PRCVI
Provincial Resource Centre for the Visually Impaired

Best Practices

Assessment Guidelines

For the Secondary Classroom Teacher

With a Student Who Has a Visual Impairment and

Reads Braille

Science

2010

A Resource Project by the Provincial Resource Centre for the Visually Impaired (PRCVI)

PRCVI is a Ministry of Education Provincial Resource Program

Provincial Resource Centre for the Visually Impaired (PRCVI)

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Science for Secondary Students Who Use Braille

Mission Statement

Students with visual impairments have unique needs and challenges when demonstrating subject knowledge through tests. The responsibility for assessments lies with the classroom teacher. With appropriate accommodations, students with visual impairments are able to accurately demonstrate their knowledge and skills. Most test questions can be formulated or adapted to minimize the need to acquire and process visual information.

Many of the following suggested guidelines may be beneficial to all students.

The following guidelines have been developed to assist classroom teachers in making assessment accommodations to both informal and formal tests without compromising integrity, reliability or validity. A Teacher of Students with Visual Impairments should be consulted during the development of test items.

Science Exams – Braille Format

Provide a copy of the exam to the transcribers as far in advance as possible. A minimum of one week is required for preparing, reviewing and proof reading a braille exam. Braille transcribers may need additional lead time to prepare exams depending on complexity and length. Graphs, charts and tactile diagrams are time consuming to prepare.

Test Administration

- Students with visual impairments should be expected to demonstrate competency in the same learning outcomes as their peers.
- Extra time may be required (often 3 or 4 times above what is required for a sighted student).
- Longer exams may need to be divided into sections to allow for writing over a period of time or even days, with breaks during each sitting.
- A separate setting with qualified supervision must be available.
- Oral clarification of test questions should be provided to the student by a supervisor, if needed.
- Provision must be made for students to respond to test items using the equipment or materials best suited and familiar to them.
- Students with visual impairments should be active participants in lab tests and/or paired with a sighted partner when necessary.

Formulation of Test Questions

- Questions that contain complex visual information should be reviewed. Adaptations may be made or questions may be replaced as long as mastery of learning outcomes is demonstrated.
- Tactile tables, diagrams and graphs are difficult and time consuming to interpret and process. Students must have previous experience and familiarity with the layout of tactile graphics and 3-D models presented on an exam.
- 3-D models or real objects may be necessary to substitute for some diagrams.

Tables

Redesign the question to include table information.

Instead of This

Which of the following describes the changes that take place in the nucleus of an atom as a result of alpha (α) decay?

	Number of Protons	Number of Neutrons
A.	decrease by 2	decrease by 4
B.	decrease by 2	decrease by 2
C.	increase by 1	decrease by 1
D.	increase by 2	decrease by 2

Try Doing It This Way

Which of the following statements describes the changes that take place in the nucleus of an atom as a result of alpha (α) decay?

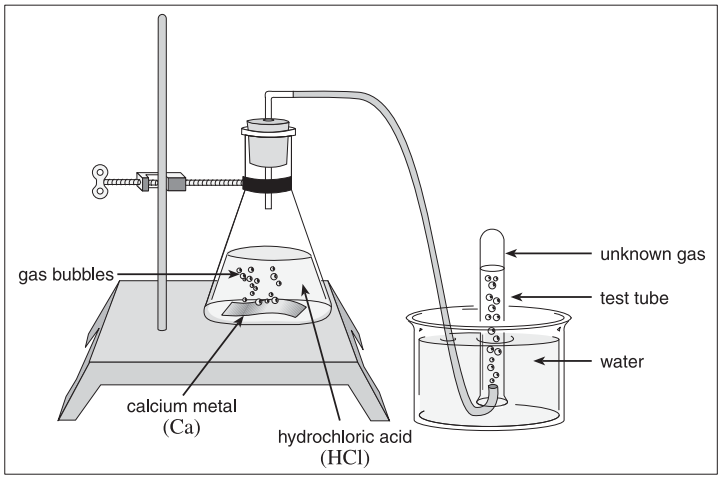
A. number of protons decrease by 2 and number of neutrons decrease by 4
B. number of protons decrease by 2 and number of neutrons decrease by 2
C. number of protons increase by 1 and number of neutrons decrease by 1
D. number of protons increase by 2 and number of neutrons decrease by 2

Diagrams and Pictures *Example 1*

Redesign the question to include picture and diagram information.

Instead of This

Use the following diagram to answer question.



What is the balanced equation for the reaction?

A. $Ca + Cl_2 \rightarrow CaCl_2$

B. $Ca + 2HCl \rightarrow H_2 + CaCl_2$

C. $Ca + 2HCl \rightarrow CaH_2 + Cl_2$

D. $2Ca + 2H_2O \rightarrow O_2 + 2CaH_2$

Try Doing It This Way

When calcium metal reacts with hydrochloric acid, HCl, bubbles of gas form.
What is the balanced equation for the reaction?

A. $Ca + Cl_2 \rightarrow CaCl_2$

B. $Ca + 2HCl \rightarrow H_2 + CaCl_2$

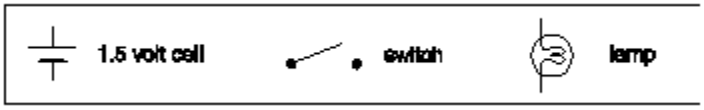
C. $Ca + 2HCl \rightarrow CaH_2 + Cl_2$

D. $2Ca + 2H_2O \rightarrow O_2 + 2CaH_2$

Diagrams and Pictures *Example 2*

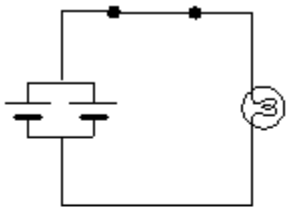
Instead of This

Use the following information to answer question.

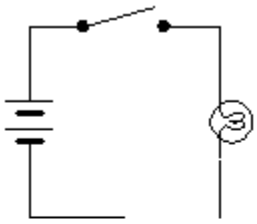


In which diagram would the bulb shine the brightest?

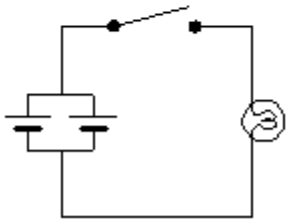
A.



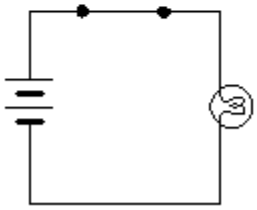
B.



C.



D.



Try Doing It This Way

A light bulb will shine brighter in a circuit with 2 cells in series than with 2 cells in parallel.

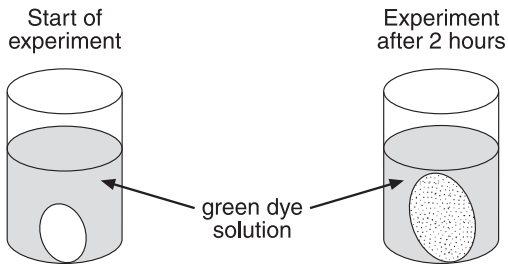
A. True
B. False

Diagrams and Pictures *Example 3*

Instead of This

Use the diagram to answer the following question.

The hard shell of an egg was dissolved with a mild acid leaving the cell membrane undamaged. An experiment was then performed on the egg, as shown below.



The egg was placed in a solution of green dye and water. After two hours the egg was larger and it became green.

Why did the egg become green?

A. The green dye reacted with the water.
B. The green dye entered the egg by osmosis.
C. The green dye entered the egg by diffusion.
D. Water and the green dye entered the egg by osmosis.

Try Doing It This Way

The hard shell of an egg was dissolved with a mild acid leaving the cell membrane undamaged. An experiment was then performed on the egg. The egg was placed in a solution of green dye and water. After two hours the egg was larger and the egg membrane became green.

Why did the egg become green?

A. The green dye reacted with the water.
B. The green dye entered the egg by osmosis.
C. The green dye entered the egg by diffusion.
D. Water and the green dye entered the egg by osmosis.

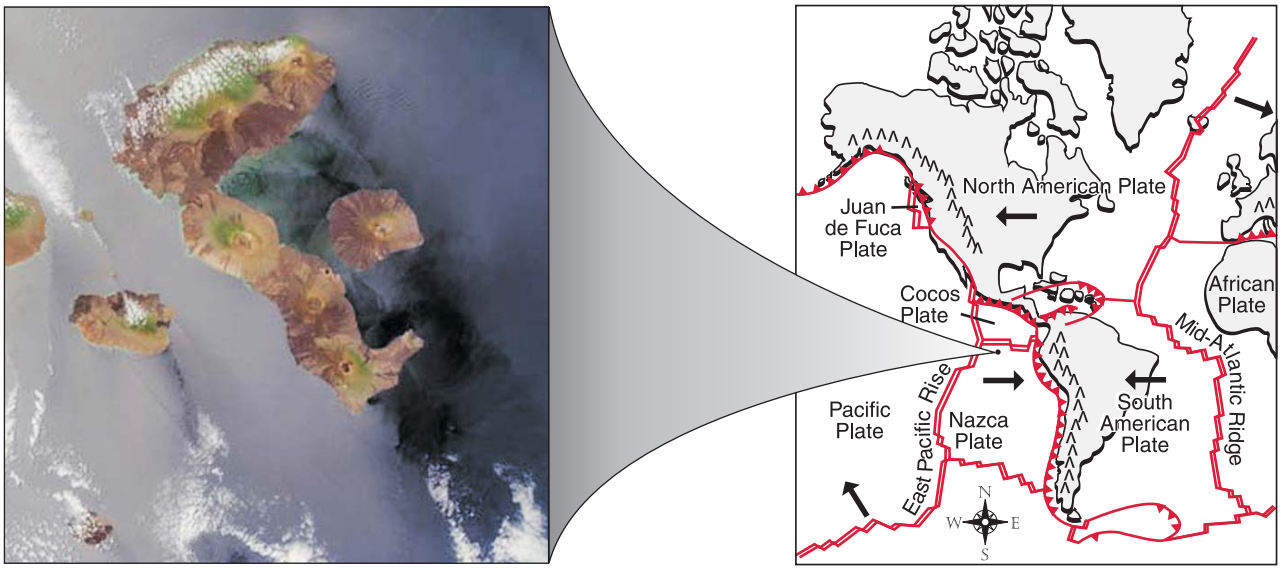
Replacement Questions

Replace these pictures and diagrams with alternative questions of similar content, difficulty, and depth of knowledge.

Instead of This

Use the following image and map of the Galapagos Islands to answer questions.

Satellite image from an altitude of 705 km



As a result of the Galapagos Islands forming over a hot spot, which of the following is true?

A. The youngest island is the island closest to South America.
B. The ages of the individual islands vary in no particular order.
C. The youngest island is the island farthest from South America.
D. All the islands formed at the same time and have the same age.

What technique was used to produce the image next to the location map?

A. mapping
B. seismology
C. remote sensing
D. geological field work

(See next page for redesigned question)

Try Doing It This Way

Which of the following provided evidence for diverging plate boundaries?

A. the location of ocean trenches
B. magnetic reversal patterns in oceanic crust
C. the temperature of ocean water across the Atlantic
D. hot spots located in the middle of an oceanic plate

Which of the following events led scientists to a renewed interest in the theory of continental drift?

A. mapping the ocean floor
B. the Anchorage, Alaska earthquake of 1964
C. determining the highest mountain on Earth
D. the discovery of 225 million-year-old fossils

Matching Columns

Redesign matching column questions into multiple choice format.

Instead of This

Match each Chemical Reaction on the left with the best Reaction Type on the right. Each Reaction Type may be used as often as necessary.	
Chemical Reaction	Reaction Type
51. $HCl + NaOH \rightarrow NaCl + H_2O$ 52. $Mg(NO_3)_2 + 2NaOH \rightarrow 2NaNO_3 + Mg(OH)_2$ 53. $2Al + Fe_2O_3 \rightarrow Al_2O_3 + 2Fe$	A. synthesis B. neutralization C. decomposition D. single replacement E. double replacement

Try Doing It This Way

51. What type of reaction is shown below?

$HCl + NaOH \rightarrow NaCl + H_2O$

A. synthesis
B. neutralization
C. decomposition
D. single replacement

52. What type of reaction is shown below?

$Mg(NO_3)_2 + 2NaOH \rightarrow 2NaNO_3 + Mg(OH)_2$

A. synthesis
B. decomposition
C. single replacement
D. double replacement

53. What type of reaction is shown below?

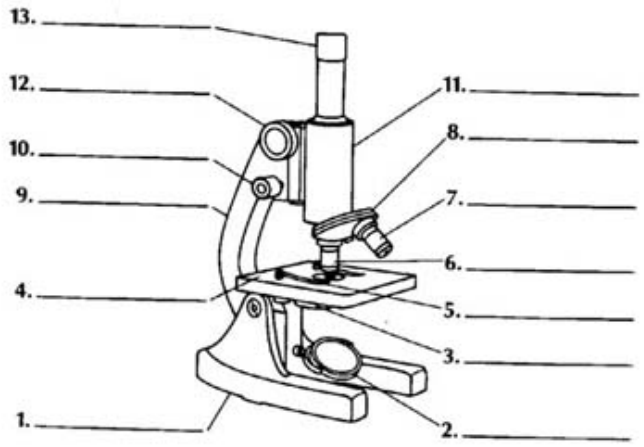
$2Al + Fe_3O_3 \rightarrow 2Al_2O_3 + 2Fe$

A. synthesis
B. decomposition
C. single replacement
D. double replacement

Real Objects or 3-D models may be required

Attach braille labels to the actual object.

Instead of This



Try Doing It This Way

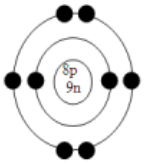
The student answers on a separate sheet of paper

Data Booklets

Redesign the question to include information from the Data Booklet

Instead of This

Use the Bohr Model diagram of an element to answer the following question.

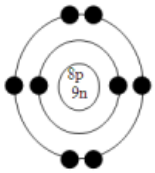


Which of the following represents an element that can easily combine with the element shown above to form a covalent compound? Refer to the periodic table in the data booklet.

A. neon
B. sodium
C. chlorine
D. magnesium

Try Doing It This Way

Use the Bohr Model diagram of an element to answer the following question.



Which of the following represents an element that can easily combine with the element shown above to form a covalent compound?

A. neon

10	0
Ne	
Neon	
20.2	

B. sodium

11	+
Na	
Sodium	
23.0	

C. chlorine

17	-
Cl	
Chlorine	
35.5	

D. magnesium

12	2+
Mg	
Magnesium	
24.3	

References:

- BC Ministry of Education Released Provincial Exams.
- Classroom Teacher Created Exams and Assessments.
- Allman, C. (2004). Making Tests Accessible for Students with Visual Impairments: A Guide for Test Publishers, Test Developers, and State Assessment Personnel. (2nd Edition). Louisville, KY: American Printing House for the Blind, Available from http://www.aph.org.