

Science Extended Depth-of-Knowledge Stages

Stage 1–Respond

Requires the ability to respond to or indicate or acknowledge scientific features.

Example:

- ◆ Points to a rock
- ◆ Attends to someone measuring
- ◆ Indicates a measuring device, i.e., ruler, measuring cup, scale
- ◆ Points to common animals, physical objects, insects, etc.

Stage 2–Reproduce

Requires the ability to copy, replicate, repeat, re-enact, mirror, or match scientific ideas.

Example:

- ◆ Copies figure of insect, bird, or animal with distinguishing features
- ◆ Traces movement of sun
- ◆ Repeats indication of a plant growing with sun
- ◆ Reproduces indication that fish live in water
- ◆ Matches a number on a scale
- ◆ Matches similar shapes together

Stage 3–Recall and Recognition

Requires students to recall or observe facts, definitions, terms. Involves simple one-step procedures. Requires a demonstration of a rote response, use of a well-known formula, or follow a set procedure (like a recipe), or perform a clearly defined series of steps.). Either knows the answer or not.

Examples:

- ◆ Recall or recognize a fact, term, or property.
- ◆ Represent in words or diagrams a scientific concept or relationship.
- ◆ Provide or recognize a standard scientific representation for simple phenomenon.
- ◆ Perform a routine procedure, such as measuring length.
- ◆ Identifies common shapes and figures
- ◆ Identifies measuring devices, i.e., ruler, measuring cup, scale

Stage 4 (DOK Level 2 Basic Reasoning)

Requires students to make some decisions as to how to approach the question or problem. Keywords that generally distinguish a Stage 4 item include “classify,” “organize,” “estimate,” “make observations,” “collect and display data,” and “compare data.” These actions imply more than one step. Examples:

- ◆ Make observations and collect data;
- ◆ Classify, organize, and compare data;
- ◆ Organize and display data in tables, graphs, and charts.
- ◆ Select a procedure according to specified criteria and perform it.
- ◆ Formulate a routine problem, given data and conditions.
- ◆ Organize, represent, and interpret data.
- ◆ Specify and explain the relationship between facts, terms, properties, or variables.
- ◆ Describe and explain examples and non-examples of science concepts.

Stage 5 (DOK Level 3 Complex Reasoning)

Requires reasoning, planning or use of evidence than previous stages. May involve activity with more than one possible answer. An activity that has more than one possible answer and requires students to justify the response they give would most likely be a Stage 5. Experimental designs at Stage 5 typically involve more than one dependent variable. Requires drawing conclusions from observations; citing evidence and developing a logical argument for concepts; and explaining phenomena in terms of concepts.

Examples:

- ◆ Form conclusions from experimental data.
- ◆ Solve non-routine problems.
- ◆ Develop a scientific model for a complex situation.
- ◆ Identify research questions and design investigations for a scientific problem.

Stage 6 (DOK Level 4 Extended Reasoning)

Involves high cognitive demands and complexity. Students are required to make several connections—relate ideas within the content area or among content areas—and have to select or devise one approach among many alternatives to solve the problem. Requires complex reasoning, experimental design and planning, and probably will require an extended period of time either for the science investigation required by an objective, or for carrying out the multiple steps of an assessment item.

Examples:

- ◆ Based on data provided from a complex experiment that is novel to the student, deduct the fundamental relationship between several controlled variables.
- ◆ Conduct an investigation, from specifying a problem to designing and carrying out an experiment, to analyzing its data and forming conclusions.