



AN INTRODUCTION TO THE CONNECTICUT NEXT GENERATION SCIENCE ASSESSMENT

NGSS RESULTS AND ANALYSIS

KILLINGLY PUBLIC SCHOOLS

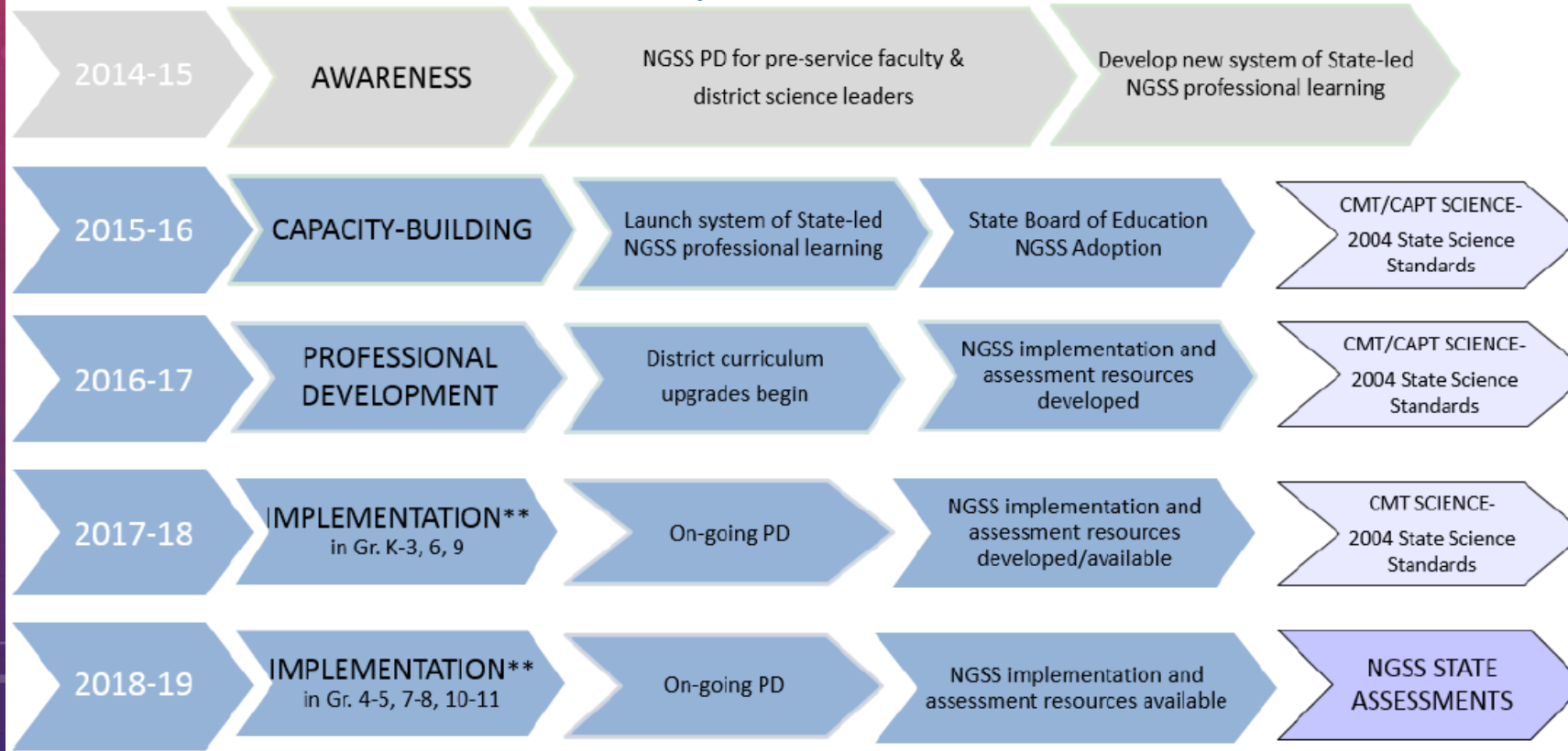
PAUL BRENTON

1.16.20

UNDERSTANDING THE HISTORY OF THE ASSESSMENT

DRAFT* 5-Year NGSS Implementation Timeline

September 2017



UNDERSTANDING THE HISTORY OF THE NEXT GENERATION SCIENCE STANDARDS (NGSS) IN KILLINGLY

- 2016-2017 Killingly Public Schools Science Task Force conducts an audit of our current curriculum in science. This audit exposes the need for additional science instruction in grades 2-4. The FOSS science curriculum is adopted by KPS for grades 2-4.
- 2017-2018 FOSS Elementary units are introduced at KMS which include Physical Science, Earth Science and Life science Components. 2017-2018 Killingly Public School engages in districtwide NGSS training for grades 5-12 Science teachers. All KPS science teachers receive the comprehensive CTSDE NGSS instructional training.
- 2018-2019 KHS incorporates new units into grade 9 Physical Science. KIS engages in the development of proficiency based curriculum for all science classes based on the NGSS standards.

Spring 2019- Connecticut students in grades 5, 8, and 9 first take the NGSS assessment for the first time.

- Summer 2019- KHS and KIS teachers engage in the development of new assessments aligned to the Next Generation Science Standards and based on the proficiency statements developed in 2018-2019.

WHAT IS TESTED?

Practices and Concepts in Physical Sciences

PS1	Matter and Interactions
PS2	Motion and Stability: Forces and Interactions
PS3	Energy
PS4	Waves and Their Applications in Technologies for Information Transfer

Practices and Concepts in Life Sciences

LS1	From Molecules to Organisms: Structures and Processes
LS2	Ecosystems: Interactions, Energy, and Dynamics
LS3	Heredity: Inheritance and Variation of Traits
LS4	Biological Evolution: Unity and Diversity

Practices and Concepts in Earth/Space Sciences

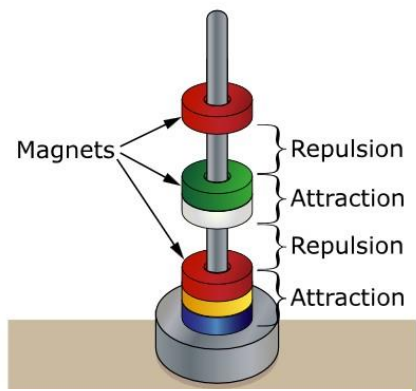
ESS1	Earth's Place in the Universe
ESS2	Earth's Systems
ESS3	Earth and Human Activity

Sample NGSS Assessment Items: Elementary School

Two magnets are placed right next to each other. They seem to pull together. A third magnet is then placed right next to the first two magnets. This magnet seems to push away from the first two.

The ability of magnets to attract and repel each other is shown in the Attraction and Repulsion between Magnets picture. In this picture, some of the magnets are floating due to their ability to repel other magnets.

Attraction and Repulsion between Magnets



Your Task

In the following questions, you will set up and perform an experiment that will help you understand what affects the force between the two magnets.

Aligned to 3-PS2-3

Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.

Part A

Select a testable, scientific question that can be answered by performing an experiment with the setup shown in the Hanging Magnets Experiment picture.

- ☐ A How does the distance between the magnets affect the force?
- ☐ B How does the orientation of the magnets affect the force?
- ☐ C Will the force between the magnets always exist?

Part C

Use the Hanging Magnets Experiment simulation to run the experiment and gather observations to answer your question from part A.

First, select the Distance and Orientations. You must select an orientation for each magnet in each trial. Then, click Start to run the simulation.

- You will be limited to **three** trials in the experiment.
- Be sure the final data table includes data that answers your question.
- Click on the trash can button if you want to delete a row and generate new data.

Hanging Magnets Experiment

Distance Far

Orientation of Magnet 1

☒ S N

☐ N S

Orientation of Magnet 2

☒ S N

☐ N S

Trial Number	Distance	Orientation of Magnet 1	Orientation of Magnet 2	Observations

Part D

Click the box to select the answer to the question you decided to test in part A, based on the results of the experiment you ran in the simulation.

Result of Experiment

Answer to Question

Sparks fly off the wheels of a train when the brakes are applied.

Click the small gray arrow to see a demonstration of this happening in Animation 1.

Animation 1. Braking Train

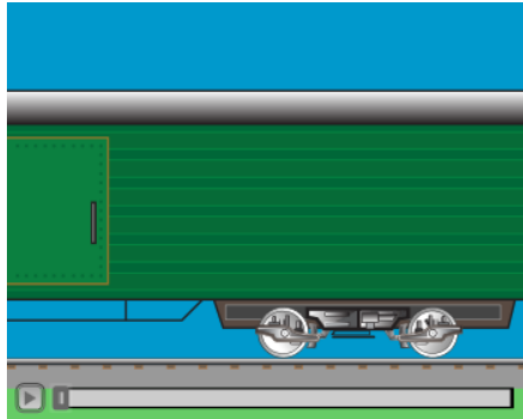


Table 1. Properties of the Train System

Before Brakes Are Applied	After Brakes Applied
No sparks	Sparks fly off the wheels and brake pads
Brake pads make no sound	Brake pads make sound
Brake pads are cold	Brake pads are hot
Wheels are warm	Wheels are hot
Rails are warm	Rails are warmer
Train is moving fast	Train is moving slow

Your Task

In the questions that follow, you will analyze what happens to the train when the brakes are applied.



Sample NGSS Assessment Item Cluster: Middle School

Part A

Click on each blank box to select the word or phrase that completes each sentence, constructing an argument about what happens when the train's brakes are applied.

Applying the brakes causes the to transfer kinetic energy to the . This causes the to slow down and have kinetic energy, which slows the train.

Part B

When the train applies its brakes, what happens to the energy of the surroundings?

- ☐ A The surroundings gain energy.
- ☐ B The surroundings lose energy.
- ☐ C The surroundings do not gain or lose energy.
- ☐ D There is not enough information to determine the energy of the surroundings.

Part C

Which **three** statements support your choice in part B?

- ☐ The train maintains its speed.
- ☐ Sound is produced.
- ☐ Sound is consumed.
- ☐ Light is produced.
- ☐ Light is consumed.
- ☐ Heat is produced.
- ☐ Heat is consumed.

Aligned to MS-PS3-5

Construct, use and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.

WHAT IS THE EXPERIENCE LIKE FOR STUDENTS?

LET'S LOOK AT A GRADE 11 QUESTION TOGETHER

People tend to get hungry at the same times each day. Feeling hungry goes away after eating.

Feeling hungry is one of the body's symptoms of abnormal blood sugar levels. Feeling hungry alerts the body to eat. The pancreas helps to regulate blood sugar levels by producing glucagon, a hormone that acts as a messenger molecule to send signals around the body. Glucose is the sugar that serves as the body's main source of energy. Sufficient levels of sugar are required for cells to have the energy needed to survive.

Your Task

In the questions that follow, you will plan and conduct an investigation to understand the processes and feedback mechanisms that cause periodic feelings of hunger.

1

GUEST

Part A

Use the simulation to investigate the effects of eating on the levels of sugar and glucagon in normal, healthy adult test subjects.

In the simulation, subjects eat a normal meal at 12:00 p.m.

For each trial, select a Subject and a Measurement Time to take the subject's blood levels. Then click Start to collect data.

- Take measurements to identify reliable patterns in the relationships among feeling hungry, eating, sugar levels, and glucagon levels.
- You may take up to **ten** measurements.
- Be sure your data table contains only the data that will help you identify a reliable pattern in the relationships among feeling hungry, eating, sugar levels, and glucagon levels.
- If you need to change your selections, click the trash can icon next to a row to delete the data from the row.
- Sugar levels are measured in milligrams per deciliter (mg/dL) while glucagon levels are measured in picograms per milliliter (pg/mL).

KILLINGLY PUBLIC SCHOOLS 2019 RESULTS

SPRING 2019 RESULTS

Grade	Percent at Level 1	Percent at Level 2	Percent at Level 3	Percent at Level 4
Grade 5	13%	36%	45%	6%
Grade 8	14%	28%	49%	9%
Grade 11	19%	45%	30%	5%

Grade	Number of Students Tested	Percent at Level 3 or Above
Grade 5	171	51%
Grade 8	163	58%
Grade 11	165	35%

GRADE 5 PERFORMANCE

Grade 5	Science Achievement Level	Practices and Concepts in Physical Sciences Discipline Achievement Category	Practices and Concepts in Life Sciences Discipline Achievement Category	Practices and Concepts in Earth/Space Sciences Discipline Achievement Category
Above Standard	51%	18%	15%	17%
Approaching Standard	36%	70%	65%	64%
Below Standard	13%	12%	20%	19%

Area of strongest performance:

- LS4 Biological Evolution: Unity and Diversity

Area of weakest performance:

- Practices and Concepts in Physical Sciences

GRADE 8 PERFORMANCE

Grade 8	Science Achievement Level	Practices and Concepts in Physical Sciences Discipline Achievement Category	Practices and Concepts in Life Sciences Discipline Achievement Category	Practices and Concepts in Earth/Space Sciences Discipline Achievement Category
Above Standard	58%	20%	27%	27%
Approaching Standard	28%	68%	57%	58%
Below Standard	14%	13%	16%	14%

Area of strongest performance:

- LS1 From Molecules to Organisms: Structures and Processes
- LS3 Heredity: Inheritance and Variation of Traits
- LS4 Biological Evolution: Unity and Diversity

Area of weakest performance:

- PS3 Energy

GRADE 11 PERFORMANCE

Grade 11	Science Achievement Level	Practices and Concepts in Physical Sciences Discipline Achievement Category	Practices and Concepts in Life Sciences Discipline Achievement Category	Practices and Concepts in Earth/Space Sciences Discipline Achievement Category
Above Standard	35%	15%	20%	15%
Approaching Standard	45%	59%	55%	67%
Below Standard	19%	26%	25%	19%

Area of strongest performance:

- LS4 Biological Evolution: Unity and Diversity

Area of weakest performance:

- PS1 Matter and Interactions
- ESS2 Earth's Systems

REGIONAL REFERENCE FOR NGSS ASSESSMENT PERFORMANCE

Grade	Killingly School District Average Scale Score (SS)	Putnam School District Average Scale Score (SS)	Thompson School District Average Scale Score (SS)	Pomfret School District Average Scale Score (SS)	Griswold School District Average Scale Score (SS)	Montville School District Average Scale Score (SS)	Woodstock School District Average Scale Score (SS)
5	498	496	490	503	500	508	507
8	802	794	795	810	810	802	802
11	1096	1093	1089		1097	1096	*

MOVING FORWARD

- In 2019 the BOE approved New Physical Science Course for 2020-2021. Students at KHS are currently enrolling in the course for the coming year.
- 2020 results for KIS will include instruction driven by the newly developed NGSS prioritized standards and Proficiency indicators. This includes assessments developed in the summer of 2019.
- 2020 science curriculum at KHS will include assessments developed in the summer of 2019 which have been developed as follow up to the twelve NGSS IAB assessments.
- 2020 results will include our first group of 11th grade students to test with exposure to our new Earth and Space Science instruction and our NGSX-based instructional strategies.
- 2020 results will include grade 5-11 students exposed to the testing module through the implementation of interim assessments.
- Introduction of New Computer Science and Data processing curricula will assist students in the development of critical thinking and problem solving skills.

INSTRUCTION CORE

The diagram features a central red circle labeled 'Curriculum'. To its left is a red circle labeled 'Instruction' and to its right is a red circle labeled 'Assessment'. These three circles are arranged in a triangular pattern and overlap with a larger red circle in the background. This larger circle is centered within a blue ring, which is itself centered within a larger purple ring. The entire graphic is set against a dark blue background with a starry night sky and a faint horizon line at the bottom. On the right side, there is a faint, curved scale with numerical markings from 120 to 190.

Instruction

Assessment

Curriculum



QUESTIONS?

PBRENTON@KILLINGLYSCHOOLS.ORG