

Spring 2013 Student Performance Analysis with Instructional Guidance

Grade 8 Science Standards of Learning



Presentation may be paused and resumed
using the arrow keys or the mouse.

Earth's Energy Budget

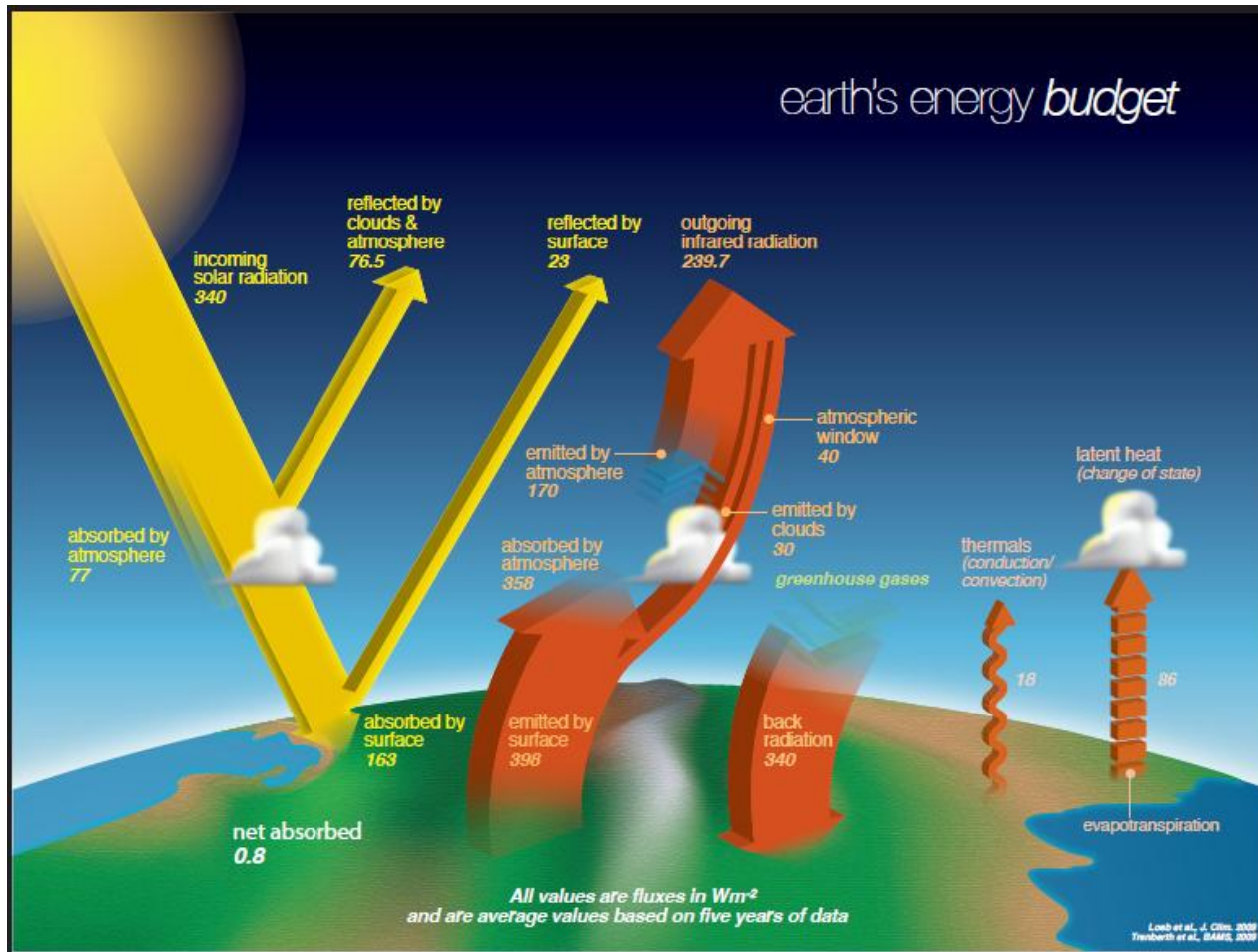
6.3 The student will investigate and understand the role of solar energy in driving most natural processes within the atmosphere, the hydrosphere, and on Earth's surface. Key concepts include

- a) Earth's energy budget;**
- b) the role of radiation and convection in the distribution of energy;**
- c) the motion of the atmosphere and the oceans;**

Students need additional experiences analyzing the significance of solar energy and the role of absorption, reflection, and radiation.

Instructional Guidance 6.3a

Earth's Energy Budget



http://science-edu.larc.nasa.gov/energy_budget/

Use of Chemical Formulas

6.4 The student will investigate and understand that all matter is made up of atoms. Key concepts include

- a) atoms consist of particles, including electrons, protons, and neutrons;**
- b) atoms of a particular element are alike but are different from atoms of other elements;**
- c) elements may be represented by chemical symbols;**
- d) two or more atoms interact to form new substances, which are held together by electrical forces (bonds);**
- e) compounds may be represented by chemical formulas;**

Students need additional practice interpreting the components of compounds through the expression of chemical formulas.

Instructional Guidance 6.4e

Use of Chemical Formulas

In the chemical formula for ammonia NH_3 , what does the subscript 3 represent?

- A. The number of nitrogen and hydrogen atoms in each molecule of ammonia
- B. The number of hydrogen atoms in each molecule of ammonia
- C. The number of ammonia molecules that will bond together
- D. The number of nitrogen atoms in each molecule of ammonia

Solar System Organization

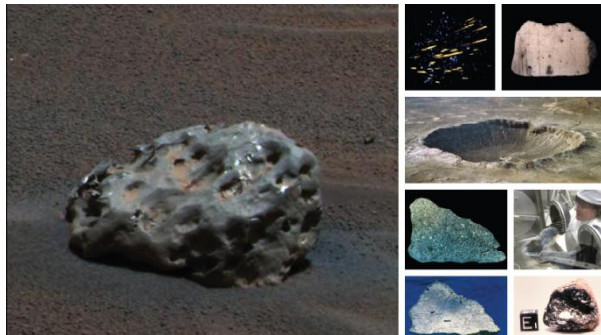
6.8 The student will investigate and understand the organization of the solar system and the interactions among the various bodies that comprise it. Key concepts include

- a) the sun, moon, Earth, other planets and their moons, dwarf planets, meteors, asteroids, and comets;**
- b) relative size of and distance between planets;**

Students need additional experiences analyzing solar system organization and comparing various solar system bodies.

Instructional Guidance for 6.8a

Solar System Organization



Meteor



Comet



Asteroid

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Structures of Cells

LS.2 The student will investigate and understand that all living things are composed of cells. Key concepts include

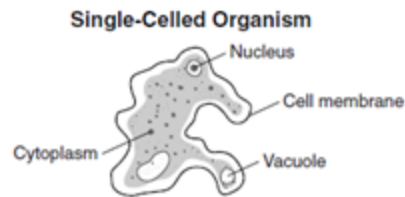
- a) cell structure and organelles;**
- b) similarities and differences between plant and animal cells;**
- c) development of cell theory; and**
- d) cell division.**

Students need additional experience investigating cellular structures using microscopes or models and simulations.

Instructional Guidance for LS.2a

Structures of Cells

1. In this diagram of a single-celled organism, which organelle functions as a place to store extra water?



- A. Cell membrane
- B. Vacuole**
- C. Cytoplasm
- D. Nucleus

2. A plant's green color is due to the presence of which organelle?

- A. Chloroplast**
- B. Nucleus
- C. Mitochondria
- D. Vacuole

Response to Environmental Change

LS.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. Key concepts include

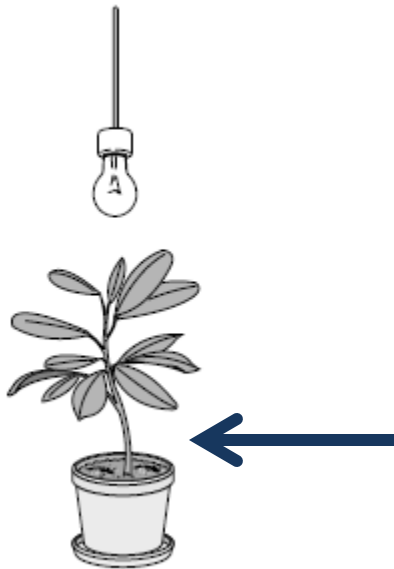
- a) phototropism, hibernation, and dormancy;**
- b) factors that increase or decrease population size; and**
- c) eutrophication, climate changes, and catastrophic disturbances.**

Students need additional experience analyzing phototropism, hibernation, and dormancy in respect to changes in the environment.

Instructional Guidance for 7.10a

Response to Environmental Change

This plant has been growing in a closet with the light bulb as its only source of light. As a result of the light bulb being moved to the location of the arrow, the plant would-



A. bend toward the new location of the light bulb and continue to grow.

B. begin to wilt, and drop its leaves.

C. grow very slowly with no change in appearance.

D. form buds and flower.

Changes in Populations over Time

LS.13 The student will investigate and understand that populations of organisms change over time. Key concepts include

- a) the relationships of mutation, adaptation, natural selection, and extinction;**
- b) evidence of evolution of different species in the fossil record; and**
- c) how environmental influences, as well as genetic variation, can lead to diversity of organisms.**

Students need additional practice interpreting and analyzing changes in populations over time through processes such as mutation, adaptation, natural selection, and extinction.

Instructional Guidance for LS.13

Changes in Populations over Time

Which process is the original source of genetic variation that allows for natural selection?

A. Pollination

B. Binary Fission

C. Mutation

D. Replication

Measurement Concepts

PS.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

- a) chemicals and equipment are used safely;**
- b) length, mass, volume, density, temperature, weight, and force are accurately measured;**

Students need extra practice obtaining and properly recording measurements through laboratory experience.

Instructional Guidance PS.1

Measurement Concepts

Which is a metric unit of measurement that is used to record the heat transfer of a solution in a classroom investigation?

A. Liter

B. Newton

C. Volt

D. Degree Celsius

Periodic Table

PS.4 The student will investigate and understand the organization and use of the periodic table of elements to obtain information. Key concepts include

- a) symbols, atomic numbers, atomic mass, chemical families (groups), and periods;**
- b) classification of elements as metals, metalloids, and nonmetals; and**
- c) formation of compounds through ionic and covalent bonding.**

Students need additional practice using a periodic table, including the use of a table for classification of elements.

Instructional Guidance PS.4b

Periodic Table

Directions: Click on each element you want to select. You must select all correct elements.

Which of the highlighted elements are nonmetals?

Partial Periodic Table of the Elements

1																	18
1 H 1.0	2											5 B 10.8	6 C 12.0	7 N 14.0	8 O 16.0	9 F 19.0	10 Ne 20.2
3 Li 6.9	4 Be 9.0											13 Al 27.0	14 Si 28.1	15 P 31.0	16 S 32.1	17 Cl 35.5	18 Ar 39.9
11 Na 23.0	12 Mg 24.3	3	4	5	6	7	8	9	10	11	12	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.9	36 Kr 83.8
19 K 39.1	20 Ca 40.1	21 Sc 45.0	22 Ti 48.0	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.7	29 Cu 63.5	30 Zn 65.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc 98.0	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po 209.0	85 At 210.0	86 Rn 222.0
55 Cs 132.9	56 Ba 137.3	57 La 138.9	72 Hf 178.5	73 Ta 181.0	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6						
87 Fr 223.0	88 Ra 226.0	89 Ac 227.0	104 Rf 261	105 Db 262	106 Sg 263	107 Bh 262	108 Hs 265	109 Mt 266	110 Ds 269								



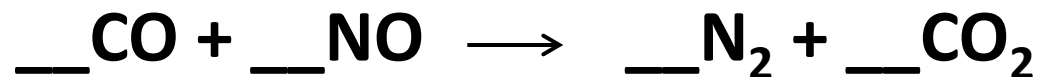
Chemical Changes

PS.5 The student will investigate and understand changes in matter and the relationship of these changes to the Law of Conservation of Matter and Energy. Key concepts include

- a) physical changes;**
- b) chemical changes; and**
- c) nuclear reactions.**

Students need additional practice investigating and properly representing chemical changes.

Chemical Changes (PS.5b)



Which set of coefficients will balance this equation?

A. 1, 4, 2, 1

B. 1, 2, 1, 1

C. 2, 2, 1, 2

D. 4, 3, 2, 4

Instructional Guidance PS.5b

Chemical Changes

Directions: Click and drag the answers to the correct boxes. Each number may be used more than one time.

Balance the chemical equation using the lowest possible coefficients.



2	3	4	5	6	7	8	9
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Answer: correct coefficients are 2, 3, 4, and 3.

Students need additional practice calculating the lowest possible coefficients for a balanced chemical reaction.

Practice Items

This concludes the student performance information for the spring 2013 Grade 8 Science SOL test.

Additionally, test preparation practice items for grade 6 science, life science, and physical science can be found on the Virginia Department of Education Web site at:

http://www.doe.virginia.gov/testing/sol/practice_items/index.shtml#science

Contact Information

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