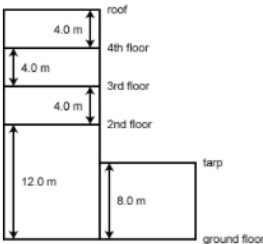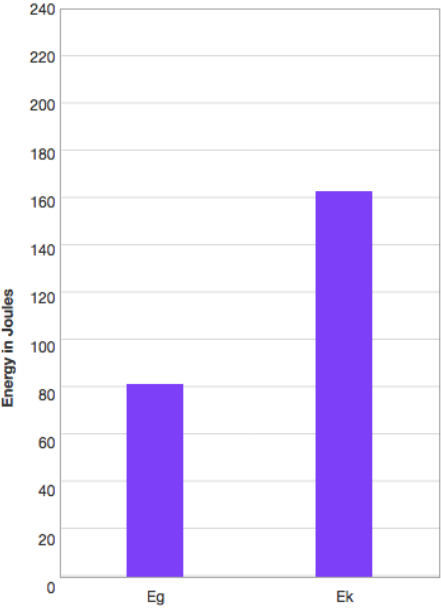# APPENDIX 3
Pro-Core Question Types and Samples

Pro-Core has a variety of question types that mirror what students will see on Ohio's state assessments. Technology enhanced questions provide ways to assess higher cognitive levels than traditional multiple choice questions. These questions also give your students practice before they see similar items on the state exams. Following the list below are examples of the **types of questions** included on Pro-Core tests. **Depth of Knowledge** (DOK) and **Cognitive Demands** (CD) Codes are shown on pages 7 - 10.

Question Types: Codes and Descriptions

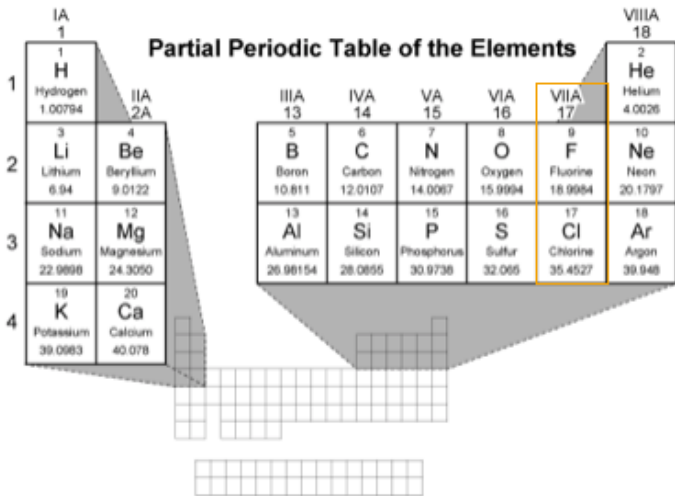|	Code	Type	Description
1	CHT	Bar Graph	Select only one column for each row of a table.
2	CMCC	Table Select (Checklist)	Select more than one column or no columns for each row of a table.
3	CMCR	Table Select (Radio)	Select only one column for each row of a table.
4	DDA	Drag and Drop – Answers	Move objects to correct locations.
5	DDT	Drag and Drop – Text	Move the correct answers to the empty boxes.
6	EB	Equation Board	Use equation board or type to answer questions. Can accept multiple correct answers.
7	EVB	Evidence-Based	A two part question in which the answer for Part B depends upon the correct answer for Part A. This is scored one point total for getting **both** parts correct.
8	FB	Fill in the Blank	Enter numbers or text. Can have multiple correct answers to account for possible misspellings and rounding differences.
9	MCC	Multiple Choice – Checkbox	Select more than one correct response. Can have up to 10 responses.
10	MCR	Multiple Choice – Radio	Select only one response.
11	PL	Pick List	Select words, numbers or phrases in drop-down menus. Six menus are possible for a question. X number of choices are possible for each selection
12	SO	Select Object	Select hot spot(s) on screen. Can be pictures, areas of graphics or charts, letters, statements or words.

Pro-Core Types and Samples of Computer-Enhanced Questions

Code	Question Type	Description	Example
CHT	Bar Graph	Select values on a bar graph.	Use the scenario below to answer the question. Question Options: ☐ Exclude from assessment Comment on this Question A construction worker accidentally drops a 1.0 kg brick from rest off the roof of the hotel that is 4.0 meters above the 4th floor. Fortunately a strong tarp is placed 8 meters from the ground to protect people and cars from such accidents. **Consider the brick just before it hits the tarp** Determine the gravitational potential energy of the brick, **Eg**, relative to the ground just before it hits the tarp 8 meters above the ground. Use 10 m/s² and assume there is no air resistance. Determine the kinetic energy of the brick, **Ek**, just before it hits the tarp 8 meters above the ground. Use 10 m/s² and assume there is no air resistance. Click on the graph above each label to show the calculated values for **Eg** and **Ek**.
CMCC	Table Select (Checklist)	Select more than one column or no columns for each row of a table.	Below are observations that were made by different groups in your class that were given different types of compounds. Use the table to indicate the type(s) of bonding possible for each observation. You will be selecting all columns if the observation does not allow you to determine which type of bonding is involved.

Code	Question Type	Description	Example
CMCR	Table Select (Radio)	Select only one column for each row of a table.	There are 90 naturally-occurring elements, with almost 4000 isotopes. Of these isotopes, about 250 are stable with more than 3000 unstable or radioactive. Radioactive isotopes have many uses, including medical treatments and geologic dating. Consider two neutral isotopes of the same element. For each characteristic, select a box to indicate whether the property is the same or different for the two neutral isotopes. <table><tr><td></td><td>Same</td><td>Different</td></tr><tr><td>Mass number</td><td>○</td><td>◉</td></tr><tr><td>Atomic number</td><td>◉</td><td>○</td></tr><tr><td>Number of protons</td><td>◉</td><td>○</td></tr><tr><td>Number of neutrons</td><td>○</td><td>◉</td></tr><tr><td>Number of electrons</td><td>◉</td><td>○</td></tr><tr><td>Number of valence electrons</td><td>◉</td><td>○</td></tr><tr><td>Chemical properties</td><td>◉</td><td>○</td></tr></table>
DDA	Drag and Drop - Answers	Move objects to correct locations.	Substance W　Substance X　Substance Y　Substance Z Use the graph of mass vs. volume below to answer the question. **Mass versus Volume for Four Substances** (graph with Mass (g) on y-axis, Volume (mL) on x-axis; Substance W, Substance X, Substance Y, Substance Z) Move the labels to place the Substances in order of increasing density. Substance X → Substance Z → Substance W → Substance Y Least Dense　　　　　　　　　　　　　　　　Most Dense

Code	Question Type	Description	Example
DDT	Drag and Drop – Text	Move the correct answers to the empty boxes.	The 15th Amendment to the Constitution granted African American men the right to vote. Southern states were still able to effectively disenfranchise African Americans. Drag and drop **three** ways in which Southern states prevented African American men from voting into the boxes below. black codes poll taxes literacy tests African American men were still not considered citizens restrictive registration practices
EB	Equation Board	Use equation board or type to answer questions. Can accept multiple correct answers.	If $f(x) = 2x$ and $g(x) = 3x + 1$, what is the value of $f(x+5) + g(-4)$? Type your answer in the box. [Equation board with keys: 7 8 9 + x y z √; 4 5 6 - √ ⬚ x x; 1 2 3 × \$ % > <; , 0 . ÷ ( ) ± ° :; ← → ⬛ = ! π ∞ ⬚]
EVB	Evidence-Based	A two part question in which the answer for Part B depends upon the correct answer for Part A. This is scored one point total for getting **both** parts correct.	**Nick Makes a Deal** ❶ Nick turned eight. Now he wanted a later bedtime. He told his parents that going to bed at 8:30 P.M was okay for his six-year-old sister. He said he should go to bed at 9:00 P.M because he was growing up. His current bedtime was too early. He was in second grade. All his friends went to bed at 9:30 P.M. He promised that he would not stay up reading books. He promised to wake up early. He made a deal with his parents. If seemed crabby, he would return to the early bedtime. This question has two parts. **Part A** Which sentence tells why Nick wanted a later bedtime? A He is getting older. B He is older than his friends. C He is being teased by his sister. D He is tired of reading his books. **Part B** Think about your answer in Part A. Which sentence from the story explains it? A "Now he wanted a later bedtime." B "He said he should go to bed at 9:00 P.M because he was growing up." C "His current bedtime was too early." D "He promised that he would not stay up reading books."

Code	Question Type	Description	Example
FB	Fill in the Blank	Enter numbers or text. Can have multiple correct answers to account for possible misspellings and rounding differences.	Iron (III) chloride exists as brownish-black crystals. It decomposes to form elemental iron and chlorine. Enter coefficients in the boxes below to balance the equation showing the decomposition of iron (III) chloride. [2] $FeCl_3 \rightarrow$ [2] Fe + [3] Cl_2
MCC	Multiple Choice – Checkbox	Select more than one correct response. Can have up to 10 responses.	Barium (Ba) is chemically combined with oxygen (O) to form a new compound. Select **all** statements that describe the resulting compound. A ☐ It has a formula of Ba_2O_2. B ☐ It has a formula of BaO_2. C ☐ It has a formula of Ba_2O. D ☑ It has a formula of BaO. E ☐ It is named barium oxygen. F ☑ It is named barium oxide. G ☐ It is named barium dioxide. H ☐ It is named dibarium oxide. I ☐ It is named barium (I) oxide. J ☐ It is named barium (II) oxide.

Code	Question Type	Description	Example
MCR	Multiple Choice – Radio)	Select only one response.	Four different elements are examined and categorized as either a metal, nonmetal or metalloid. Which element is most likely a metalloid? A — an element that is dull, not ductile, and has a low melting point B — an element that is shiny, brittle, and conducts electricity C — an element that is dull, not ductile, and does not conduct electricity D — an element that is shiny, malleable, and has a high melting point
PL	Pick List	Select words, numbers or phrases in drop-down menus. Six menus are possible for a question.	A solution is a [homogeneous ▾] mixture where a [solute ▾] is dissolved in a [solvent ▾].
SO	Select object	Select hot spot(s) on screen. Can be pictures, areas of graphics or charts, letters, statements or words.	On the partial periodic table pictured below, select the column of elements that are halogens. Partial Periodic Table of the Elements

➢ Information and samples of **reports** for district administrators, teachers, and students are available in various sections of the **Pro-Core User Manual**.

Ohio's Cognitive Demands for Science

As with all other frameworks and cognitive demand systems, Ohio's revised system has overlap between the categories. Recalling Accurate Science is a part of the other three cognitive demands included in Ohio's framework because science knowledge is required for students to demonstrate scientific literacy.

These definitional paragraphs are used to describe the cognitive demand and are the prerequisite conditions that must be met before secondary conditions are considered.

Cognitive Demand	Description
Designing Technological/ Engineering Solutions Using Science Concepts (T)	Requires students to solve science-based engineering or technological problems through application of scientific inquiry. Within given scientific constraints, propose or critique solutions, analyze and interpret technological and engineering problems, use science principles to anticipate effects of technological or engineering design, find solutions using science and engineering or technology, consider consequences and alternatives and/or integrate and synthesize scientific information.
Demonstrating Science Knowledge (D)	Requires students to use scientific inquiry and develop the ability to think and act in ways associated with inquiry, including asking questions, planning and conducting investigations, using appropriate tools and techniques to gather and organize data, thinking critically and logically about relationships between evidence and explanations, constructing and analyzing alternative explanations, and communicating scientific arguments. (Slightly altered from National Science Education Standards) **Note:** Procedural knowledge (knowing how) is included in Recalling/Identifying Accurate Science.
Interpreting and Communicating Science Concepts (C)	Requires students to use subject-specific conceptual knowledge to interpret and explain events, phenomena, concepts and experiences using grade-appropriate scientific terminology, technological knowledge and mathematical knowledge. Communicate with clarity, focus and organization using rich, investigative scenarios, real-world data and valid scientific information.
Recalling Accurate Science (R)	Requires students to provide accurate statements about scientifically valid facts, concepts and relationships. Recall only requires students to provide a rote response, declarative knowledge or perform routine mathematical task. This cognitive demand refers to students' knowledge of science fact, information, concepts, tools, procedures and basic principles.

Ohio Department of Education, March 2011

***Math Descriptors* – Applying Depth of Knowledge Levels for Mathematics (Webb, 2002) & NAEP 2002 Mathematics Levels of Complexity** (M. Petit, Center for Assessment 2003, K. Hess, Center for Assessment, updated 2006)

Level 1 Recall	Level 2 Skills/Concepts	Level 3 Strategic Thinking	Level 4 Extended Thinking
a. Recall, observe, or recognize a fact, definition, term, or property b. Apply/compute a well-known algorithm (e.g., sum, quotient) c. Apply a formula d. Determine the area or perimeter of rectangles or triangles given a drawing and labels e. Identify a plane or three dimensional figure f. Measure g. Perform a specified or routine procedure (e.g., apply rules for rounding) h. Evaluate an expression i. Solve a one-step word problem j. Retrieve information from a table or graph k. Recall, identify, or make conversions between and among representations or numbers (fractions, decimals, and percents), or within and between customary and metric measures l. Locate numbers on a number line, or points on a coordinate grid m. Solve linear equations n. Represent math relationships in words, pictures, or symbols o. Read, write, and compare decimals in scientific notation	a. Classify plane and three dimensional figures b. Interpret information from a simple graph c. Use models to represent mathematical concepts d. **Solve a routine problem** requiring multiple steps/decision points, or the application of multiple concepts e. Compare and/or contrast figures or statements f. Construct 2-dimensional patterns for 3-dimensional models, such as cylinders and cones g. Provide justifications for steps in a solution process h. Extend a pattern i. Retrieve information from a table, graph, or figure and use it solve a problem requiring multiple steps j. Translate between tables, graphs, words and symbolic notation k. Make direct translations between problem situations and symbolic notation l. Select a procedure according to criteria and perform it m. Specify and explain relationships between facts, terms, properties, or operations n. Compare, classify, organize, estimate, or order data	a) Interpret information from a complex graph b) Explain thinking when more than one response is possible c) Make and/or justify conjectures d) Use evidence to develop logical arguments for a concept e) Use concepts to solve non-routine problems f) Perform procedure with multiple steps and multiple decision points g) Generalize a pattern h) Describe, compare, and contrast solution methods i) Formulate a mathematical model for a complex situation j) Provide mathematical justifications k) Solve a multiple- step problem and provide support with a mathematical explanation that justifies the answer l) Solve 2-step linear equations/inequalities in one variable over the rational numbers, interpret solution(s) in the original context, and verify reasonableness of results m) Translate between a problem situation and symbolic notation that is not a direct translation n) Formulate an original problem, given a situation o) Analyze the similarities and differences between procedures p) Draw conclusion from observations or data, citing evidence	a) Relate mathematical concepts to other content areas b) Relate mathematical concepts to real-world applications in new situations c) Apply a mathematical model to illuminate a problem, situation d) Conduct a project that specifies a problem, identifies solution paths, solves the problem, and reports results e) Design a mathematical model to inform and solve a practical or abstract situation f) Develop generalizations of the results obtained and the strategies used and apply them to new problem situations g) Apply one approach among many to solve problems h) Apply understanding in a novel way, providing an argument/justification for the application ***NOTE**: Level 4 involves such things as complex restructuring of data or establishing and evaluating criteria to solve problems.*

<u>Depth of Knowledge</u> – Social Studies

Each test is assigned a Depth of Knowledge (DOK) level. Descriptions of the three DOK levels from Karin Hess are provided below.

Level 1 Recall of Information
Level 1 asks students to recall facts, terms, concepts, trends, generalizations and theories or to recognize or identify specific information contained in graphics. This level generally requires students to identify, list, or define. The items at this level usually ask the student to recall who, what, when and where. Items that require students to "describe" and "explain" could be classified at Level 1 or 2 depending on what is to be described and explained. A Level 1 "describe or explain" would recall, recite or reproduce information. Items that require students to recognize or identify specific information contained in maps, charts, tables, graphs or drawings are generally level 1.

Level 2 Basic Reasoning
Level 2 includes the engagement of some mental processing beyond recalling or reproducing a response. This level generally requires students to contrast or compare people, places, events and concepts; convert information from one form to another; give an example; classify or sort items into meaningful categories; describe, interpret or explain issues and problems, patterns, reasons, cause and effect, significance or impact, relationships, points of view or processes. A Level 2 "describe or explain" would require students to go beyond a description or explanation of recalled information to describe or explain a result or "how" or "why."

Level 3 Complex Reasoning
Level 3 requires reasoning, using evidence, and a higher level of thinking than the previous two levels. Students would go beyond explaining or describing "how and why" to justifying the "how and why" through application and evidence. The cognitive demands at Level 3 are more complex and more abstract than Levels 1 or 2. Items at Level 3 include drawing conclusions; citing evidence; applying concepts to new situations; using concepts to solve problems; analyzing similarities and differences in issues and problems; proposing and evaluating solutions to problems; recognizing and explaining misconceptions or making connections across time and place to explain a concept or big idea.

Excerpt from "Applying Webb's Depth-of-Knowledge (DOK) Levels in Social Studies" by Karin K. Hess. Copyright © 2005 Karin Hess, Nation Center for Assessment, Dover, NH.

Depth of Knowledge (DOK) – ELA/Reading

Depth of Knowledge (DOK) refers to the complexity of thinking required to complete a task in a given item.

Items with a DOK 1 designation focus on the recall of information, such as definitions and terms, and simple procedures.

Items with a DOK 2 designation require students to make decisions, solve problems, make accurate generalizations, or locate supportive details.

Items with a DOK 3 designation feature higher-order cognitive tasks such as critiquing a statement and forming a conclusion, explaining, justifying, or proving a statement, or approaching abstract and complex problems. For ELA, 2-3 items will be developed at the DOK 3 level for each set of items written to a passage or passage set.

Items with a DOK 4 designation require the need for information to be synthesized, applied, and analyzed. The DOK 4 designation may be used for the development of extended response items in ELA.