

Patricia Mason , West Lafayette, IN

(PAEMST 2003, Purdue University College of Science Distinguished Alumna 2005)

Standards addressed are 1, 2, 4, and 6

[<http://dc.doe.in.gov/Standards/AcademicStandards/StandardSearch.aspx>] accessed 7/25/2011

- 1- Nature of Science and Technology
- 2- Scientific Thinking
- 3- The Physical Setting (not addressed in this contest)
- 4- The Living Environment
- 5- The Mathematical World (There are calculations of percentages in this contest)
- 6- Common Themes

5.1.5 Explain that technology extends the ability of people to make positive and/or negative changes in the world (Core Standard) and

5.1.6 Explain how the solution to one problem, such as the use of pesticides in agriculture may create other problems. (Core Standard)

6.1.2 Recognize and explain that hypotheses are valuable, even if they turn out not to be true, if they lead to fruitful investigations.

7.1.1 Recognize and explain that when similar investigations give different results, the scientific challenge is to judge whether the differences are trivial or significant, which often takes further studies to decide.

7.1.3 Explain why is it important in science to keep honest, clear and accurate records.

7.1.4 Describe that different explanations can be given for the same evidence, and it is not always possible to tell which one is correct without further inquiry.

7.1.8 Explain that technologies often have drawbacks as well as benefits. Consider a technology, such as the use of pesticides, which helps some organisms but may hurt others, either deliberately or inadvertently.

5.2.4 Keep a notebook to record observations and be able to distinguish inferences from actual observations and

5.2.6 Write instructions that others can follow in carrying out a procedure and

5.2.7 Read and follow step-by-step instructions when learning new procedures and

5.2.8 Recognize when and describe that comparisons might not be accurate because some of the conditions are not kept the same. (Core Standard).

6.2.1 Find the mean and median of a set of data.

6.2.5 Organize information in simple tables and graphs and identify relationships they reveal.

6.2.6 Read simple tables and graphs produced by others and describe in words what they show.

6.2.8 Analyze and interpret a given set of findings, demonstrating that there may be more than one good way to do so.

7.2.1 Find what percentage one number is of another and figure any percentage of a number.

7.2.5 Estimate probabilities of outcomes in familiar situations, on the basis of history or the number of possible outcomes.

7.2.6 Read analog and digital meters on instruments used to make direct measurements of length, weight, elapsed time, rates or temperatures and choose appropriate units.

Students will be instructed to test the effect of varying salt concentrations on seed germination. They will prepare a standard stock solution of salt and then make serial dilutions of the stock to create other solutions of known concentrations. Radish seeds will be grown between paper towels dampened with the various solutions in plastic baggies taped to a window.

5.4.4 Explain that in any particular environment, some kinds of plants and animals survive, some do not survive as well and some cannot survive at all.

5.4.5 Explain how changes in an organism's habitat are sometimes beneficial and sometimes harmful.

5.4.7 Explain that living things, such as plants and animals, differ in their characteristics, and that sometimes these differences can give members of these groups (Plants and animals) an advantage in surviving and reproducing.

6.4.6 Distinguish the main differences between plant and animal cells, such as the presence of chlorophyll and cell walls in plant cells and their absence in animal cells.

6.4.7 Explain that about two-thirds of the mass of a cell is accounted for by water. Understand that water gives cells many of their properties.

6.4.8 Explain that in all environments, such as freshwater, marine, forest, desert, grassland, mountain and others, organisms with similar needs may compete with one another for resources, including food, space, water, air and shelter. Note that in any environment, the growth and survival of organisms depend on the physical conditions.

6.4.10 Describe how life on Earth depends on energy from the sun.

7.4.4 Explain that cells continually divide to make more cells for growth and repair and that various organs and tissues function to serve the needs of cells for food, air and waste removal.

7.4.5 Explain that the basic functions of organisms, such as extracting energy from food and getting rid of wastes, are carried out within the cell and understand that the way in which cells function is similar in all organisms.

7.4.6 Explain how food provides the fuel and the building material for all organisms.

7.4.7 Describe how plants use the energy from light to make sugars from carbon dioxide and water to produce food that can be used immediately or stored for later use.

7.4.9 Understand and explain that as any population of organisms grows, it is held in check by one or more environmental factors. These factors could result in depletion of food or nesting sites and/or increased loss due to increased numbers of predators or parasites.

7.4.14 Explain that the environment may contain dangerous levels of substances that are harmful to human beings. Understand, therefore, that the good health of individuals requires monitoring the soil, air and water as well as taking steps to keep them safe.

5.6.3 Recognize and describe that almost anything has limits on how big or small it can be.

6.6.1 Understand and explain that from the earliest times until now, people have believed that even though countless different kinds of materials seem to exist in the world, most things can be made up of combinations of just a few basic kinds of things. Note that there has not always been agreement, however, on what those basic kinds of things are.....