

***Gallatin Gateway  
School  
District***

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

**July 2014**

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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 2014 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 2014 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 81% proficient in science (all tested students in grades 4 & 8) on the CRT test in 2014 compared to 82% proficient in 2013 and 84% in 2012. Grade 4 district students scored 75% proficient compared to 68% state wide. Grade 8 students scored 85% proficient compared to 68% state wide. Overall the district was 13% above the state wide proficiency rate of 68% in 2014.

The district sub groups of students by gender and special education scored as follows: males in the district in 2014 scored higher than females in science with 88% proficient compared to females at 75%, there were not enough special education students tested in 2013 to analyze the data, and economically disadvantaged students results are not identified in the data any longer.

The data analysis results indicate that the district was 13% above the state profile in 2014 for science with 81% proficiency compared to the state at 68%. The district scored higher than the state in all tested grades for science. When all tested students in grades 4 and 8 are combined each year for the district from 2008 to 2014 the results show science scores have averaged 81% proficient which is excellent.

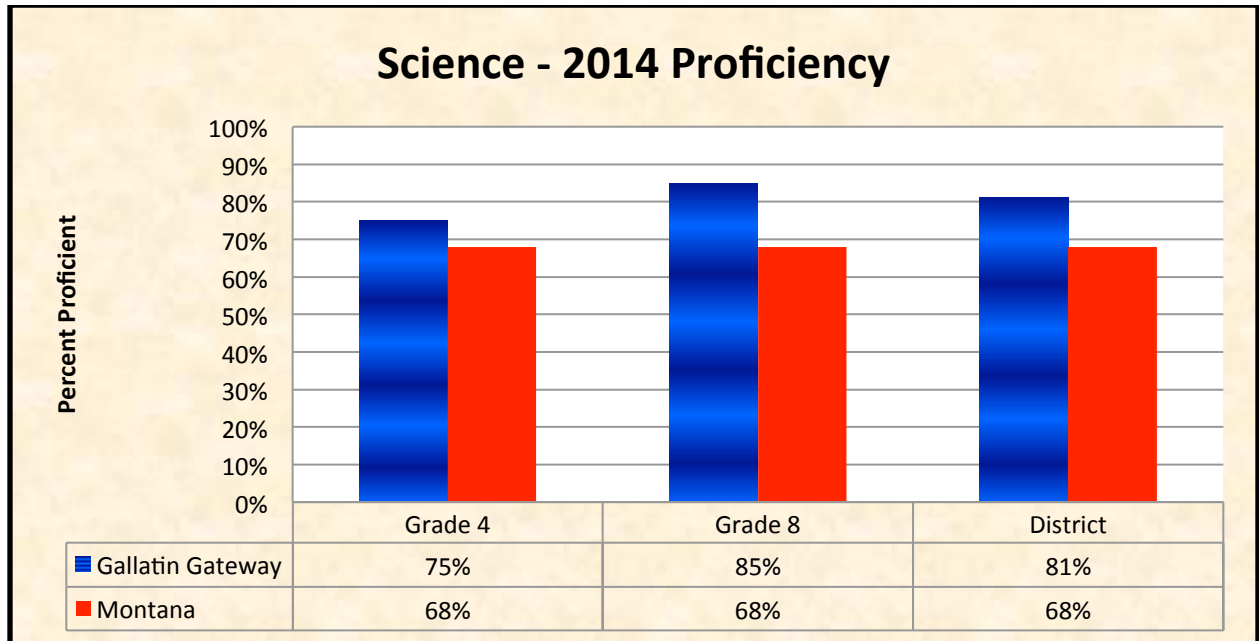
Student results compared to the Montana Standards for Science shows that standard 2 (*Students, through the inquiry process, demonstrate knowledge of properties, forms, changes and interactions of physical and chemical systems*) was the highest scoring in science for 2014 with 72.9% of all answers correct. The lowest scoring science standard for 2014 was 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*) with 62.5% of all answers correct. Student scores on open response type questions were up in 2014 with 48.8% (the state was 35%) of the total points in science compared to 47.5% in 2013 and 58.8% in 2012. The all student group scored the highest on standard 3 open response items in science with 70% of the points and the lowest on standard 4 with 27.5%. Females scored 40% on science open response questions in 2014 compared to males at 56.3%.

Overall conclusions show that district students scored extremely well on the 2014 CRT test at 81% proficiency which was 13% higher than the overall state score of 68%. District proficiency in science has averaged 81% over the last seven years which is outstanding. Results of the analysis indicate that students find standard 4 type questions the most difficult and scored the highest on standard 2 type questions in 2014 for science.

# CRT Test Results

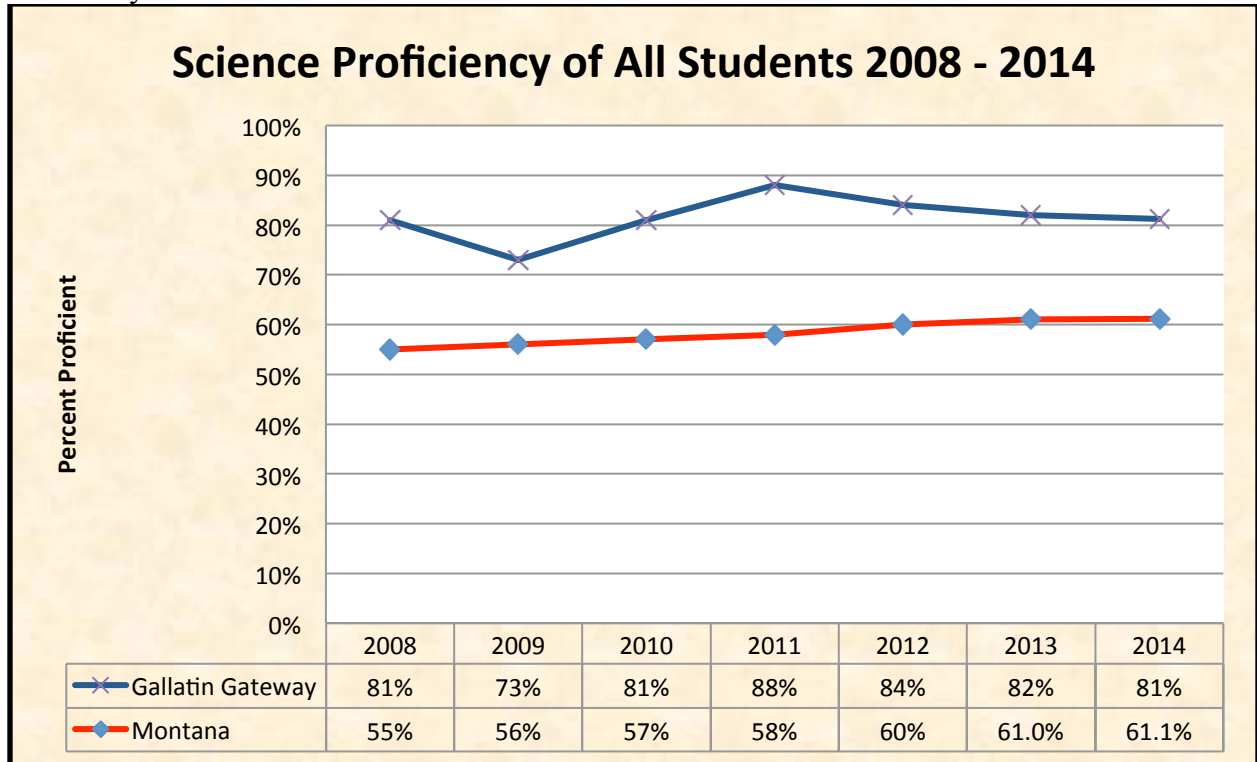
## Science Proficiency Compared to Montana

The following chart shows the percent of proficient/advanced students in the district in 2014 compared to the same group in Montana. The results indicate that Gallatin Gateway was at or higher than the state profile for science in grades 4 & 8. Grade 8 scored the highest at 85% proficient in 2014. Science results for the district were 13% higher than the state.



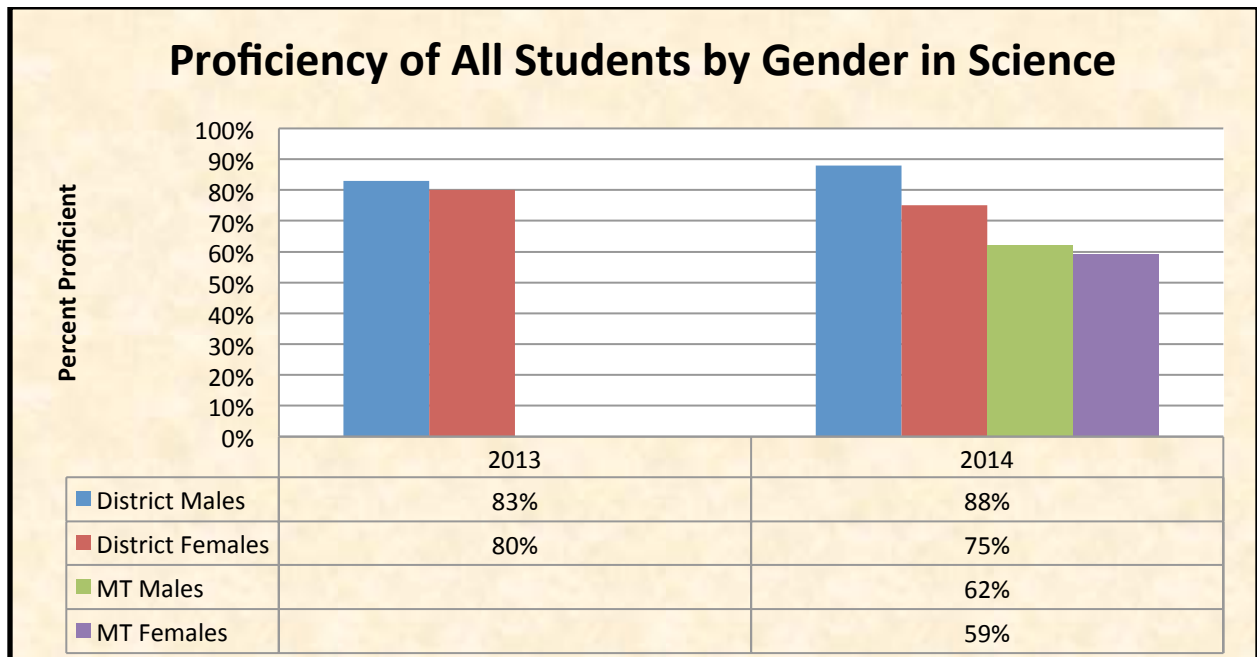
## Proficiency of All Students Tested Each Year

The following chart shows the proficiency of all students tested in science from 2008 through 2014 in the district compared to the state. Science proficiency has averaged 81% proficient over the last 7 years which is well above the state rate.



## Gender Proficiency in 2013 & 2014

The following chart shows the proficiency of males and females for science in 2013 & 2014 on the CRT test. In the district, males scored higher than females in science and both scored higher than the state.

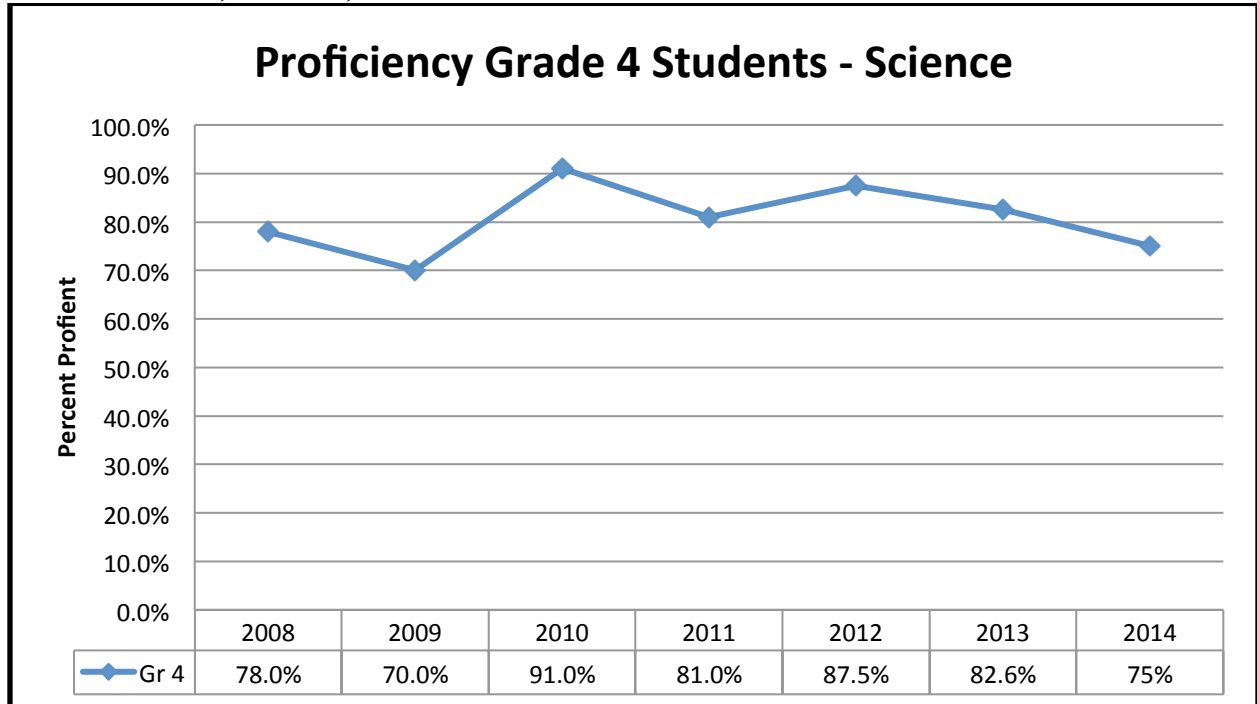


## Special Education Proficiency

There were not enough special education students tested in 2014 to analyze the data.

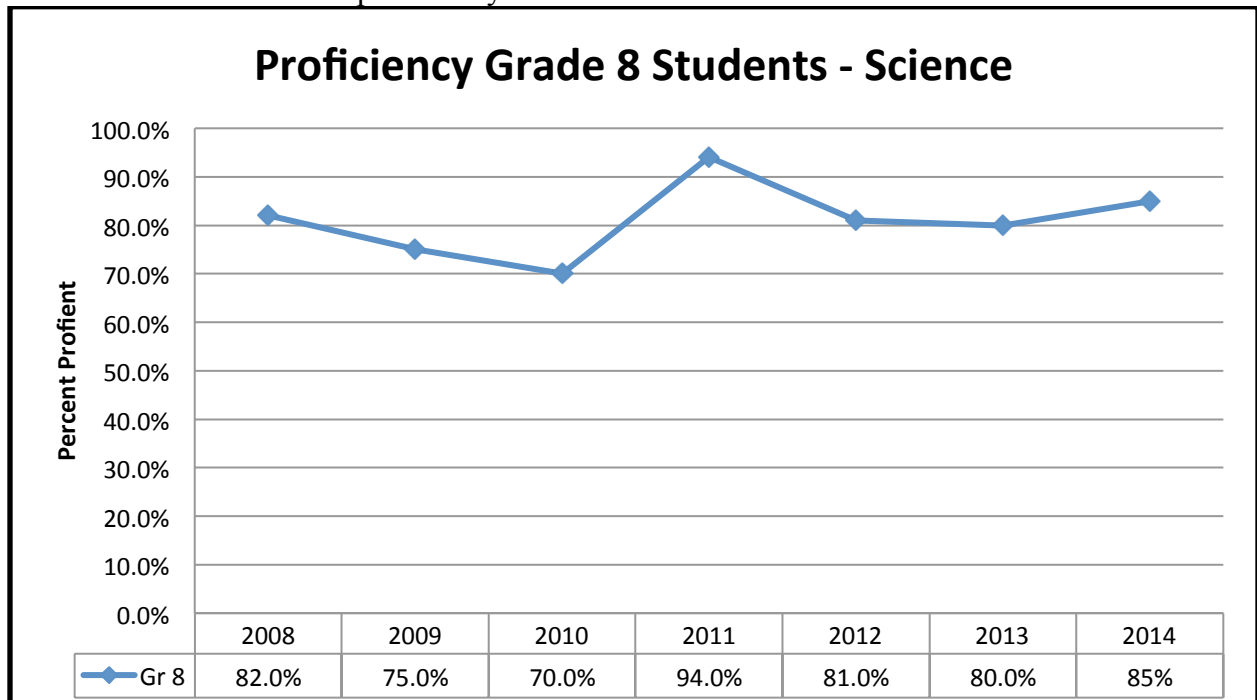
## 4th Grade CRT Results

Gallatin Gateway 4<sup>th</sup> grade students scored 75% proficient in 2014 on the CRT test which was down from 2013, however, the students still scored above the state rate.



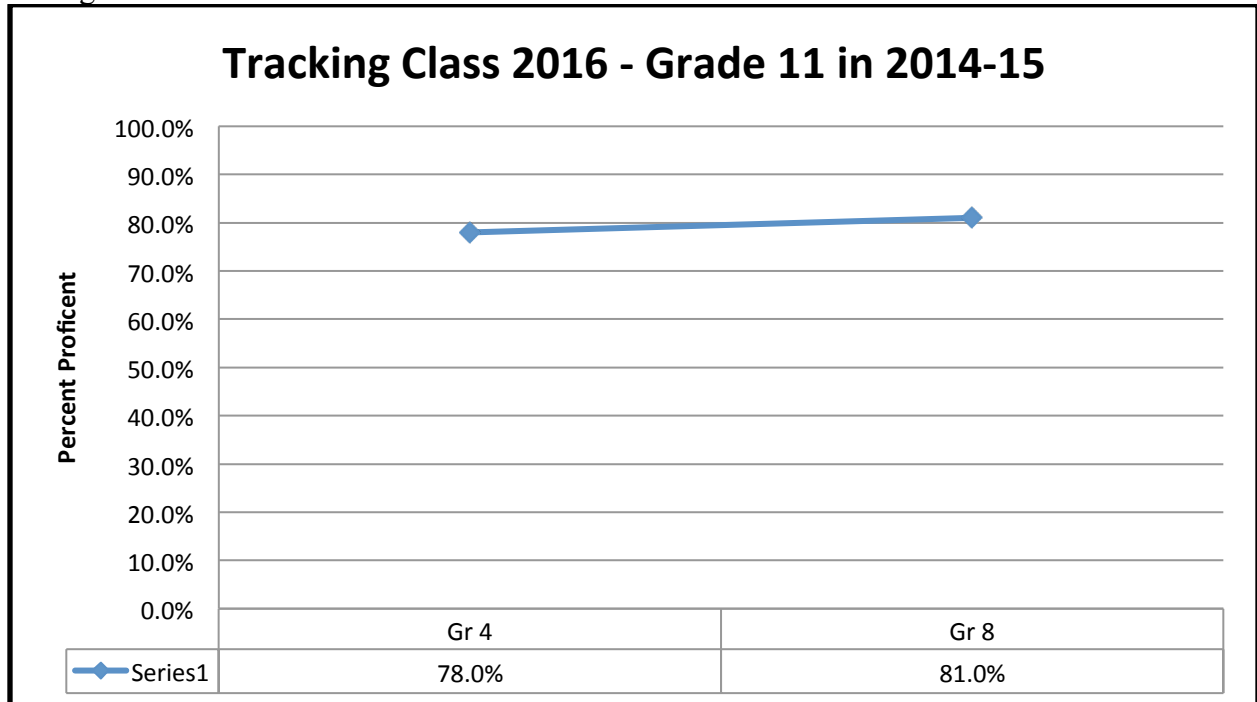
## 8<sup>th</sup> Grade CRT Results

The following chart shows 8<sup>th</sup> grade science CRT results from 2008 through 2014. The 2014 results show an increase in proficiency in science to 85%.



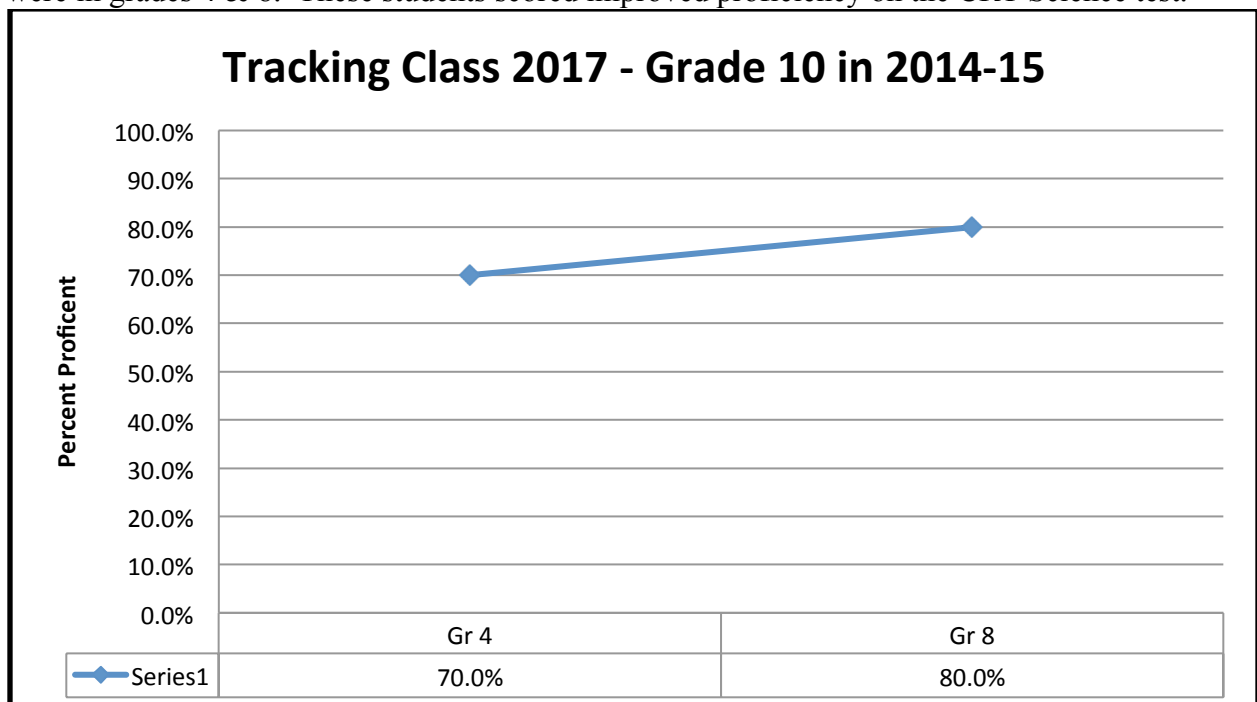
### Class of 2016 - Tracking Results Each Year on the CRT

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



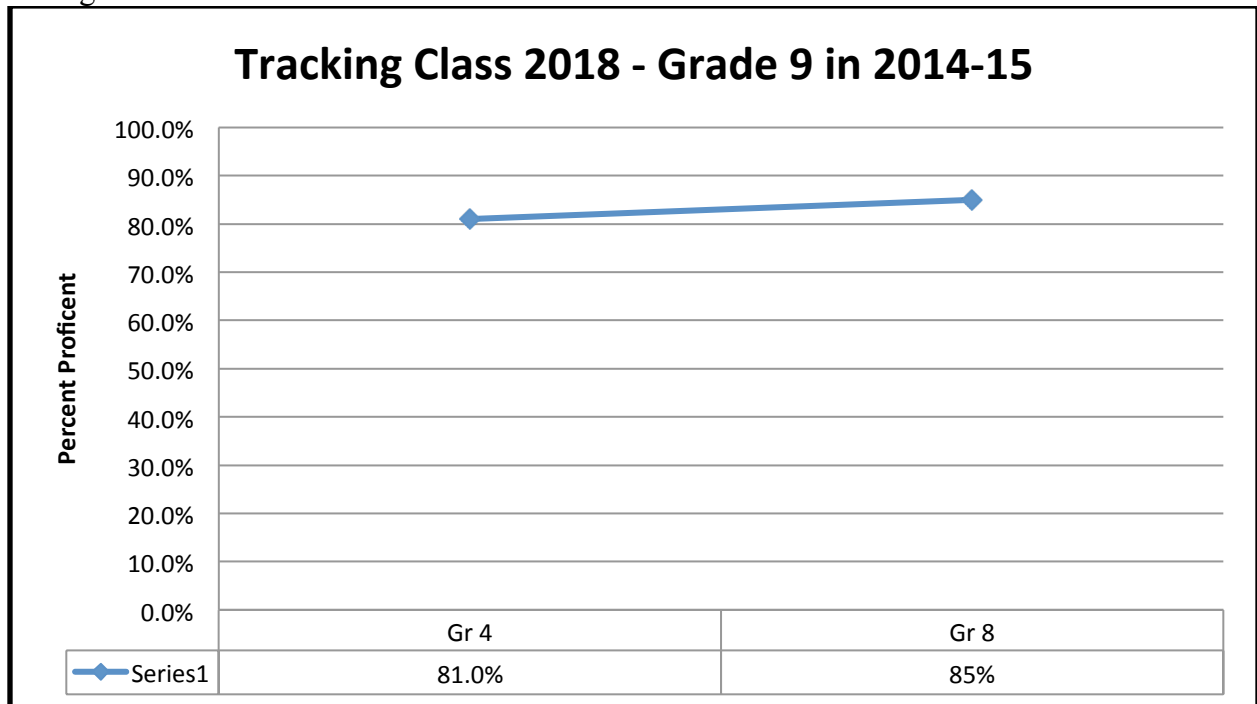
### Class of 2017 - Tracking Results Each Year on the CRT

The following chart shows the results of the class of 2017 on the CRT Science test when they were in grades 4 & 8. These students scored improved proficiency on the CRT Science test.



## 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 showed an increase 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 2014. 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>	58.6%	55.7%	70.7%	61.4%	64.6%	61.7%
<b>2</b>	73.6%	72.1%	72.1%	65.0%	72.9%	62.9%
<b>3</b>	65.7%	61.4%	70.7%	57.9%	68.2%	59.3%
<b>4</b>	57.9%	59.3%	67.1%	61.4%	62.5%	56.7%



## 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.

<b>District CRT Test Results Compared to the Montana Standards</b>		
	<b>Science</b>	
<b>Grade</b>	<b>Highest Science Standard 2014</b>	<b>Lowest Science Standard 2014</b>
<b>4</b>	2	4
<b>8</b>	2	4
<b>All Grades</b>	2	4

## 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 2014 compared to the state results.

<b>Standard Content Science Open Response Questions</b>		<b>All Grades 2014</b>	
		<b>District</b>	<b>State</b>
Standard 2	Students, through the inquiry process, demonstrate knowledge of properties, forms, changes and interactions of physical and chemical systems.	NA	32.5%
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.	70.0%	45.0%
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.	27.5%	27.5%
	Total results on all standards for science	48.8%	35.0%

## 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 2014 based on gender.

Standard Content Science Open Response Questions		All Grades 2014	
		Males	State
Standard 2	Students, through the inquiry process, demonstrate knowledge of properties, forms, changes and interactions of physical and chemical systems.	NA	32.5%
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.	80.0%	45.0%
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.	32.5%	25.0%
Total results on all standards for science		56.3%	34.2%

Standard Content Science Open Response Questions		All Grades 2014	
		Females	State
Standard 2	Students, through the inquiry process, demonstrate knowledge of properties, forms, changes and interactions of physical and chemical systems.	NA	30.0%
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.	60.0%	47.5%
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.	20.0%	27.5%
Total results on all standards for science		40.0%	35.0%

## 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 2013 CRT by each specific question showed the following results. The lowest scoring questions were related to standards 3 & 4. The highest scoring question was related to standard 2.

12. Why do constellations, or groups of stars, appear to change places in the sky from season to season?

- A. Stars move in a straight line through space.
- B. Earth revolves around the Sun.
- C. The Moon blocks different constellations at different times.
- D. Constellations rotate on a tilted axis.

The correct answer is B with 25% of the students correct. 42% chose C for the answer.

5. Earth's temperature is slowly increasing. Which of the following is happening because the temperature is rising?

- A. snowfall amounts are rising
- B. polar ice caps are melting
- C. winters are longer
- D. days are sunnier

The correct answer is B with 42% of the students correct. 42% chose D for the answer.

21. Most mother birds protect their young. Which word best describes this behavior?

- A. extinct
- B. friendly
- C. instinct
- D. learned

The correct answer is C with 33% of the students correct. 42% chose B for the answer.

10. A student wants to find out how temperature affects the calls made by frogs.

- He placed frogs in containers with different temperatures.
- He counted the number of calls each frog made and measured the length of each call.

The data is shown in the table below.

**Frog Calls**

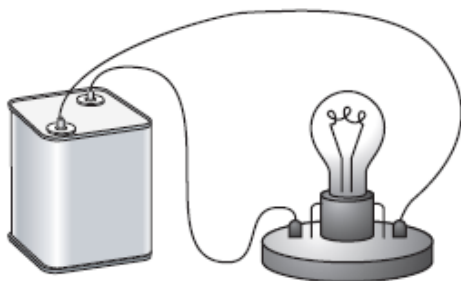
Temperature (°C)	Number of Calls in One Minute	Average Length of Each Call (seconds)
18	71	.31
20	80	.27
22	96	.24
24	103	.21

According to the data, which conclusion is best?

- A. Frogs make fewer but longer calls at warmer temperatures.
- B. Frogs make more and longer calls at warmer temperatures.
- C. Frogs make fewer and shorter calls at warmer temperatures.
- D. Frogs make more but shorter calls at warmer temperatures.

The correct answer is D with 42% of the students correct. 42% chose A for the answer.

13. The picture below shows an electric circuit.




What does electricity produce in this circuit?

- A. a breeze
- B. light
- C. a picture
- D. sound

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

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

View Item	Released Item	Standard	Point Value	Avg Score
	27	4	4	1.1

The open response summary for 4<sup>th</sup> graders shows that students found number 27 difficult.

27. Water is one of Earth's natural resources.

Describe three main steps of the water cycle. Tell whether water is a solid, a liquid, or a gas at each step.

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

Analysis of all 8<sup>th</sup> grade student responses for science on the 2014 CRT by each specific question showed the following results. The lowest scoring questions were related to standards 2 & 4. The highest scoring questions were related to standards 1, 3 & 2.

27. According to the current scientific model, the solar system formed out of a cloud of different gases and dust. As the cloud flattened into a disk, most of the mass accumulated in one place. Which part of the solar system formed there?

- A. Earth
- B. Jupiter
- C. the Milky Way
- D. the Sun

The correct answer is D with 15% of the students correct. 60% chose C for the answer.

22. A student wants to know if practice helps people improve their reaction times.

The student measures how quickly his 20 classmates catch a meterstick released in front of them. He repeats the procedure with his classmates every day for one week. At the end of the week, he calculates the change in each classmate's reaction time.

How could the student improve his experimental design?

- A. run the tests with fewer of his classmates
- B. add a control group that does not practice
- C. release the meterstick from a different height each day
- D. ask his classmates to collect and report their own data

The correct answer is B with 50% of the students correct. 40% chose C for the answer.

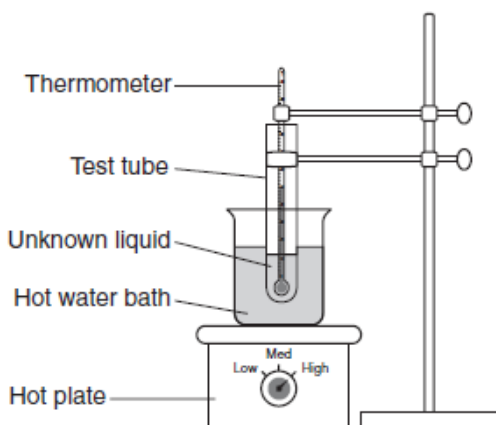
26. Only about 10 percent of the energy given off by standard incandescent bulbs is visible light. Most of the light given off by fluorescent bulbs is visible light. What can be inferred from this example?
- A. Incandescent bulbs produce more kinetic energy than fluorescent bulbs.
  - B. Incandescent bulbs transform more energy into heat than fluorescent bulbs.
  - C. Light waves travel faster from incandescent bulbs than from fluorescent bulbs.
  - D. Light waves change into electrical energy quicker in incandescent bulbs than in fluorescent bulbs.

The correct answer is B with 30% of the students correct. 35% chose A for the answer.

8. Over the course of its lifetime, a male elephant may grow from 148 kg to 5910 kg. Which process is responsible for the elephant's growth?
- A. muscles stretching
  - B. body cells dividing
  - C. nerve impulses being sent
  - D. the digestive system developing

The correct answer is B with 35% of the students correct. 35% chose D for the answer.

10. The diagram below shows the equipment used to determine a physical property of an unknown liquid.




Which physical property is the equipment measuring?

- A. boiling point
- B. density
- C. electrical conductivity
- D. solubility in water

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

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

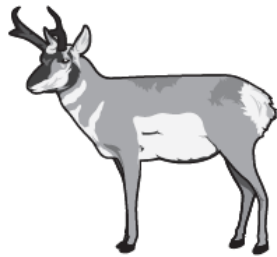
View Item	Released Item	Standard	Point Value	Avg Score
	9	3	4	2.8

Students scored well above average on number 9.

9. The diagram below shows an example of a dichotomous key for geometric shapes.

Dichotomous Key for Geometric Shapes	
1. a. shape with curved surface .....	go to step 2
b. shape with straight lines .....	go to step 3
2. a. shape is perfectly round .....	circle
b. shape is longer than it is wide .....	oval
3. a. shape has four equal length sides .....	square
b. shape has two sides longer than the others .....	rectangle

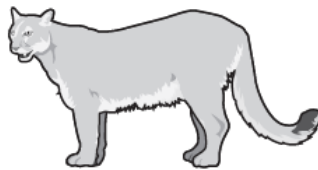
The pictures below show four mammals found in Montana.



Pronghorn



Canada lynx



Mountain lion



Bighorn sheep

Create a dichotomous key to classify the pronghorn, the Canada lynx, the mountain lion, and the bighorn sheep.