

***Gallatin Gateway
School
District***

***Montana Criterion
Reference Test
Analysis***

Science

July 2009

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Introduction

This report contains data analysis of the Gallatin Gateway School District student performance on the science portion of the Montana Criterion Reference Test. The science portion of the CRT state achievement test is given each year to grades 4, 8, & 10. The first section of this report provides an overview of analysis results obtained from the data listed throughout this document. In addition, the first section lists the conclusions from the data analysis. The report then documents science CRT results for 2009 by grade level for Gallatin Gateway compared to the profile for the entire state of Montana. The analysis utilizes the percentage of students scoring proficient and advanced in the Gallatin Gateway District compared to the state wide results for the same group. The next step in the analysis shows results by grade level for each of the proficiency groups. Gallatin Gateway School District science CRT results for 2009 are compiled for each Montana Science Standard. The percentage of correct responses by all district students at each grade is shown by the specific Montana Standard. In addition, the report analyzes student results on individual questions from the CRT test comparing areas of district strength and need for science.

Summary of Data Analysis Results

Gallatin Gateway students scored very well on the 2009 CRT science test. All tested students in 4th and 8th grade for the Gallatin Gateway District scored well above the state of Montana in science on the CRT test. All Gallatin Gateway students that took the science test were 73% proficient while the state was 63% proficient. All economically disadvantaged students in the tested grades scored 57% proficient on the test which was down from 70% in 2008.

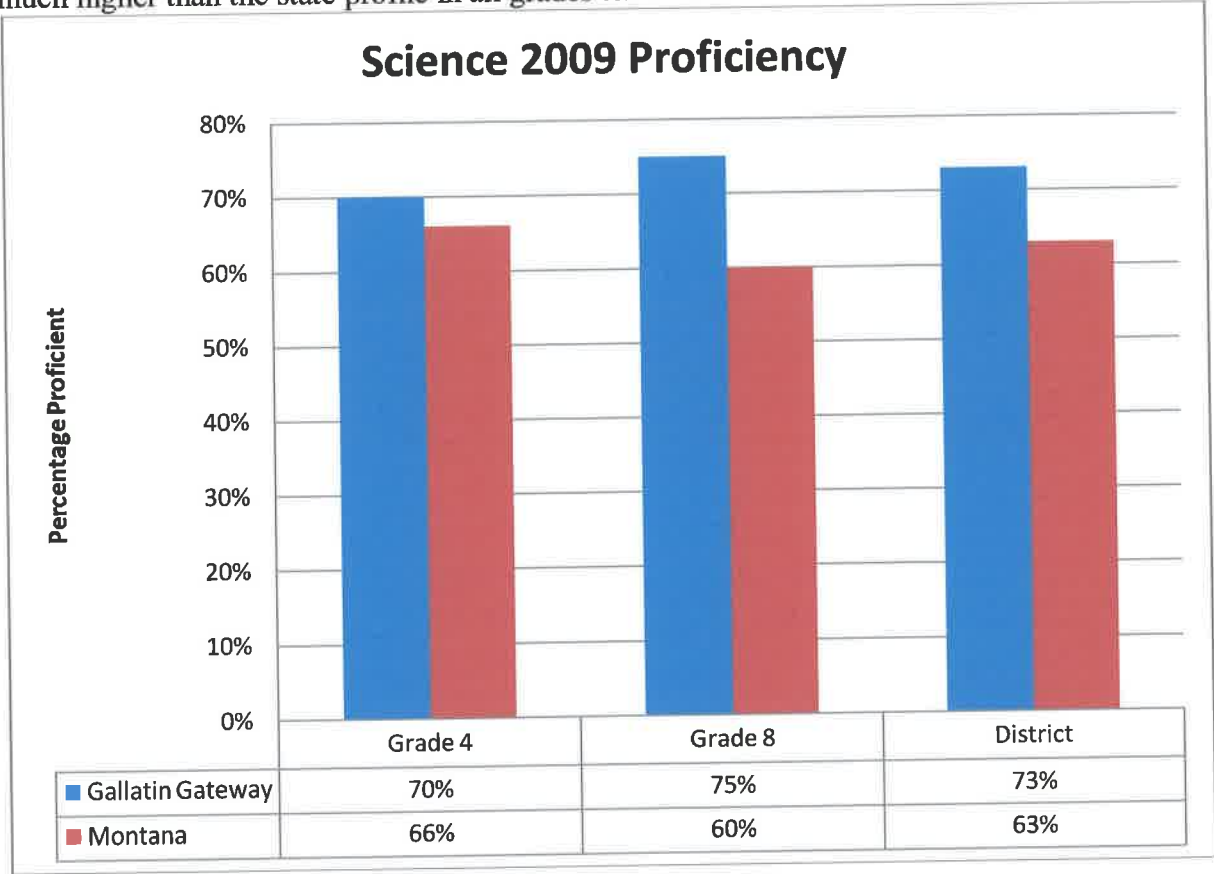
Student results on the science portion of the CRT are compared to the Montana Standards by analyzing the percentage of correct responses on questions related to each standard. The analysis for the district shows that standard 5 was the highest scoring and standard 6 was the lowest scoring in 2009 for all tested students. Over the last two years standard 1 was the highest scoring and standard 4 was the lowest scoring for all students. Gallatin Gateway students scored 40% of the total points on open response questions compared to the state at 38.1%. The highest scoring standard on open response questions was grade 4 standard 1 with 55% and the lowest scoring was grade 4 standard 2 with 25%.

Overall conclusions show that Gallatin Gateway students scored well above the state on the CRT science test in 2009. Open response questions seemed to be the most difficult for students scoring approximately 40% of the total points on the test.

CRT Test Results

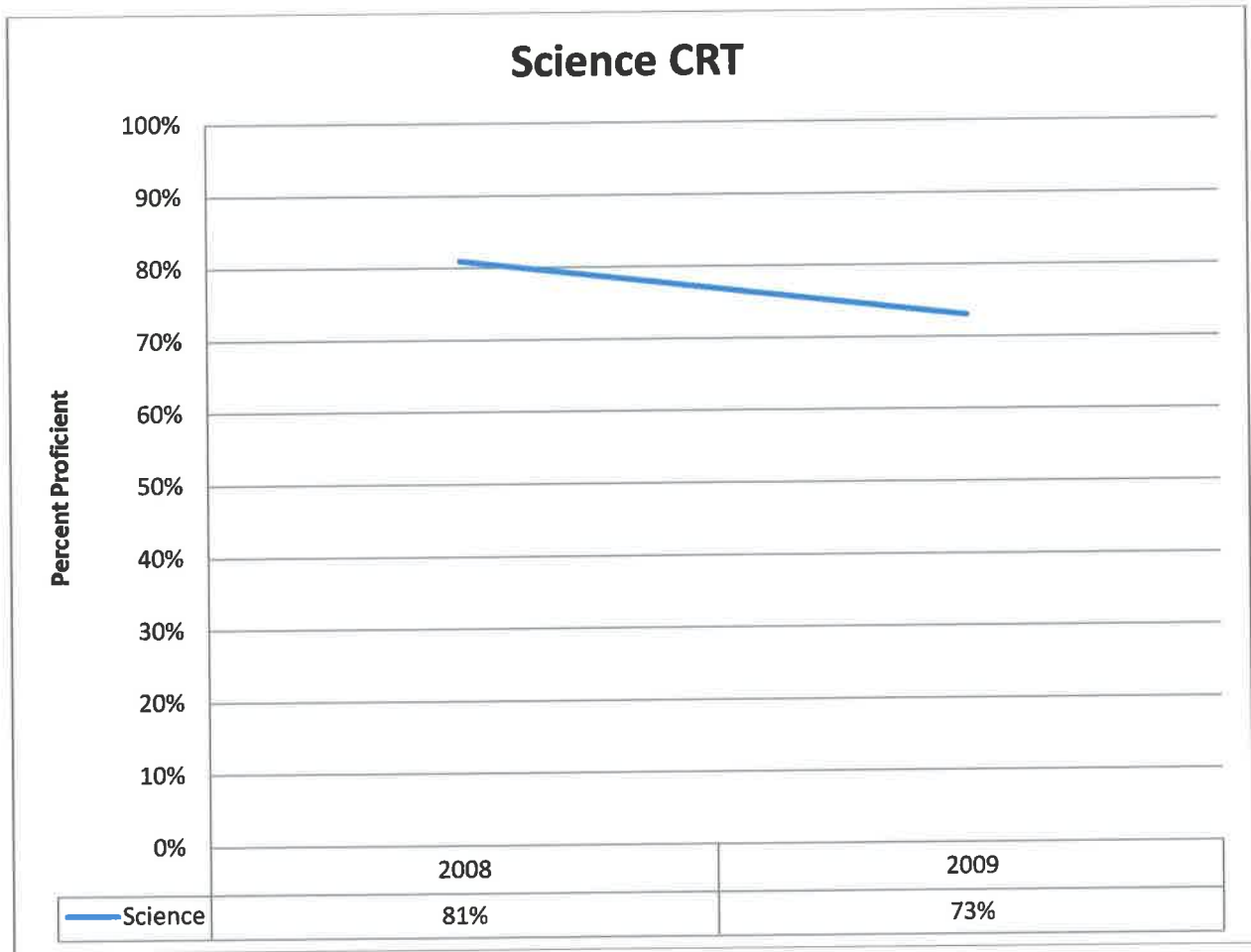
Science Proficiency Compared to Montana

The following chart represents the percent of proficient and advanced students in the district in 2009 compared to the same group in Montana. The results indicate that Gallatin Gateway was much higher than the state profile in all grades tested and overall in the district.



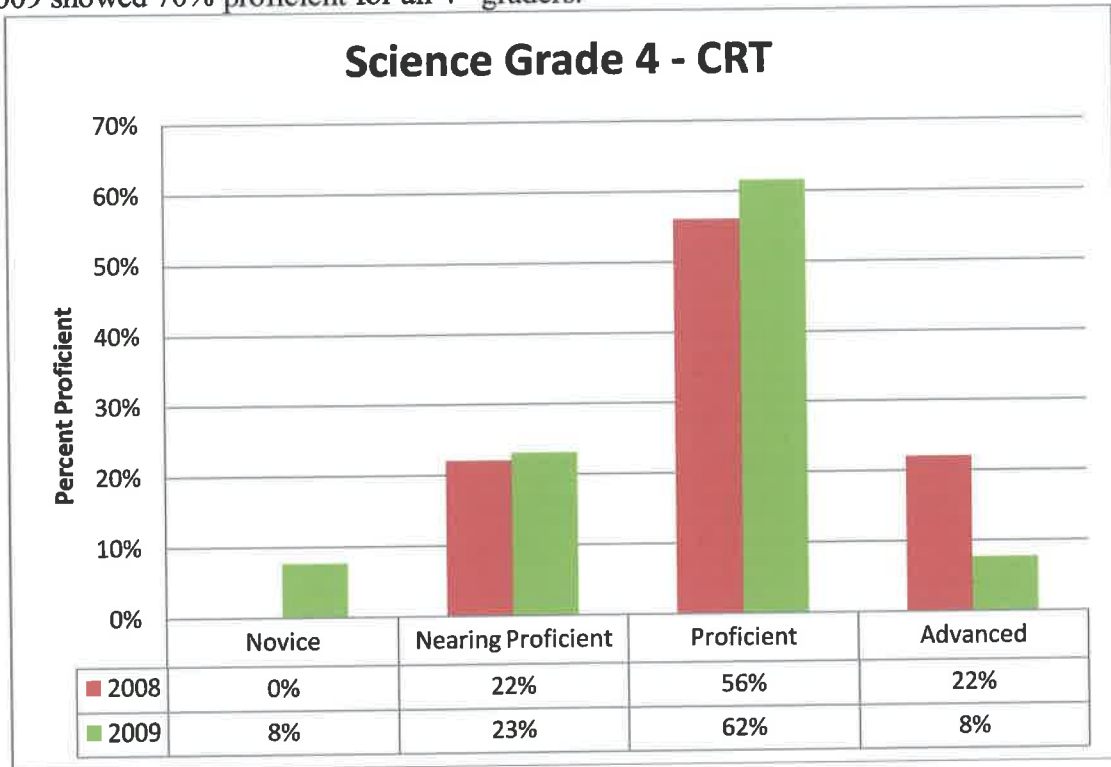
District Science Proficiency 2008 & 2009

Overall science proficiency in the district dropped from 81% in 2008 to 73% in 2009.



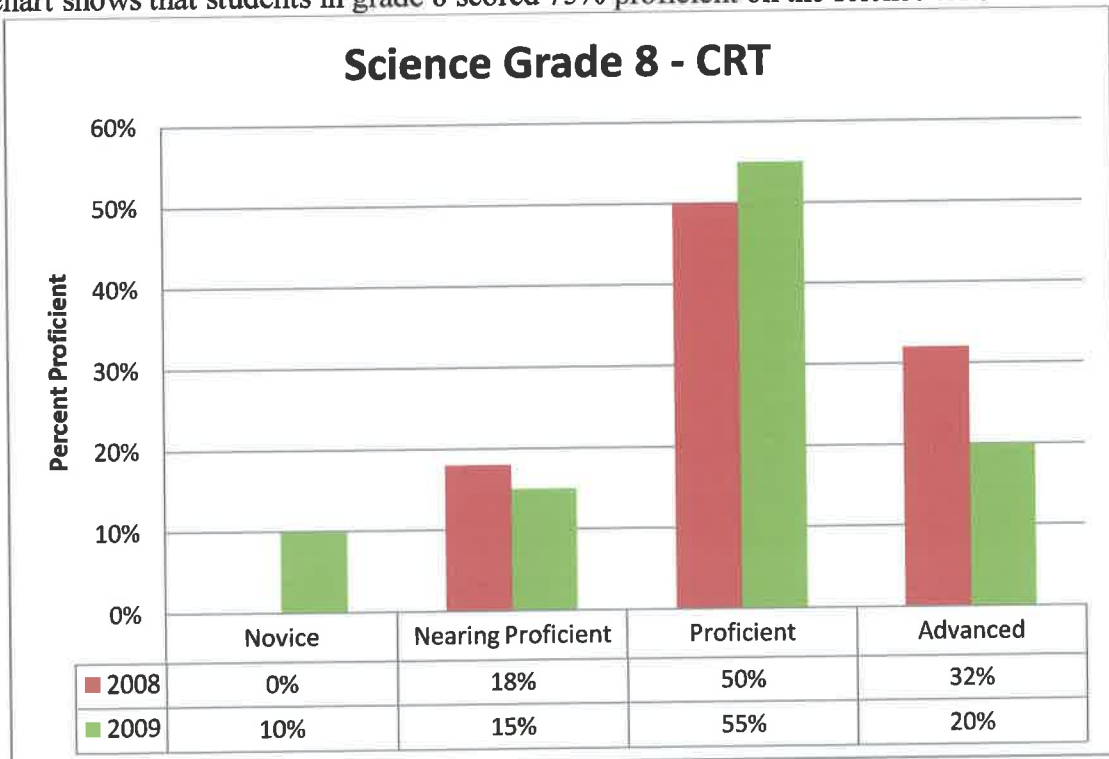
4th Grade CRT Results

The chart shows the percentage of students in each of the achievement categories. The results for 2009 showed 70% proficient for all 4th graders.



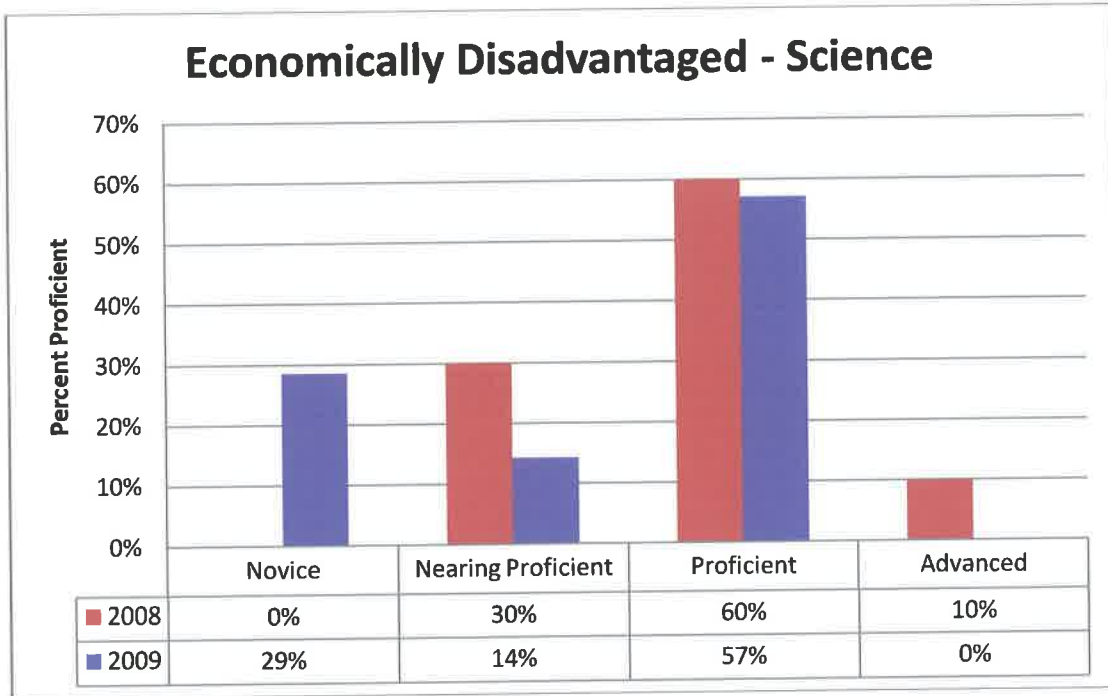
8th Grade CRT Results

The chart shows that students in grade 8 scored 75% proficient on the science test.



Proficiency of All Economically Disadvantaged Students Tested

The following chart shows the proficiency of all economically disadvantaged students in the district tested during the 2009 year for science. Fifty seven percent of all economically disadvantaged students tested in the district were at least proficient in science which was down from 70% in 2008.



Results of Multiple Choice Questions by each Montana Standard for All Students

The following charts show 4th grade CRT results for students by each Montana Standard for science. The percentage of correct responses by all 4th grade students on multiple choice questions related to that specific standard is represented in the right hand columns.

Science Results for the District Grade 4

- *The highest scoring standard for 2009 was #2.*
- *The lowest scoring standard for 2009 was #6.*
- *The highest scoring standard for 2008 & 2009 was #3.*
- *The lowest scoring standard for 2008 & 2009 was #5.*

Standard Content Science		Grade 4	
		2008	2009
Standard 1	Students, through the inquiry process, demonstrate the ability to design, conduct, evaluate, and communicate results and reasonable conclusions of scientific investigations.	80.00%	68.5%
Standard 2	Students, through the inquiry process, demonstrate knowledge of properties, forms, changes and interactions of physical and chemical systems.	78.60%	76.9%
Standard 3	Students, through the inquiry process, demonstrate knowledge of characteristics, structures and function of living things, the process and diversity of life, and how living organisms interact with each other and their environment.	82.80%	74.2%
Standard 4	Students, through the inquiry process, demonstrate knowledge of the composition, structures, processes and interactions of Earth's systems and other objects in space.	70.60%	69.2%
Standard 5	Students, through the inquiry process, understand how scientific knowledge and technological developments impact communities, cultures and societies.	63.90%	69.2%
Standard 6	Students understand historical developments in science and technology.	83.30%	65.4%

Results of Multiple Choice Questions by each Montana Standard for All Students

The following charts show 8th grade CRT results for students by each Montana Standard for science. The percentage of correct responses by all 8th grade students on multiple choice questions related to that specific standard is represented in the right hand columns.

Science Results for the District Grade 8

- *The highest scoring standard for 2009 was #5.*
- *The lowest scoring standard for 2009 was #6.*
- *The highest scoring standard for 2008 & 2009 was #5.*
- *The lowest scoring standard for 2008 & 2009 was #4.*

Standard Content Science		Grade 8	
		2008	2009
Standard 1	Students, through the inquiry process, demonstrate the ability to design, conduct, evaluate, and communicate results and reasonable conclusions of scientific investigations.	83.20%	79.6%
Standard 2	Students, through the inquiry process, demonstrate knowledge of properties, forms, changes and interactions of physical and chemical systems.	77.60%	69.3%
Standard 3	Students, through the inquiry process, demonstrate knowledge of characteristics, structures and function of living things, the process and diversity of life, and how living organisms interact with each other and their environment.	78.20%	67.5%
Standard 4	Students, through the inquiry process, demonstrate knowledge of the composition, structures, processes and interactions of Earth's systems and other objects in space.	68.50%	64.0%
Standard 5	Students, through the inquiry process, understand how scientific knowledge and technological developments impact communities, cultures and societies.	83.30%	80.0%
Standard 6	Students understand historical developments in science and technology.	77.30%	57.5%

Results of Open Response Questions by each Montana Standard for All Students

The following charts show the percentage of the total points that students scored on open response questions for science in 2009.

Standard Content Science		2009		
		Grade	District	State
Standard 1	Students, through the inquiry process, demonstrate the ability to design, conduct, evaluate, and communicate results and reasonable conclusions of scientific investigations.	4	55.0%	62.5%
Standard 2	Students, through the inquiry process, demonstrate knowledge of properties, forms, changes and interactions of physical and chemical systems.	4	25.0%	22.5%
Standard 3	Students, through the inquiry process, demonstrate knowledge of characteristics, structures and function of living things, the process and diversity of life, and how living organisms interact with each other and their environment.	8	32.5%	27.5%
Standard 4	Students, through the inquiry process, demonstrate knowledge of the composition, structures, processes and interactions of Earth's systems and other objects in space.	8	47.5%	40%
	Total results on all standards for science		40%	38.1%

All Student Comparisons for Science Standards

The chart below shows the specific grade levels and the highest and lowest performing standards for science.

District CRT Test Results Compared to the Montana Science Standards				
Grade	Highest Scoring Standard 2009	Highest Scoring Standard 2008 & 2009	Lowest Scoring Standard 2009	Lowest Scoring Standard 2008 & 2009
4	2	3	6	5
8	5	5	6	4
All Grades	5	1	6	4

CRT Test Item Analysis

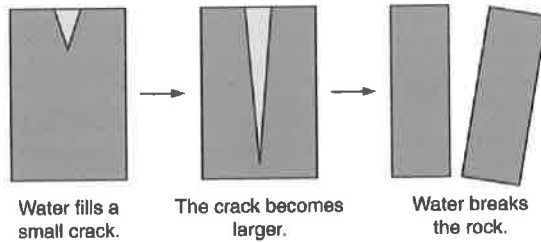
Measured Progress released 100% of the questions from each grade for science this year. This analysis lists the seven lowest and three highest scoring questions from each grade.

4th Grade Science

Analysis of all 4th grade student responses for science on the 2009 CRT by each specific question showed the following results. The highest scoring questions were related to standards 2 and 3.

The lowest scoring questions were related to standards 3 & 4.

1. The pictures below show what happens when water fills a small crack in a rock.



How does water cause a crack in a rock to become larger in a short period of time?

- A. When the water freezes in the crack, the water expands and pushes against the rock.
- B. When the Sun heats the water, the water expands and makes the crack bigger.
- C. When the water mixes with the rock, the water causes larger cracks.
- D. When the water washes over the rock, the crack becomes larger.

The correct answer is A with 46% of the students correct.

70. Which example is a learned behavior an animal uses when looking for food?

- A. a bird singing a mating song
- B. a goose flying south for the winter
- C. a horse eating grass
- D. a raccoon tipping over a garbage can

The correct answer is D with 31% of the students correct. Thirty one percent of the students chose C.

37. Which environmental problem can Montana ranchers help prevent by **not** allowing cattle to overgraze grasslands?

- A. acid rain
- B. air pollution
- C. mineral waste
- D. soil erosion

The correct answer is D with 54% of the students correct.

62. A scientist is measuring the masses of different burrowing owls. Which unit of measure is **best** for the scientist to use?

- A. grams
- B. liters
- C. meters
- D. seconds

The correct answer is A with 46% of the students correct.

15. A student is planning an investigation to see if seeds need darkness to sprout. What is the **only** thing that should be changed in the investigation?

- A. the amount of light
- B. the age of the seeds
- C. the temperature of the soil
- D. the amount of water the seeds get

The correct answer is A with 54% of the students correct.

64. The picture below shows the path of a river from its source to its mouth.

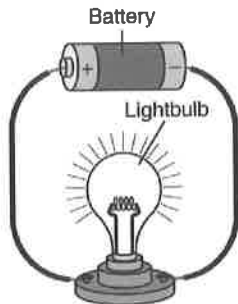


At which location would the **most** sediment be deposited?

- A. location W
- B. location X
- C. location Y
- D. location Z

The correct answer is B with 38% of the students correct. The same number chose A for the answer.

38. The picture below shows a simple circuit.

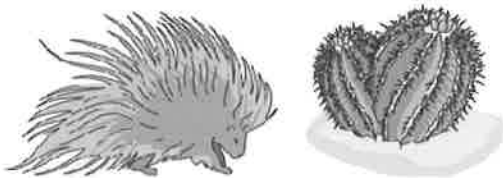


If another battery is added to the circuit, what will **most likely** happen to the light produced by the lightbulb?

- A. The light will be brighter.
- B. The light will not be produced.
- C. The light will be dimmer.
- D. The light will flash on and off.

The correct answer is A with 46% of the students correct.

10. The pictures below show a porcupine and a cactus.



What is **most** similar about these living things?

- A. how they move
- B. how they get their food
- C. how they protect themselves
- D. how they take in water

The correct answer is C with 100% of the students correct.

5. Which question would people in a town **most likely** ask a scientist?

- A. Do we need a new elementary school?
- B. How can we increase our water supply?
- C. What can we do to attract new people?
- D. Can we afford to hire more police officers?

The correct answer is B with 92% of the students correct.

71. The picture below shows a campfire.



What are the **most** useful types of energy in a campfire?

- A. heat and light
- B. chemical and sound
- C. electrical and motion
- D. sound and magnetic

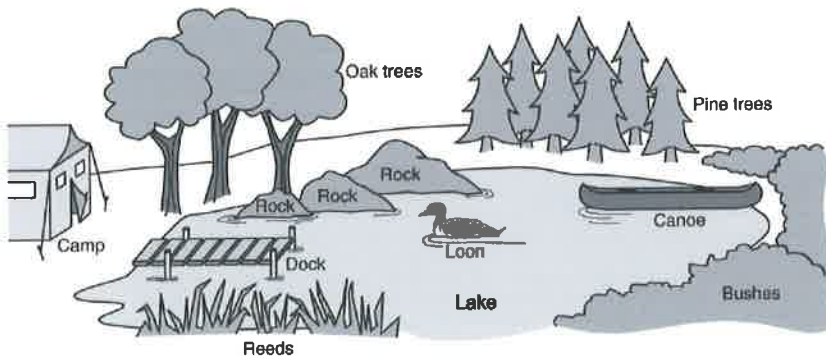
The correct answer is A with 100% of the students correct.

Open Response Summary for 4th Grade Science

<u>Released Item</u>	<u>Standard</u>	<u>Point Value</u>	<u>Average Score</u>
27	1	4	2.2
81	2	4	1.0

The district scored the best on number 27.

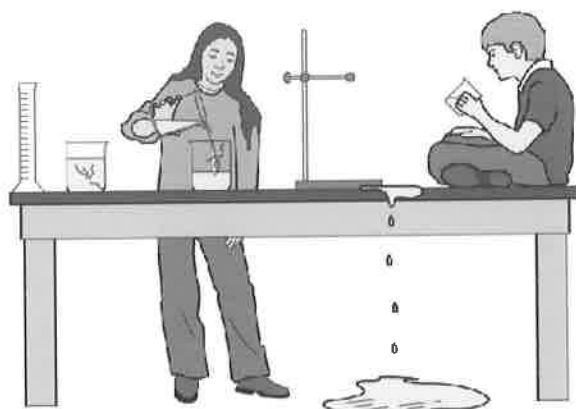
81. Look at the picture below.



Describe the position of the loon by locating it relative to **four** other objects.

37. The picture below shows students conducting an experiment in an unsafe school science work area.

Conducting an Experiment



Name four safety problems in the school science work area. Explain why each is a safety problem.

8th Grade Science

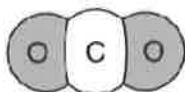
Analysis of all 8th grade student responses for reading on the 2008 CRT by each specific question showed the following results. The highest scoring questions were related to standards 1, 3, 4, and 5. The lowest scoring questions were related to standards 2, 3, 4, and 6.

10. Which phrase describes Earth's crust and the layer directly below it?

- A. a shell of solid rock supported by a core of metal
- B. sections of soil, sand, or snow covering solid rock
- C. large plates of solid rock floating on liquid rock
- D. oceans of water covering plates of solid rock

The correct answer is C with 45% of the students correct.

37. A model of carbon dioxide is shown below.

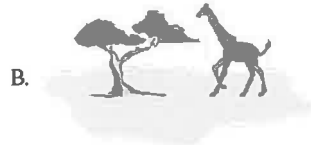


Which statement describes the formation of carbon dioxide?

- A. One atom of carbon combines with two atoms of oxygen to make one atom of carbon dioxide.
- B. One atom of carbon combines with two atoms of oxygen to make one molecule of carbon dioxide.
- C. One atom of carbon combines with two molecules of oxygen to make one molecule of carbon dioxide.
- D. One molecule of carbon combines with two molecules of oxygen to make one molecule of carbon dioxide.

The correct answer is B with 50% of the students correct.

72. Which diagram **best** represents a population?



The correct answer is C with 30% of the students correct, most students chose A.

16. What happens to the motion of a moving object when the net force (sum of the forces) acting on it is zero?

- A. The object travels in a straight line at a constant speed.
- B. The object comes to rest due to opposing forces.
- C. The object speeds up in the direction of the greater force.
- D. The object changes direction while moving at a constant speed.

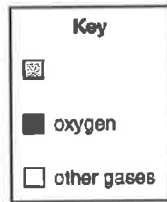
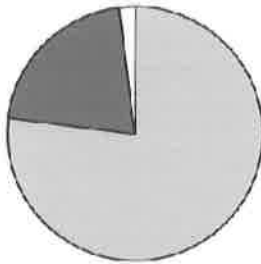
The correct answer is A with 40% of the students correct, most students chose B.

63. Which medical advancement is the **newest** method doctors have for treating patients?

- A. using X-rays to view bones
- B. transplanting human organs
- C. prescribing antibiotics
- D. using anesthesia when performing surgeries

The correct answer is B with 40% of the students correct. Most chose A for the answer.

64. A student constructed the pie chart below to show the composition of the atmosphere. She forgot to label one of the gases in the key.

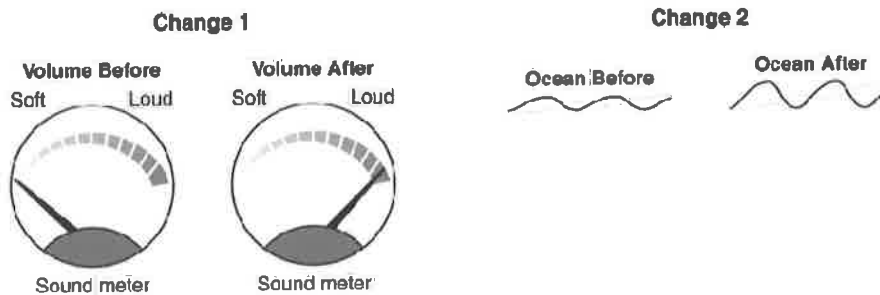


Which gas is represented by the shaded box in the key?

- A. carbon dioxide
- B. hydrogen
- C. nitrogen
- D. water vapor

The correct answer is C with 15% of the students correct, most students chose A.

80. The diagrams below show two different wave changes.



Which wave characteristic changed in both instances?

- A. amplitude
- B. frequency
- C. speed
- D. wavelength

The correct answer is A with 45% of the students correct.

59. In December 2004, a series of tsunamis (giant waves) raced across the Indian Ocean in all directions. When these tsunamis reached shore, they washed far inland. What caused these tsunamis?

- A. a sudden increase in gravitational pull
- B. a sudden shift of tectonic plates
- C. a sudden rise in water temperature
- D. a sudden change of polar magnetic forces

The correct answer is B with 95% of the students correct.

1. As part of an investigation, students in a science class placed the same type and amount of bacteria in each of five test tubes. Different chemicals were added to four of the test tubes. After two days, the test tubes were checked for the presence (cloudy) or absence (clear) of bacteria. The table below shows the results of the investigation.

Test Tube Number	Appearance of Liquid at Start	Bacteria Present	Chemical Added	Appearance of Liquid after Two Days	Bacteria Present
1	Cloudy	Yes	Alcohol	Clear	No
2	Cloudy	Yes	Bleach	Clear	No
3	Cloudy	Yes	Soap solution	Clear	No
4	Cloudy	Yes	Mouthwash	Clear	No
5	Cloudy	Yes	None	Cloudy	Yes

Which test tube was the control in the investigation?

- A. Test Tube 1
- B. Test Tube 2
- C. Test Tube 4
- D. Test Tube 5

The correct answer is D with 100% of the students correct.

55. Why does an astronaut who weighs 180 pounds on Earth weigh only 30 pounds on the Moon?
- A. Earth has an atmosphere, and the Moon does not.
 - B. Earth revolves around the Sun, but the Moon revolves around Earth.
 - C. The force of gravity on Earth is greater than the force of gravity on the Moon.
 - D. Earth rotates faster on its axis than the Moon.

The correct answer is C with 95% of the students correct.

Open Response Summary for Grade 8 Science

Released Item	Standard	Point Value	Average Score
27	4	4	1.9
81	3	4	1.3

The open response summary for 8th graders is listed above and shows that students performed the best on number 27.

27. The Andes, the Himalayas, the Alps, and the Rockies are four of Earth's mountain chains. Four hundred million years from now, these mountain chains will no longer be as evident on Earth's surface. New mountain chains will have risen up in other locations on Earth.
- a. Describe in detail **two** processes (destructive forces) that are wearing down these mountain chains.
 - b. Describe in detail **two** processes (constructive forces) that are building up new mountain chains.
81. Plant and animal cells have similarities and differences.
- a. Describe in detail **two** ways plant and animal cells are similar.
 - b. Describe in detail **two** ways plant and animal cells are different.