

***Gallatin Gateway  
School  
District***

***Montana Criterion  
Reference Test  
Analysis - Science***

**July 2015**

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## Introduction

This report contains data analysis of the Gallatin Gateway School District student performance on the Montana Criterion Reference Test. The CRT state achievement test is given each year to grades 4 & 8 for science. The first section of this report provides a summary of analysis results from the data in this document. Also, the first section compares and lists the conclusions from the data analysis. The report documents science CRT results for 2015 by grade level for students in the district compared to the student 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. This report provides the district with a year by year comparison of proficiency district wide in science along with an overall view of results on the CRT test. Also, subgroups of sufficient size are analyzed to show proficiency (Gender, Special Education, etc.). The report compares results for each grade level over the years that the test has been administered and includes tracking results for a class through each grade level where they took the test. The percentage of students achieving proficient/advanced is used as a base line when comparing trends. Gallatin Gateway District CRT results for 2015 are compiled for each Montana Science Standard and compared to the state wide average on each standard. The percentage of correct responses by all district students at each grade is shown by specific Montana Standard. The report analyzes open response questions for all student groups in the district and subgroups of sufficient size. Also, the report analyzes student results on individual questions from the CRT test comparing areas of district strength and weakness for science.

## Summary of CRT Data Analysis Results

### Science

The district scored 74% proficient in science (all tested students in grades 4, 8, and 10) on the CRT test in 2015 compared to 81% proficient in 2014 and 82% in 2013. Grade 4 district students scored 100% proficient compared to 69% state wide. Grade 8 students scored 63% proficient compared to 62% state wide. Overall the district was 8.5% above the state wide proficiency rate of 65.5% in 2015.

The district sub groups of students by gender and special education scored as follows: females in the district in 2015 scored higher than males in science with 81.8% proficient compared to males at 66.7%, special education students scored 0% proficient in 2015 (state was 25.4% proficient), and economically disadvantaged students results are not identified in the data any longer.

The data analysis results indicate that the district was 8.5% above the state profile in 2015 for science with 74% proficiency compared to the state at 65.5%. The district scored at or higher than the state on the CRT test in all tested grades for science. When all tested students in grades 4 & 8 are combined each year for the district from 2008 to 2015 the results show science scores have averaged 80.5% proficient in the district compared to Montana at 58% proficient over the same time period.

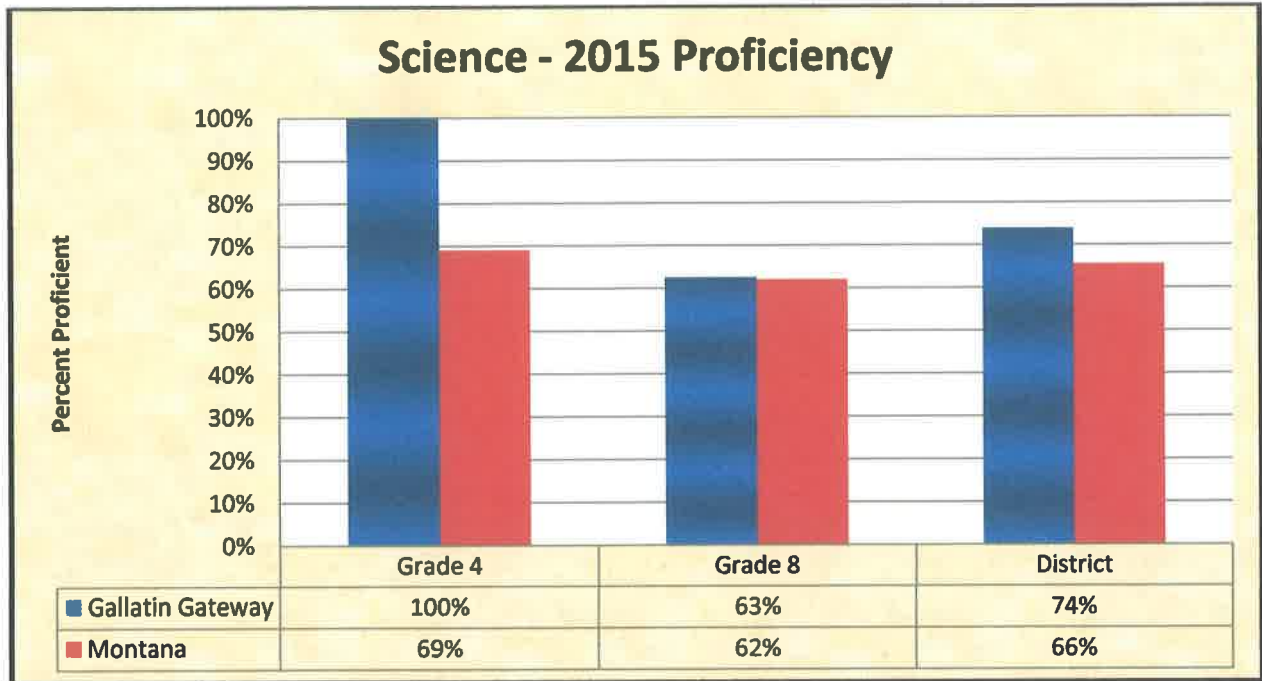
Student results compared to the Montana Standards for Science shows that standard 2 (*Students, through the inquiry process, demonstrate knowledge of properties, forms, changes and interactions of physical and chemical systems*) was the highest scoring in science for 2015 with 72.9% of all answers correct. The lowest scoring science standard for 2015 was 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*) with 67.1% of all answers correct. Student scores on open response type questions were up in 2015 with 51.3% (the state was 39.2%) of the total points in science compared to 48.8% in 2014 and 47.5% in 2013. The all student group scored the highest on standard 5 open response items in science with 65% of the points and the lowest on standard 1 with 37.5%. Females scored 61.3% (state females 43.3%) on science open response questions in 2015 compared to males at 41.3% (state males 35%).

Overall conclusions show that district students scored well on the 2015 CRT test at 74% proficiency which was 8.5% higher than the overall state score of 65.5%. District proficiency in science has continued to be excellent over time as shown by the 80.5% proficiency average over the life of the test. Results of the analysis indicate that students find standard 3 type questions the most difficult and scored the highest on standard 2 type questions in 2015 for science.

# CRT Test Results

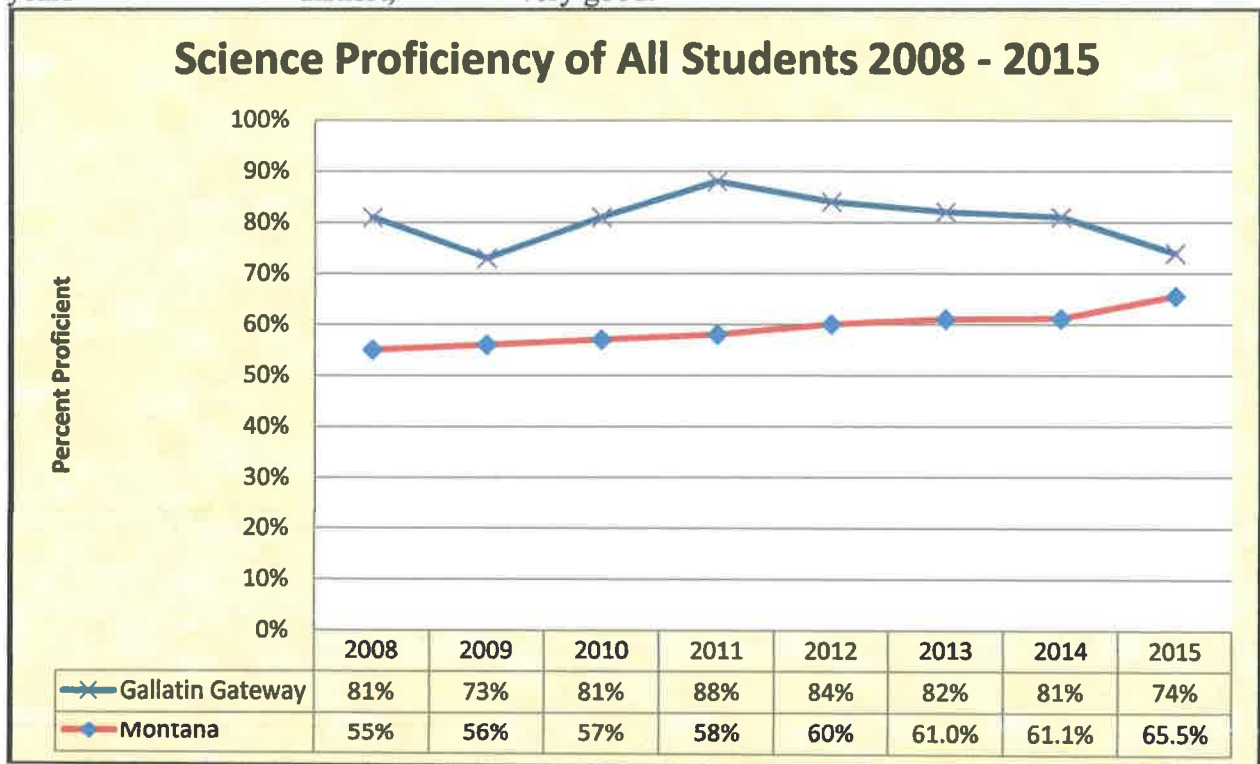
## Science Proficiency Compared to Montana

The following chart shows the percent of proficient/advanced students in the district in 2015 compared to the same group in Montana. The results indicate that Gallatin Gateway was at or higher than the state profile for science in all grades. Grade 4 scored the highest with 100% proficient in 2015. Science results for the district were 8.5% higher than the state.



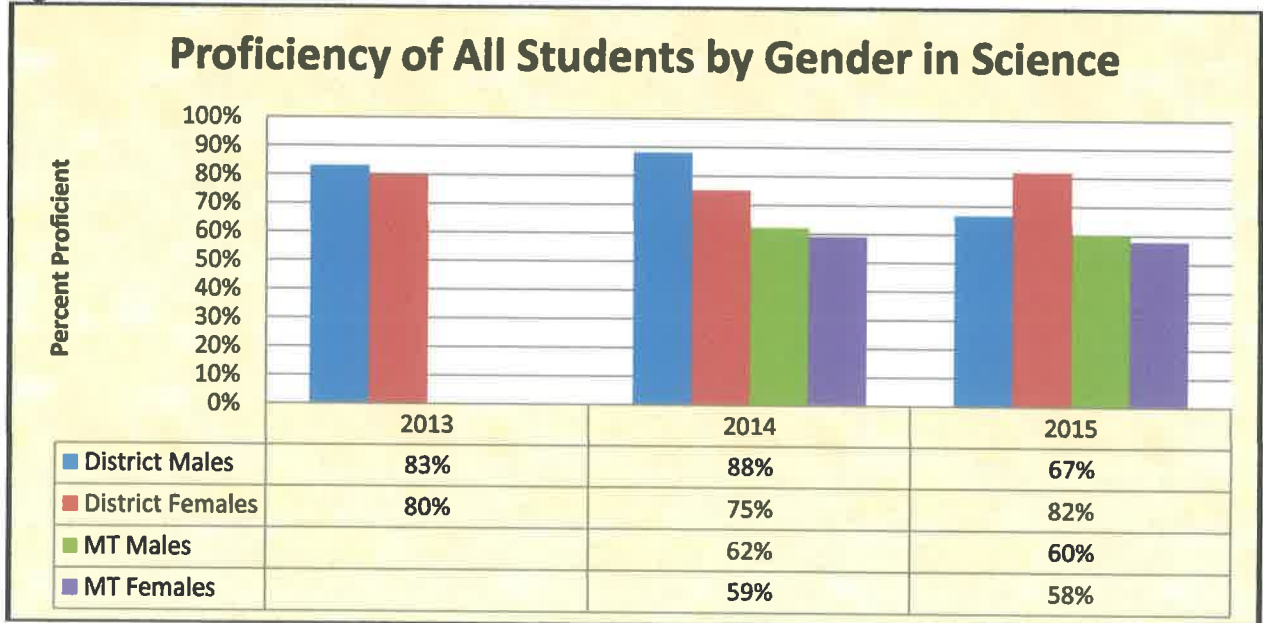
## Proficiency of All Students Tested Each Year

The following chart shows the proficiency of all students tested in science from 2008 through 2015 in the district compared to the state. Science proficiency has averaged 80.5% over the 8 years of the test in the district, which is very good.

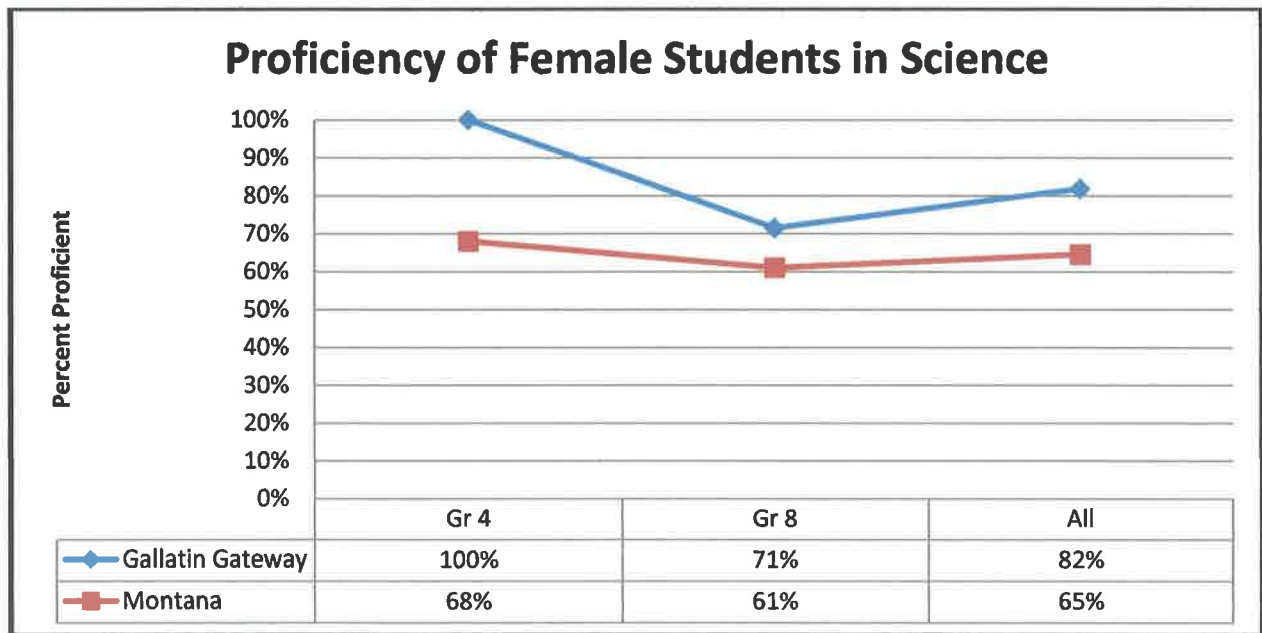
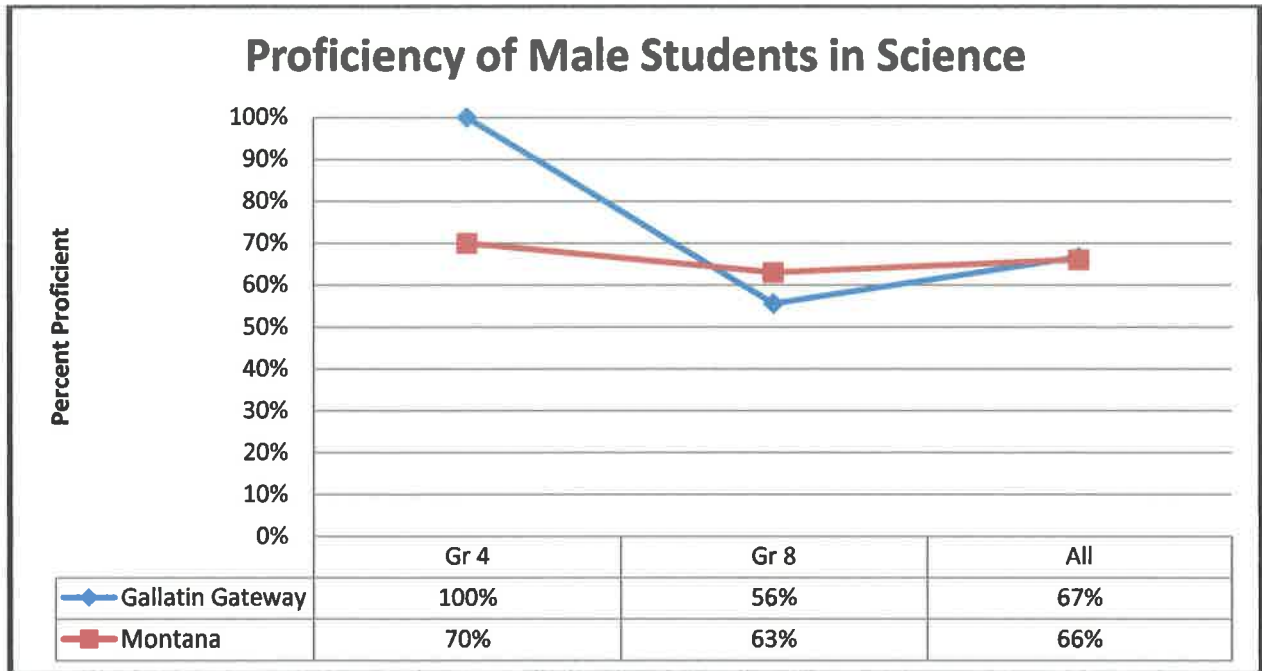


## Gender Proficiency in 2013 - 2015

The following chart shows the proficiency of males and females for science from 2013 to 2015 on the CRT test. In the district, females scored higher than males in science and both scored higher than the state.



The following charts show male and female proficiency compared to Montana by grade in 2015. District females scored 82% proficient in 2015 and scored higher than the state in each grade. Males in the district scored higher than the state overall and in grade 4.

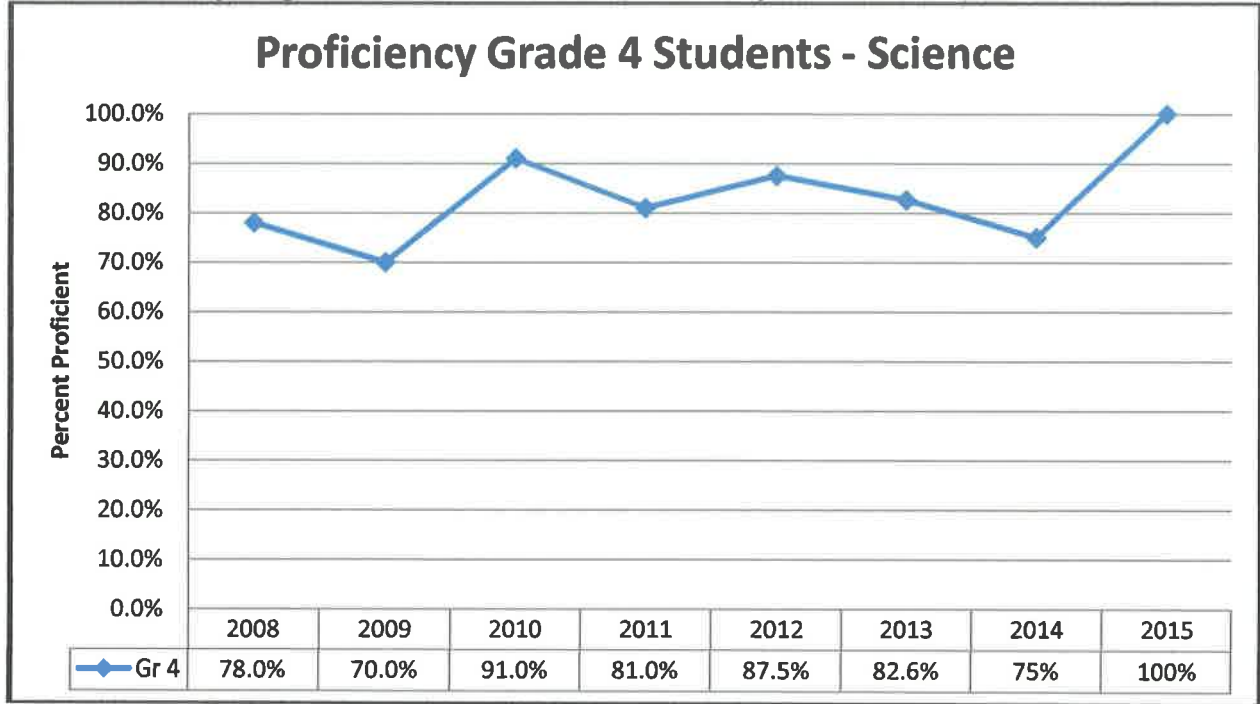


### Special Education Proficiency

Special education students scored 0% proficient in 2015. Special education students state wide averaged 25.4% proficient in 2015.

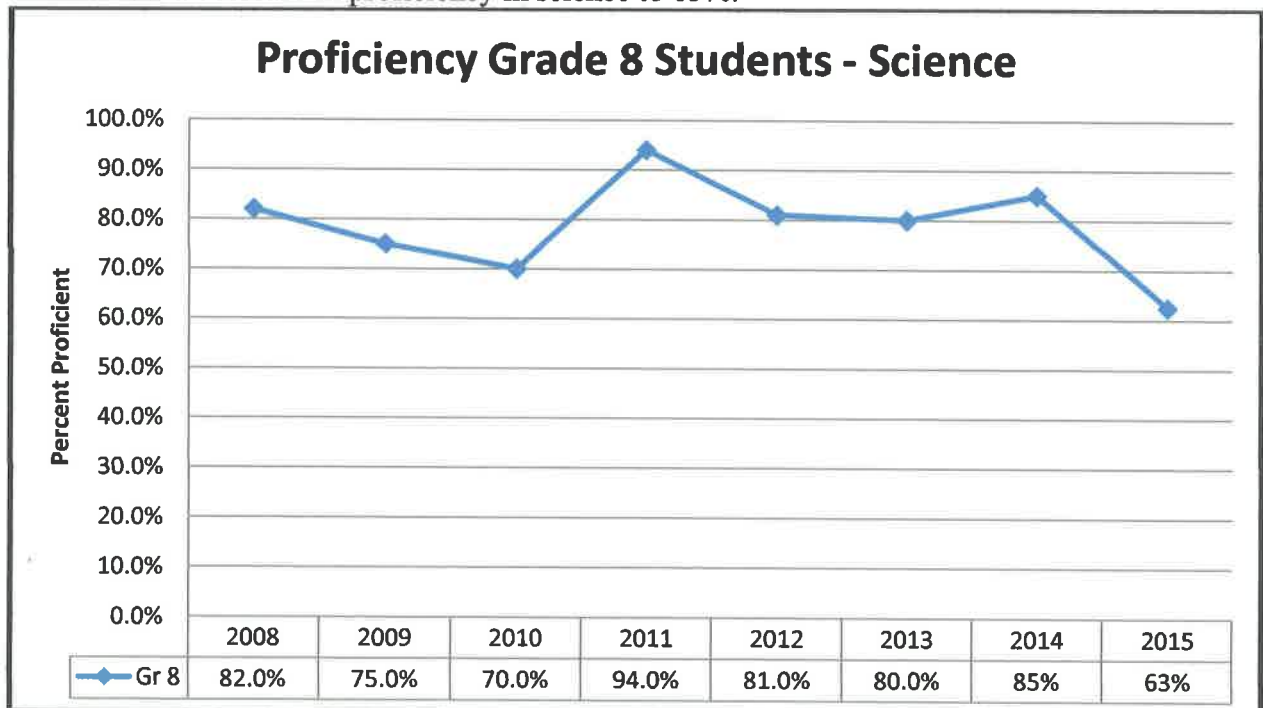
### 4th Grade CRT Results

Gallatin Gateway 4<sup>th</sup> grade students continued to score very well in 2015 on the CRT test.



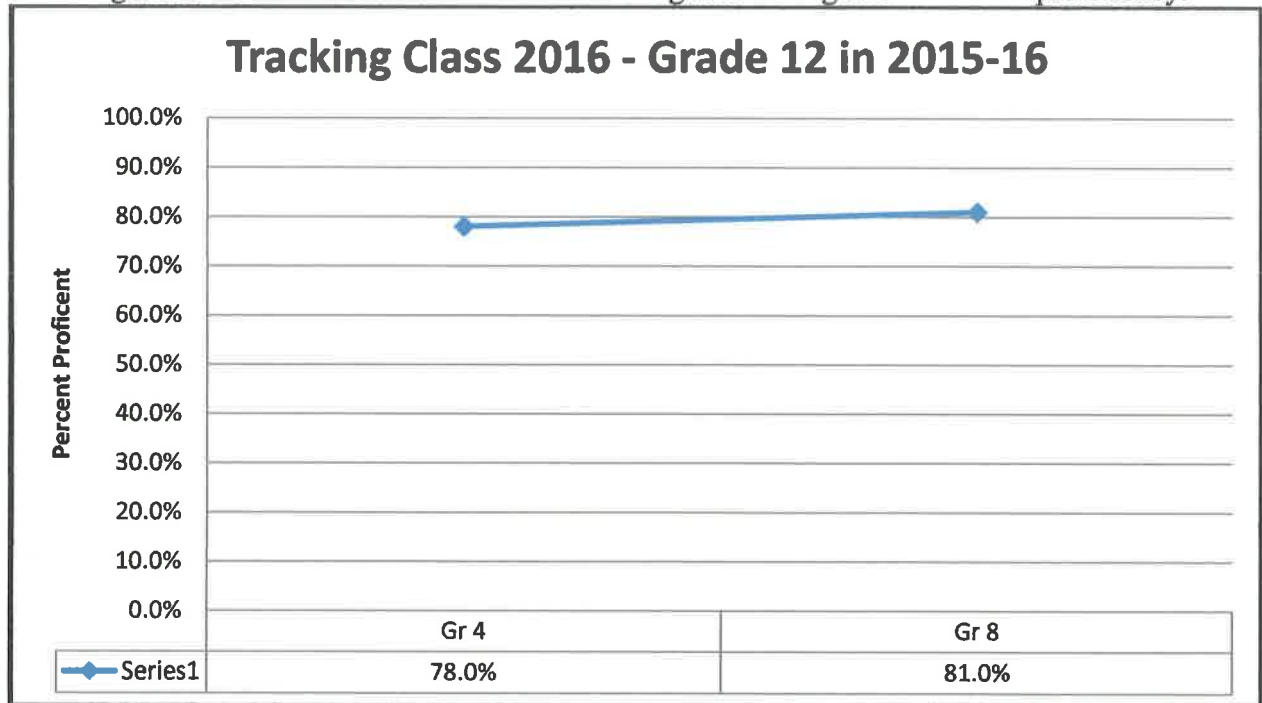
### 8<sup>th</sup> Grade CRT Results

The following chart shows 8<sup>th</sup> grade science CRT results from 2008 through 2015. The 2015 results show a decrease in proficiency in science to 63%.



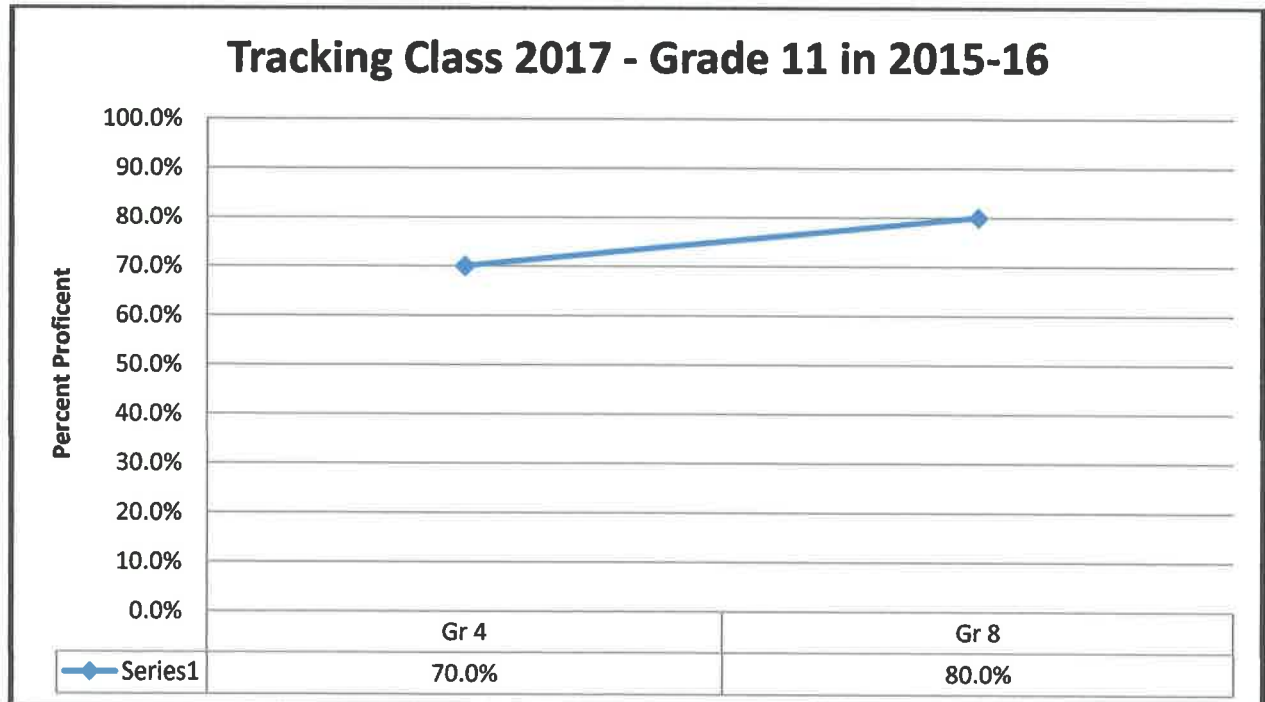
### Class of 2016 - Tracking Results Each Year on the CRT

The following chart shows the results of the class of 2016 on the CRT Science test when they were in grades 4 & 8. The class increased from 4<sup>th</sup> grade to 8<sup>th</sup> grade in science proficiency.



### Class of 2017 - Tracking Results Each Year on the CRT

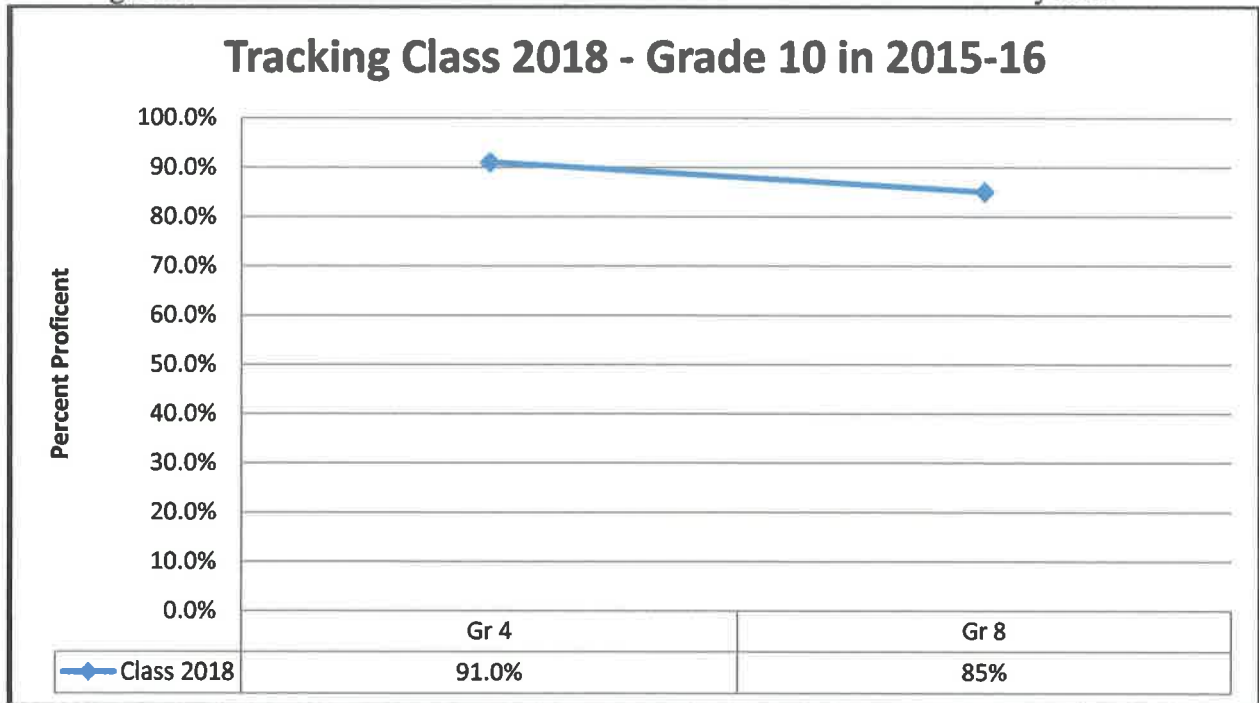
The following chart shows the results of the class of 2017 on the CRT Science test when they were in grades 4 & 8. The percentage proficient improved from 4<sup>th</sup> to 8<sup>th</sup> grade for this class of students.





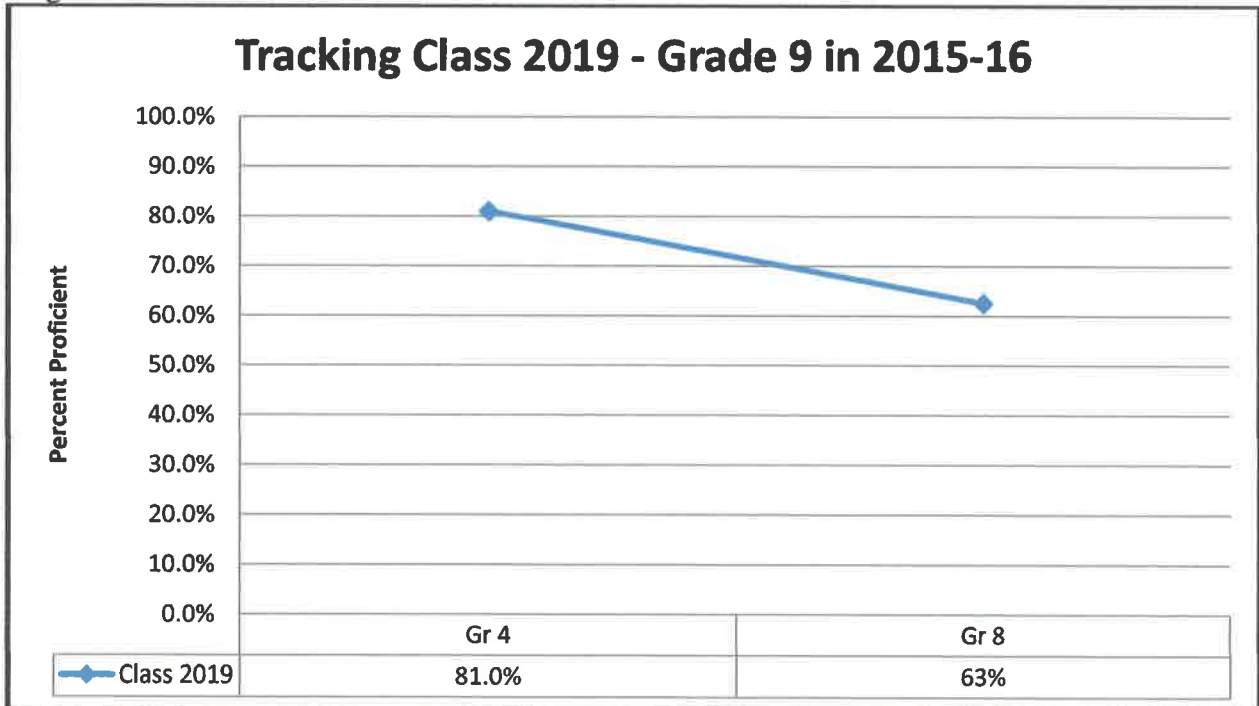
### Class of 2018 - Tracking Results Each Year on the CRT

The following chart shows the results of the class of 2018 on the CRT Science test when they were in grades 4 & 8. These students scored well on the CRT Science test both years.



### Class of 2019 - Tracking Results Each Year on the CRT

The following chart shows the results of the class of 2019 on the CRT Science test when they were in grades 4 & 8. These students showed a decrease in science proficiency from 4<sup>th</sup> grade to 8<sup>th</sup> grade.



### Results of All CRT Questions on each Montana Standard

The following chart shows district student results by each Montana Standard in science compared to the state wide results on each standard in 2015. The percentage of correct responses by all students on all questions related to that specific standard is represented in the chart.

Science Standard	Grade 4		Grade 8		All Grades	
	District	State	District	State	Total Percent District	Total Percent State
<b>1</b>	81.4%	62.1%	60.0%	57.9%	70.7%	60.0%
<b>2</b>	86.4%	66.4%	59.3%	56.4%	72.9%	61.4%
<b>3</b>	75.7%	65.0%	58.6%	60.0%	67.1%	62.5%
<b>4</b>	71.4%	57.9%	63.6%	65.7%	67.5%	61.8%

### Overall District Comparisons for Standards

The chart below shows the specific grade levels and the highest and lowest performing standards by district students in reading, math, and science.

District CRT Test Results Compared to the Montana Standards		
Grade	Science	
	Highest Science Standard 2015	Lowest Science Standard 2015
<b>4</b>	2	4
<b>8</b>	4	3
<b>All Grades</b>	2	3

### All Student Results on Open Response Questions

The following charts show the percentage of the total points that students scored on open response questions for science in 2015 compared to the state results.

Standard Content Science Open Response Questions		All Grades 2015	
		District	State
Standard 1	Students, through the inquiry process, demonstrate the ability to design, conduct, evaluate, and communicate the results and form reasonable conclusions of scientific investigations.	37.5%	32.5%
Standard 5	Students, through the inquiry process, understand how scientific knowledge and technological developments impact communities, cultures and societies.	65.0%	52.5%
Total results on all standards for science		51.3%	39.2%

## Gender Results on Open Response Questions

The following charts show the percentage of the total points that students scored on open response questions for science in 2015 based on gender.

Standard Content Science Open Response Questions		All Grades 2015	
		Males	State
Standard 1	Students, through the inquiry process, demonstrate the ability to design, conduct, evaluate, and communicate the results and form reasonable conclusions of scientific investigations.	25.0%	28.8%
Standard 5	Students, through the inquiry process, understand how scientific knowledge and technological developments impact communities, cultures and societies.	57.5%	47.5%
Total results on all standards for science		41.3%	35.0%

Standard Content Science Open Response Questions		All Grades 2015	
		Females	State
Standard 1	Students, through the inquiry process, demonstrate the ability to design, conduct, evaluate, and communicate the results and form reasonable conclusions of scientific investigations.	52.5%	35.0%
Standard 5	Students, through the inquiry process, understand how scientific knowledge and technological developments impact communities, cultures and societies.	70.0%	60.0%
Total results on all standards for science		61.3%	43.3%

## CRT Test Item Analysis

Measured Progress released questions for science. Fifty percent of the science questions used for scoring was released and some of the lowest and highest scoring questions are listed for each grade. Due to the release policy, for some grades the lowest and highest scoring questions may not have been released. In that situation, the lowest scoring released questions are listed.

### 4<sup>th</sup> Grade Science

Analysis of all 4<sup>th</sup> grade student responses for science on the 2015 CRT by each specific question showed the following results. The lowest scoring questions were related to standards 1 & 4. The highest scoring questions were related to standards 1, 2 & 3.

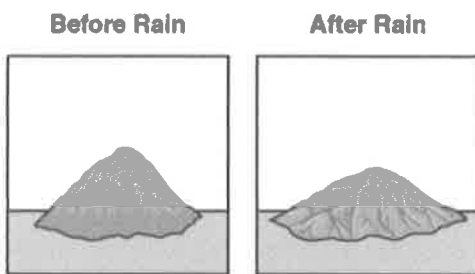
11. A group of fourth-grade students is making a model of a beaver dam. Which materials would make their model most like a real beaver dam?
- A. modeling clay and grass on a paper plate
  - B. wood chips and rocks on the playground
  - C. papier-mâché in a bucket of water
  - D. mud and sticks in a tub of water

The correct answer is D with 57% of the students correct. 43% chose A for the answer.

17. How should a gardener set up an experiment to test which type of plant food grows the largest plants?
- A. Give the plants equal amounts of the same plant food.
  - B. Give the plants different amounts of the same type of plant food.
  - C. Give the plants equal amounts of the same plant food but put the plants in different places.
  - D. Give the plants equal amounts of different types of plant foods.

The correct answer is D with 29% of the students correct. 57% chose A for the answer.

13. The pictures below show a pile of dirt before and after a week of rainy weather.

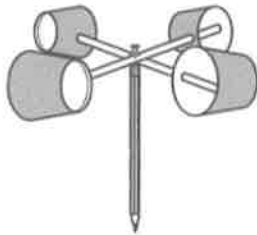


Which sentence best explains why the pile of dirt changed size?

- A. The pile of dirt eroded.
- B. The pile of dirt weathered.
- C. The pile of dirt evaporated.
- D. The pile of dirt condensed.

The correct answer is A with 43% of the students correct. 43% chose B for the answer.

1. Students used paper cups and a pencil to make the anemometer shown below.

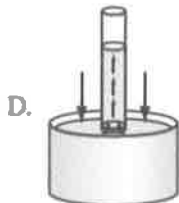
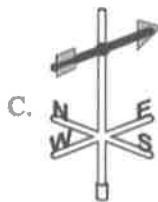
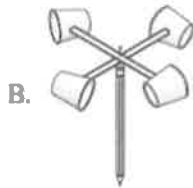
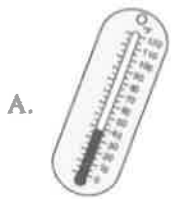


When the wind blows, the paper cups spin around the pencil. What does the anemometer measure?

- A. the amount of air pollution
- B. the amount of air that fills each cup
- C. the weight of the cups on the pencil
- D. the speed of the wind pushing on the cups

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

26. Which tool would be used to find out if the air pressure is changing?



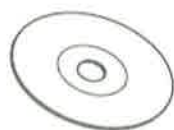
The correct answer is D with 43% of the students correct. 43% chose B for the answer.

### Open Response Summary for 4<sup>th</sup> Grade Science

View Item	Released Item	Standard	Point Value	Avg Score
	27	5	4	2.6

The open response summary for 4<sup>th</sup> graders shows that students scored above average on number 27.

27. Different types of technology used in schools are shown below.



DVD



Calculator



Television



The Internet



Personal computer



Pencil and paper



Electronic whiteboard

Select three types of technology and explain how they make learning easier for students.

## 8<sup>th</sup> Grade Science

Analysis of all 8<sup>th</sup> grade student responses for science on the 2015 CRT by each specific question showed the following results. The lowest scoring questions were related to standards 4 & 3. The highest scoring questions were related to standards 3 & 4.

2. Which characteristics are most useful for classifying related flowers?
- A. smell and color of petals
  - B. color and shape of leaves
  - C. height and width of plant
  - D. shape and number of petals

The correct answer is D with 19% of the students correct. 63% chose B for the answer.

6. Which statement best describes how species in a population acquire new characteristics?
- A. Organisms change their genetic makeup before they reproduce.
  - B. Organisms within a population adapt to changes through a sudden process.
  - C. An organism changes its behavior or structure and passes the change on to its offspring.
  - D. Variations of traits better suited to the environment are passed on to new generations.

The correct answer is D with 44% of the students correct. 25% chose B or C for the answer.

17. Which natural feature directly resulted from constructive forces caused by the movement of Earth's tectonic plates?

- A. Grand Canyon
- B. Great Salt Lake
- C. Mississippi River delta
- D. Mount Saint Helens volcano

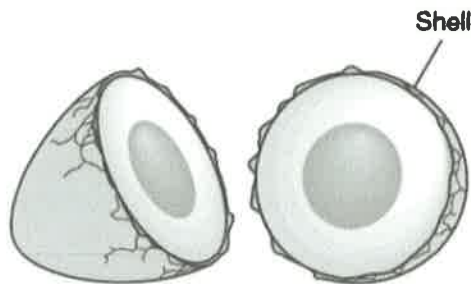
The correct answer is D with 50% of the students correct. 38% chose A for the answer.

4. An object has a certain weight and mass on Earth. If the object were placed on Mercury, what would happen to the object's weight and mass?

- A. The weight and mass would increase.
- B. The weight would increase, but the mass would remain the same.
- C. The weight and mass would decrease.
- D. The weight would decrease, but the mass would remain the same.

The correct answer is D with 38% of the students correct. 50% chose B for the answer.

19. The picture below shows a hard-boiled egg that has been cut in half.



Students use the hard-boiled egg as a model of Earth's interior. Which of Earth's layers is represented by the shell of the egg?

- A. crust
- B. inner core
- C. mantle
- D. outer core

The correct answer is A with 88% of the students correct.

### Open Response Summary for 8<sup>th</sup> Grade Science

<u>View Item</u>	<u>Released Item</u>	<u>Standard</u>	<u>Point Value</u>	<u>Avg Score</u>
	27	1	4	1.5

Students scored below average on number 27.

27. Two students designed an experiment to test the effect of plant fertilizers on earthworms. They collected 500 cubic centimeters of soil from three different places and put the soil in three identical containers. They placed 25 earthworms in each container. They mixed the fertilizers with water and then added water to each container until the soil was damp. They repeated this process three times. After two weeks, they counted the number of earthworms in each soil sample on the same date and time.
- a. Identify two strengths in the experimental design.
  - b. Identify two weaknesses in the experimental design. For each weakness, describe what the students should do to improve the design.