E. works:

C - Circle

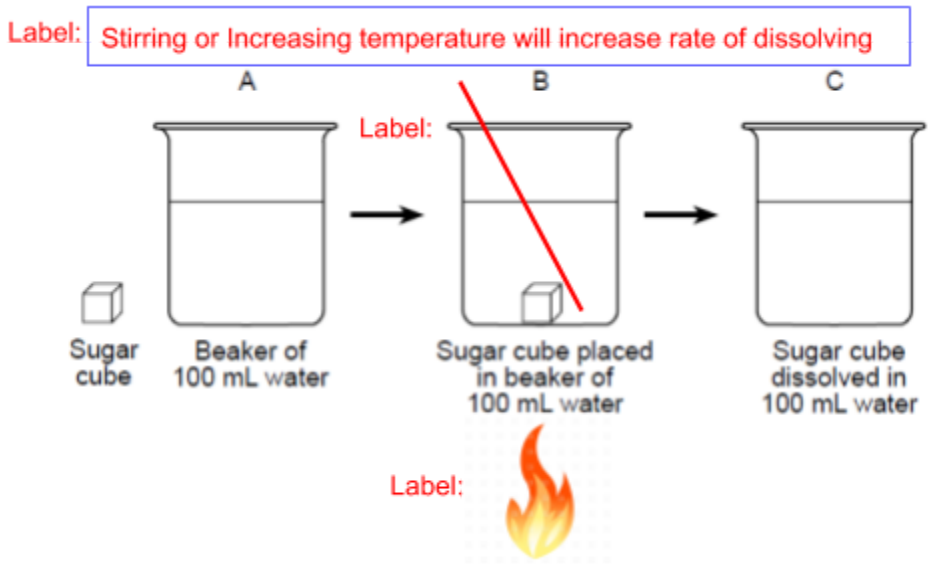
Circle the key vocabulary terms and question words.
To answer a question, the student must know what is being asked of them.
Some example question words are: Explain, Describe, Predict, Identify, Determine, etc.

Circle:

Describe one way to make the sugar cube dissolve faster in the 100 mL of water. [1]

L - Label

Label important information in the diagram.
Use your knowledge of science to add details and information to the diagram.
Labeling will enable students to access their classroom experiences to help them make connections to the question.



U - Underline

Underline vocabulary in the descriptor for the graph or diagram.
Underline any matching terms found in your labels, the question, multiple choices, or the descriptor.
Underlining will help students to use important vocabulary terms in their written responses and for selecting the correct multiple choice response.

A sugar cube was placed into a beaker containing 100 mL of water at room temperature and completely dissolved into the water. This process is represented by the series of diagrams labeled *A*, *B*, and *C* below.

E - Explain

Answer the question based on the connections made from circling, labeling, and underlining.
Use complete sentences to explain your answer in the written response area.
For multiple choice responses write a sentence explaining your choice.

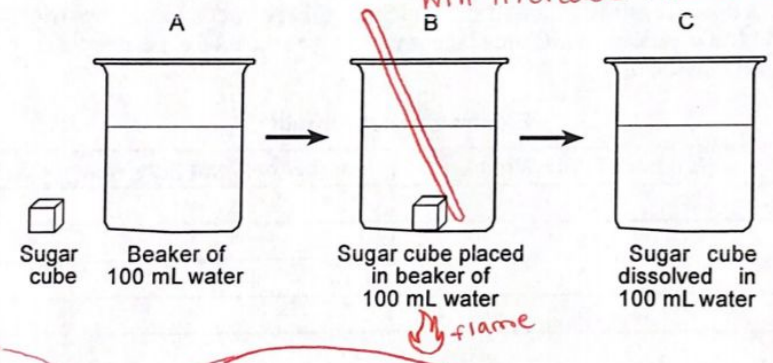
Example Response: Heating the water will make the molecules collide faster dissolving the sugar cube faster.

C.L.U.E. Examples

- **Example 1**: Written Response (June 2018, Question: 82)

A sugar cube was placed into a beaker containing 100 mL of water at room temperature and completely dissolved into the water. This process is represented by the series of diagrams labeled *A*, *B*, and *C* below.

Stirring or increasing temp. will increase rate of dissolving.



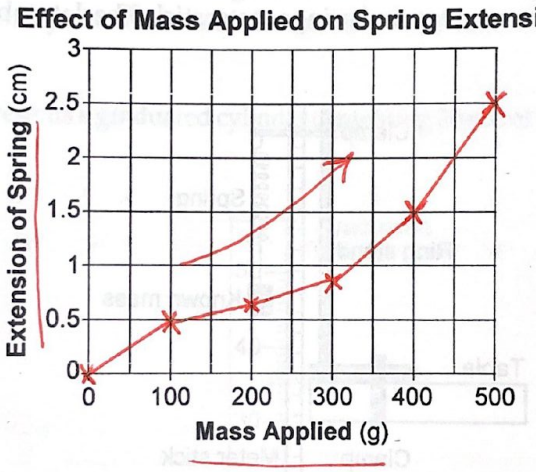
✓C
✓L
✓U
✓E

82 Describe *one* way to make the sugar cube dissolve faster in the 100 mL of water. [1]

Heating the water will make the molecules collide faster dissolving the sugar cube faster.

- **Example 2**: Written Response (June 2018, Question: 48)

As mass is added, the spring extends further.



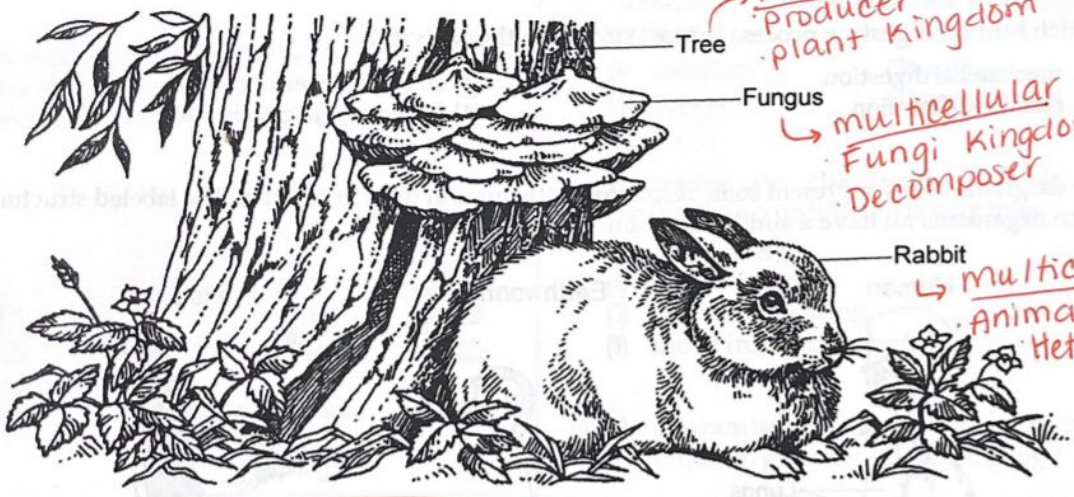
✓C
✓L
✓U
✓E

48 Describe the general relationship between the mass applied and the extension on the spring. [1]

The relationship is that the extension of the spring increases as the mass applied increases.

- **Example 3**: Multiple Choice (June 2017, Question: 3)

3 Three living organisms are labeled in the diagram below.



√C
√L
√U
√E

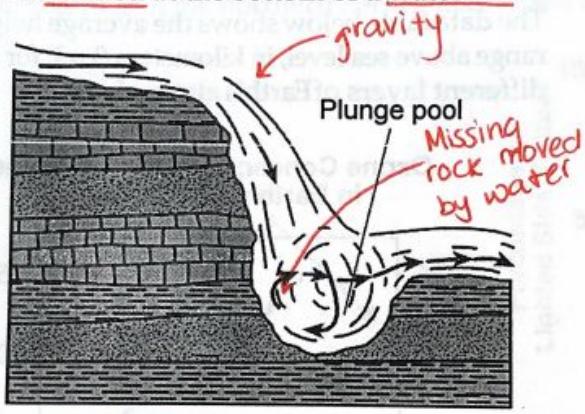
What do the rabbit, fungus, and tree have in common?

(1) They are all producers.
(2) They are all omnivores.
(3) They all belong to the same kingdom.
(4) They are all multicellular organisms.

All organisms above are multicellular, made up of more than one cell.

- **Example 4**: Multiple Choice (June 2018, Question: 32)

32 The cross section below represents a plunge pool that formed at the bottom of a waterfall.



√C
√L
√U
√E

The plunge pool at the bottom of the waterfall was formed mainly by

(1) deposition
(2) evaporation
(3) precipitation
(4) erosion

Missing rock has been moved by water

- **Example 5**: Written Response (June 2017, Question:46)

46 The data table below shows a person's heart rate measured in beats per minute (bpm) at five different times in the beginning of a day.

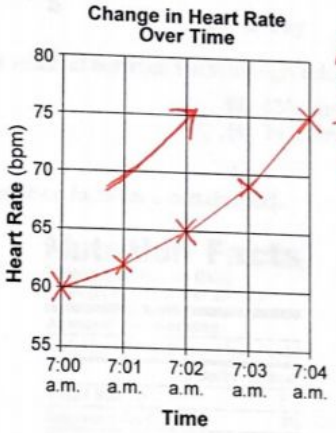
Change in Heart Rate Over Time

Time (X)	Heart Rate (bpm) (Y)	Activity
7:00 a.m.	60	sleeping
7:01 a.m.	62	waking up
7:02 a.m.	65	sitting up in bed
7:03 a.m.	68	getting out of bed
7:04 a.m.	75	walking around bedroom

On the grid below, use an **X** to plot the heart rate for each time shown in the data table. Connect the **X**s with a line. [1]

Dependent
Responding
Y - axis

Manipulated
Independent
X - axis



As time increases, the heart rate also increases

✓C ✓L ✓U ✓E

Summary

A suggested method for implementation would be to begin by modeling the method with the students. Select multiple choice questions that you as a teacher can apply the C.L.U.E. method to easily. Practice your predetermined examples before showing the class. Then expand into using extended written response questions. Slowly scaffold students towards independently applying the C.L.U.E. method on their own.

The goal of this study group is to improve students' interpretation skills for diagrams and graphs by using this method. Through collaboration and consistency throughout the science grade levels, students will develop the skills needed to interpret diagrams and graphs more effectively. Research has shown that mnemonic devices like C.L.U.E. provide students with strategies for problem solving and academic achievement.

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