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A Component of the  
Washington State Assessment System

# Science, Math & Educational Technology

## Speed Racer

*Investigate factors affecting speed and apply technology  
to solve a problem with a toy car race.*

# Grades 3-5

*OSPI-Developed*  
**Assessment**

Office of Superintendent of Public Instruction  
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# Grades 3 – 5 Speed Racer

## Science, Math, and Educational Technology Assessment

### Overview

#### Introduction

This document contains information which is essential to the administration of the OSPI-Developed assessment for science, math, and educational technology. This assessment is an ideal culminating project for the study of various factors which impact the speed of an object. Developed by teachers in Washington State, this assessment is designed to measure learning of selected standards for science, math, and educational technology.

#### Description of the OSPI-Developed Assessment

This assessment models best practices of instruction, including the use of technology, lesson cycle, differentiation, and student-centered learning. In addition, teachers will be able to collect and use formative and summative evidence regarding **student performance on the STEM** and educational technology standards.

Students will complete the assessment by responding to a prompt that requires the use of educational technology. During the assessment, students will conduct research about how weight, distance, and time affect an object's speed as it travels down a ramp. In addition, students will collect data, then build a graph using a digital tool. In the final session of this assessment students will produce a multimedia product as a response to the original prompt. Teachers will score student work using the Educational Technology Scoring Guide.

#### Using the Assessment

The rubric for this educational technology assessment is structured distinctively in that it **combines a checklist and a performance scale**. The Sample Unit Plan and individual Session Plans describe the basic materials and time needed to complete the assessment. Teachers will need to develop their own scoring tools to evaluate student work for STEM topics.

Teachers should allow any student working productively on the assessment to continue. Session Plans provide some accommodations that differentiate the instruction or assessment based on the needs of students. Teachers should enable specific accommodations for ELL students, such as access to a paraprofessional, during the assessment. Any students who have an Individualized Education Plan (IEP) should have access to all accommodations required by the students' IEP.

#### For More Information

Please visit the OSPI Web site for additional resources for the educational technology assessments (<http://www.k12.wa.us/EdTech>).

## Grades 3 – 5 Speed Racer Science, Math, and Educational Technology Assessment

This integrated assessment for science, math, and educational technology asks students to develop a set of rules for a race involving toy cars. Students will investigate how different factors affect the speed of an object as it moves down an inclined ramp. As students complete the task, they will also collect data using a digital tool, and create and interpret graphs. Teachers can use this single assessment to evaluate student knowledge and abilities with the educational technology standards.

The educational technology assessment is divided into two parts. The first three sessions of the suggested Unit Plan help students build background knowledge and can be used by teachers to collect and provide formative feedback. During the final two sessions, students will create the products associated with the summative assessment of the educational technology standards.

Speed Racer offers an opportunity to extend learning activities connected to grade-level science kits—Motion and Design through Science & Technology for Children (STC), and Models & Designs in the FOSS (Full Option Science System) kit.

This assessment offers an opportunity for teachers to develop their proficiency with the following National Educational Technology Standards for Teachers (NETS•T):

- **2a:** Design or adapt relevant learning experiences that incorporate digital tools and resources to promote student learning and creativity.
- **2d:** Provide students with multiple and varied formative and summative assessments aligned with content and technology standards and use resulting data to inform learning and teaching.
- **4a:** Advocate, model, and teach safe, legal, and ethical use of digital information and technology, including respect for copyright, intellectual property, and the appropriate documentation of sources.

For more information on the NETS for Teachers, please visit <http://www.iste.org/standards/nets-for-teachers.aspx>.

This integrated assessment addresses the following standards:

Standards	
Educational Technology	
1.1.1	Generate ideas and create original works for personal and group expression using a variety of digital tools. <ul style="list-style-type: none"><li>▪ Organize ideas and design and produce multimedia projects.</li></ul>
1.1.2	Use models and simulations to explore systems, identify trends and forecast possibilities. <ul style="list-style-type: none"><li>▪ Practice skills, explore new concepts and recognize patterns using interactive resources and educational games.</li><li>▪ Collect and graph data to predict outcomes and interpret patterns.</li></ul>
1.3.1	Identify and define authentic problems and significant questions for investigation and plan strategies to guide inquiry. <ul style="list-style-type: none"><li>▪ Build background knowledge and generate questions by viewing multimedia.</li><li>▪ Use digital tools to help plan projects.</li></ul>

# Grades 3 – 5 Speed Racer

## Science, Math, and Educational Technology Assessment

### Options for Instruction

This assessment for educational technology integrates standards-based learning activities for science and math. However, the modular design enables flexibility and adaptation. Teachers have these options as they plan for instruction:

- Use the learning and assessment activities for **both subjects**.
- Focus on a **single subject** and target specific competencies for educational technology.

Standards	
Science	Math
NGSS <b>4-PS3-1.</b> Use evidence to construct an explanation relating the speed of an object to the energy of that object. <b>Science and Engineering Practice 2:</b> Developing and Using Models	CCSS Math <b>4.MD.4</b> Make a line plot to display a data set of measurements in fractions of a unit ( $\frac{1}{2}$ , $\frac{1}{4}$ , $\frac{1}{8}$ ). Solve problems involving addition and subtraction of fractions by using information presented in line plots. <b>5.MD.2</b> Make a line plot to display a data set of measurements in fractions of a unit ( $\frac{1}{2}$ , $\frac{1}{4}$ , $\frac{1}{8}$ ). Use operations on fractions for this grade to solve problems involving information presented in line plots.

### Student Task

You have been asked to judge a toy car race. Last year, some cars were so much faster than others that it was believed some racers might have cheated. The organizers want the race to be fair. They would like you to write a set of rules for the event to ensure no racers can cheat to win. Make sure you base the rules on evidence about how weight, time, and distance affect the speed of an object rolling down a ramp.

To develop the rules, you will need to plan and conduct an investigation, collect and interpret data, and explain how your rules will make the race fair. Use digital tools to organize your information and communicate your results to the Racing Committee.

## Grades 3 – 5 Speed Racer Educational Technology Scoring Guide

**Directions:** Each of the *attribute names* below represents part of an educational technology standard. These are followed by *descriptions* of student performance which meet the standard. If the student work provides evidence of meeting the standard, it earns the *points* shown in the final column. Total the points and then compare to the *Scoring Rubric* to determine the overall level of performance.

We use the term *digital* to refer to tools and information that do not exist in a physical form. Computer software, Web sites, online databases, pod/vodcasts and pages from an eReader are just a few examples.

### Attributes of Educational Technology Standards

GLE	Attribute Name	Description	Points
Research Process (separate from multimedia product)			
1.3.1	Generate Questions	Develops original questions after viewing multimedia (for example an online simulation or video clip).	1
	Plan Projects	Uses a digital tool to plan an investigation related directly to the student task.	1
1.1.2	Collect and Graph Data	Collects data related directly to the student task.	1
		Graphs data using a digital tool.	1
	Recognize Patterns	Uses an interactive resource (online simulation or graphing tool) to identify a pattern or trend. <i>For example, "The graph shows that as the weight of a ball increases, so does its speed down the ramp."</i>	1
Multimedia Product			
1.1.1	Produce Multimedia	Creates a digital product to communicate information.	1
		Combines audio, text, graphs, video, symbols, or pictures that are related directly to the student task into product.	1
	Organize Ideas	Uses information gathered during the investigation to explain how the rules will make the race fair.	1
		Uses features (font, color, transitions) of the digital tool to effectively communicate main ideas to the audience. <i>For example, different font sizes are used consistently to show headers and subjects or transitions to reveal answers.</i>	1
<b>TOTAL</b>			<b>9</b>

## Grades 3 – 5 Speed Racer Educational Technology Scoring Guide

### Scoring Rubric for Educational Technology

Performance Description	Points
A <b>Level 3 response</b> exceeds the standards and reflects that a student can demonstrate knowledge and ability beyond the requirements for Educational Technology GLEs 1.1.1, 1.1.2, and 1.3.1.	8 - 9
A <b>Level 2 response</b> meets the standards and reflects that a student understands and is able to perform GLE 1.1.1 <i>Demonstrate creative thinking, construct knowledge and develop innovative products and processes using technology</i> , 1.1.2 <i>Use models and simulations to explore systems, identify trends and forecast possibilities</i> and GLE 1.3.1 <i>Identify and define authentic problems and significant questions for investigation and plan strategies to guide inquiry</i> BY using digital tools to explore the relationship between time, distance, weight and speed in order to develop a set of rules for a toy car race.	6 - 7
A <b>Level 1 response</b> reflects that a student is still working toward meeting GLEs 1.1.1, 1.1.2 and 1.3.1.	0 - 5



# Grades 3 – 5 Speed Racer

## Assessment for Science-Math-Educational Technology

**Teachers must use the student task and scoring guide as written.** However, teachers have leeway to adapt the amount of instruction, time considerations, and resources for individual classroom use. There is no requirement to use this plan or the sessions that follow. However, teachers might find the structure useful. There are many ways to use the Sample Unit Plan, shown below. Its versatile design will adapt to multiple instructional strategies and classroom settings as teachers complete this integrated OSPI-Developed assessment.

During the first four sessions, teachers will model the assessment with the whole class and provide formative feedback on student work. Students will complete the summative tasks for scoring during Session Five.

Sample Unit Plan			
Session	Standards	Time	Preparation and Materials
<u>1</u> Model and Question	ET 1.1.2 ET 1.3.1 4-PS3-1	60 minutes	<input type="checkbox"/> Computer connected to a projector <input type="checkbox"/> Internet access <input type="checkbox"/> 1 ball or other rolling object <input type="checkbox"/> Inclined ramp (for example, books + meter sticks or boards) <input type="checkbox"/> Computers or devices for student use <input type="checkbox"/> Intergalactic Luge Simulation <a href="http://sunshine.chpc.utah.edu/javalabs/java12/fnm/act2/lab.htm">http://sunshine.chpc.utah.edu/javalabs/java12/fnm/act2/lab.htm</a>
<u>2</u> Investigate	ET 1.1.2 ET 1.3.1 4-PS3-1	60 minutes	<input type="checkbox"/> Video clip of a toy car race <input type="checkbox"/> 5 - 7 balls of various weights (for example, marble, ping pong ball, golf ball, tennis ball, rubber bounce ball, baseball) <input type="checkbox"/> Inclined ramp (for example, meter stick and books) <input type="checkbox"/> Timer or stopwatch <input type="checkbox"/> Balance or scale <input type="checkbox"/> Digital Planning Tool (for example, Word or PowerPoint template, wiki). We have included a <a href="#">Sample Planning Tool</a> . <input type="checkbox"/> Computer or interactive whiteboard connected to a projector
<u>3</u> Organize Data	ET 1.1.2 4.MD.4 5.MD.2	60 minutes	<input type="checkbox"/> Computers or devices for student use <input type="checkbox"/> Digital graphing tool: <a href="#">graphing Web site</a> (recommended) or spreadsheet program (for example, Excel)
<u>4</u> Plan a Project	ET 1.1.2 ET 1.3.1 4-PS3-1 SE 2 4.MD.4 5.MD.2	90 minutes	<input type="checkbox"/> Rolling object, 1 per student (for example, 1” pieces of a wooden dowel, marbles, or foam balls from a craft store) <input type="checkbox"/> Materials for modifying the rolling object (for example, paint, tape) <input type="checkbox"/> Inclined ramp (for example, meter stick and books) <input type="checkbox"/> Timer or stopwatch <input type="checkbox"/> Balance or scale <input type="checkbox"/> Project Planning Tool (for example, Word or PowerPoint template, wiki). We have included a <a href="#">Sample Planning Tool</a> . <input type="checkbox"/> Computers or devices for student use
<u>5</u> Communicate Results	ET 1.1.1	90 minutes	<input type="checkbox"/> Tools to <a href="#">create and publish</a> a digital product <input type="checkbox"/> Computers or devices for student use <i>Optional</i> <input type="checkbox"/> Computer connected to a projector, if students will be presenting <input type="checkbox"/> Document camera <input type="checkbox"/> Internet access

# Grades 3 – 5 Speed Racer

## Assessment for Science-Math-Educational Technology

### Session One: Model and Question

#### Background

During Session One, students will begin to build their knowledge and skills with Educational Technology GLEs 1.1.2 and 1.3.1, as well as Science Standard 4-PS3-1. They will develop questions and plan strategies to guide inquiry about how to determine the relative speed of two objects. This session also provides formative assessment opportunities for the teacher to uncover and address student misconceptions about the relationship between the weight of an object and its speed.

You could split this session into two separate lessons, depending on the available resources. However, make sure you bring closure to the first part after “Explore” and introduce the “Extend” at another time.

Teachers should consider introducing new vocabulary—intergalactic, luge, luger and simulation.

Prep	<ul style="list-style-type: none"> <li><input type="checkbox"/> Practice using the ball and ramp set up.</li> <li><input type="checkbox"/> Be sure that the Intergalactic Luge Simulation is accessible for students. If blocked, contact your district’s technology department.</li> <li><input type="checkbox"/> Review federal policies that protect children in the online environment—<a href="#">CIPA</a>, <a href="#">COPPA</a> and <a href="#">FERPA</a>. Also, review district policies on Acceptable Use of technology and Digital Citizenship. Note provisions related to ethical and legal use, personal safety, cyberbullying, and the publication of student work, if you plan to post this content to a public Web site. If your district does not provide one, we have a sample <a href="#">Parental Permission Form</a> to publish student work on a Web site.</li> </ul>
Materials	<ul style="list-style-type: none"> <li><input type="checkbox"/> Computer connected to a projector</li> <li><input type="checkbox"/> Internet access</li> <li><input type="checkbox"/> 1 ball or other rolling object</li> <li><input type="checkbox"/> Inclined ramp (for example, books + meter sticks or boards)</li> <li><input type="checkbox"/> Computers or devices for student use</li> <li><input type="checkbox"/> Intergalactic Luge Simulation (<a href="http://sunshine.chpc.utah.edu/javalabs/java12/fnm/act2/lab.htm">http://sunshine.chpc.utah.edu/javalabs/java12/fnm/act2/lab.htm</a>)</li> </ul>

# Grades 3 – 5 Speed Racer

## Assessment for Science-Math-Educational Technology

Session One: Model and Question	
Learning Plan (60 minutes)	
Engage	<ul style="list-style-type: none"> <li>▪ Introduce the task and related learning targets to students. Explain that over the next several days, they will identify factors that would help make a race fair.</li> </ul>
Explore	<ul style="list-style-type: none"> <li>▪ Use a student volunteer to set up a ramp and release the ball down the ramp. Ask the other students to observe the ball. Ask:               <ul style="list-style-type: none"> <li>▪ <i>How fast was the ball traveling?</i></li> <li>▪ <i>How do students know?</i></li> <li>▪ <i>How could you determine the answer?</i></li> </ul> </li> <li>▪ Students should identify the need to measure time and distance. Speed is determined by dividing the distance traveled by the time traveled (for example, mph in a car).</li> </ul>
Extend	<ul style="list-style-type: none"> <li>▪ Ask students:               <ul style="list-style-type: none"> <li>▪ <i>What might make the ball travel faster down the ramp?</i></li> <li>▪ <i>What could you do to make the ball travel more slowly down the ramp?</i></li> </ul> </li> <li>▪ Students might identify ideas related to changing the angle of the ramp, the smoothness of the ramp or ball, adding force to the ball (pushing at the top or using a vacuum for “pull” at the bottom). If students do not suggest altering weight of the ball, prompt their thinking.</li> <li>▪ Show students the “Intergalactic Luge” simulation using an athlete on Earth. Show students how to change the weight of the luger by placing the track on different sites. The gravity of each planet is different, so even though the luger and the track stay the same, the weight is different.</li> <li>▪ Allow students to use the simulation in order to see how the results are different for different places (Sun, Moon, Jupiter). Ask students to collect data for each site.</li> <li>▪ Debrief the activity as a class. <i>What do students notice about the relationship between the weight of the luger and his/her speed down the track?</i></li> </ul> <p><i>Teaching Tips and Accommodations</i></p> <ul style="list-style-type: none"> <li>▪ If you do not have access to a computer lab, consider making this activity one station that students can access during center time.</li> </ul>
Evaluate	<ul style="list-style-type: none"> <li>▪ Ask students to think about the task they will be doing, and what they observed about how weight, time, and distance affect speed. Based on what they know so far, have them suggest one rule for the toy car race.</li> <li>▪ Show or provide a copy of the <a href="#">Student Checklist</a>. Review the skills students will be expected to demonstrate throughout the assessment. Ask them to identify the skills and abilities they were developing during today’s lesson. Do not score this session as part of the assessment—use for formative evaluation only.</li> </ul>

# Grades 3 – 5 Speed Racer

## Assessment for Science-Math-Educational Technology

### Session Two: Investigate

#### Background

In the previous session, students observed and used two models (a ball and an online simulation) to build background knowledge of how time, distance, and weight can affect speed. Students will continue to build experience with Educational Technology GLE 1.1.2 and 1.3.1 and Science standard 4-PS3-1 as they conduct their own experiments. They will also consider how the model they use may or may not be like the toy cars used in the race (Science and Engineering Practice 2).

Session Two provides practice for students in measurement, collecting data, and planning an investigation. Students will need these skills to respond fully to the prompt for this assessment.

You may choose to assess these, depending on how much practice students have had already with the concepts. If the skills are new to students, consider this session an opportunity for introduction and formative assessment only.

Prep	<input type="checkbox"/> Select a video clip of a toy car race from your district resources or from the <a href="#">videos</a> we provide on the <a href="#">Resources</a> pages for this assessment. <input type="checkbox"/> Collect necessary materials for your class.
Materials	<input type="checkbox"/> Video clip of a toy car race <input type="checkbox"/> 5 - 7 balls of various weights (for example, marble, ping pong ball, golf ball, tennis ball, rubber bounce ball, baseball) <input type="checkbox"/> Inclined ramp (for example, meter stick and books) <input type="checkbox"/> Timer or stopwatch <input type="checkbox"/> Balance or scale <input type="checkbox"/> Project Planning Tool (for example, Word or PowerPoint template, wiki). We have included a <a href="#">Sample Planning Tool</a> with this assessment. <input type="checkbox"/> Computer or interactive whiteboard connected to a projector

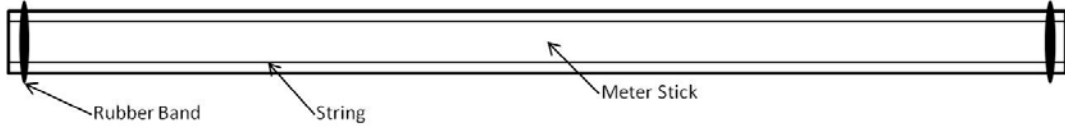
# Grades 3 – 5 Speed Racer

## Assessment for Science-Math-Educational Technology

<b>Session Two: Investigate</b>	
<b>Learning Plan (60 minutes)</b>	
<b>Engage</b>	<ul style="list-style-type: none"> <li>▪ Show students a video clip from a toy car race. Use the clip to elicit student observations about the track, cars, and race, as well as prompt connections with the previous lesson. Remind students about the problem they will solve to determine how to make the race fair).</li> <li>▪ Review observations about the ball and the simulation from the previous session. Ask students:               <ul style="list-style-type: none"> <li>▪ <i>How is the ball/luger similar to a toy car moving down a track?</i></li> <li>▪ <i>How is the ball/luger different from the toy car?</i></li> <li>▪ <i>What are some benefits and drawbacks to using a model, such as a ball or online simulation?</i></li> </ul> </li> <li>▪ Review the standards for this session with students to set clear targets. Tell students that today they will focus on organizing their observations. The purpose of the observations they share will be twofold: the basis for a class forum on the topic and practice for their own experiment.</li> <li>▪ Introduce the Project Planning Tool students will use later in the assessment. You may choose to just model the tool for students at this time or provide guided practice during this session.</li> <li>▪ First, remind students that, although the luge simulation showed that the weight of an object can impact its speed, the model is designed to conduct the experiments on different planets. As a result, they will need to make observations about weight and speed on Earth.</li> <li>▪ Elicit ideas for a question students could investigate or provide one to the class: <i>How does the weight of a ball impact its speed on an inclined ramp?</i></li> </ul> <p><i>Teaching Tip:</i></p> <ul style="list-style-type: none"> <li>▪ If you will be showing a video clip from YouTube, you can use Safe Share (<a href="http://www.safeshare.tv/">http://www.safeshare.tv/</a>) to hide the comments, sidebar, etc. from view.</li> <li>▪ If YouTube is not available at your school, you can use a tool such as Media Converter (<a href="http://www.mediaconverter.org/index.php">http://www.mediaconverter.org/index.php</a>) or Online-Convert (<a href="http://www.online-convert.com/">http://www.online-convert.com/</a>) to download the video, then bring to school.</li> </ul>
<b>Explore</b>	<ul style="list-style-type: none"> <li>▪ Tell students they will make more specific observations to collect numerical data in this session.</li> <li>▪ Show students the available materials for this inquiry activity—balls of different weights, inclined ramp, and timers, if available.</li> <li>▪ Have students predict which ball they think will be fastest, and how they will be able to tell. Use this as a basis for a brief discussion about which data points to collect (distance, time, speed, and weight), as well as the number of times they should repeat the experiment (3 - 5) and why. If students have not had much experience with independent data collection, you could choose to scaffold this activity with a data table or other organizer.</li> <li>▪ Review the procedure used in Session One, with opportunities for students to suggest improvements so that the tests conducted by all groups are fair:               <ol style="list-style-type: none"> <li>1. One student releases a ball at the top of an inclined ramp.</li> <li>2. Another student times how many seconds it takes for the ball to reach a predetermined mark.</li> <li>3. Students record data.</li> <li>4. Steps 1 - 3 are repeated for all trials and for each of the objects.</li> <li>5. Students divide distance by time to calculate the speed of each ball.</li> </ol> </li> <li>▪ Continue to add information to the Project Planning Tool.</li> <li>▪ Students should work in groups of two or three in order to complete their observations and record data.</li> </ul>

# Grades 3 – 5 Speed Racer

## Assessment for Science-Math-Educational Technology

Session Two: Investigate	
Learning Plan, continued (60 minutes)	
Explore	<p><i>Teaching Tips and Accommodations</i></p> <ul style="list-style-type: none"> <li>▪ If student tests require more supplies than you have on hand, we suggest you have students test one type of ball only. Then, have them add the data to a whole class table. As students add data to a table on the computer or document camera, project the image so that all students can see the test results.</li> <li>▪ If you do not have access to a balance or scale, students can use a search engine to find the weights of the balls used in the experiment.</li> <li>▪ If you do not have access to timers or stopwatches, teach students to count in a uniform manner, for example “one thousand one, one thousand two, on thousand three,” etc.</li> <li>▪ If you plan to use meter sticks as ramps, use two pieces of string and two rubber bands to guide balls down the ramps. Lay the strings over the meter stick close to the edges, then secure both strings at each end with a rubber band.</li> </ul> <div style="text-align: center; margin-top: 10px;">  </div>
Evaluate	<ul style="list-style-type: none"> <li>▪ As students complete the investigation, monitor their progress toward recording the necessary data. They will need this information to complete the next session.</li> <li>▪ Ask students to reconsider the opening questions about using a model.               <ul style="list-style-type: none"> <li>▪ <i>What are the similarities and differences between the balls and toy cars?</i></li> <li>▪ <i>How might these similarities and differences impact the students' ability to develop rules for the toy car race?</i></li> </ul> </li> <li>▪ Do not score this session as part of the assessment—use for formative evaluation only. Provide feedback to students on their skill with the experiment, and recording and calculating data.</li> </ul>

# Grades 3 – 5 Speed Racer

## Assessment for Science-Math-Educational Technology

### Session Three: Organize Data

#### Background

Session Three builds on student background knowledge with Educational Technology GLE 1.1.2 (graph data, interpret patterns). This session also connects with CCSS\* Math standards 4.MD.4 and 5.MD.2 as students create graphs and analyze the data collected during the previous session, then discuss how they could use the data to develop rules for the toy car race. At the end of this session, students will draft their set of rules.

You could split this session into two different lessons, depending on the available resources. However, make sure you bring closure to the first part after “Explain” and introduce the second “Engage” activity at another time.

#### \*Common Core State Standards

Prep	<input type="checkbox"/> Choose a <a href="#">digital graphing tool</a> for student use. Be sure that the tool is accessible for students. If blocked, contact your district’s technology department or use a spreadsheet program. <i>Optional</i> <input type="checkbox"/> Review the <a href="#">Lesson Plans</a> on the Resources page for opportunities to pre-teach, re-teach, or extend learning with data collection and graphing.
Materials	<input type="checkbox"/> Computers or devices for student use <input type="checkbox"/> <a href="#">Digital graphing tool</a> : graphing Web site (recommended) or spreadsheet program (for example, Excel).
<b>Learning Plan (60 minutes)</b>	
Engage	<ul style="list-style-type: none"> <li>▪ Show students a completed data table and a graph which represents the data in the table. For example, you could choose to graph examples from the Intergalactic Luge Simulation. Any data set will work. Ask students: <i>Which example is easiest to interpret? Why?</i></li> <li>▪ Use this entry discussion to help students understand that graphs can convey complex information in a single picture. Point out that a graph can show evidence they need to communicate, such as why their set of rules can eliminate cheating in the toy car race. Introduce Educational Technology GLE 1.1.1 and stress the importance of using tools to communicate learning to others.</li> </ul>
Explain	<ul style="list-style-type: none"> <li>▪ Conduct a class discussion about the data students collected during the previous session.</li> <li>▪ Remind students they have data from several trials of rolling the ball(s) down the ramp. If students are not familiar with the concept of the mean (average), introduce it at this time. This is also an opportunity to look for data points which are outliers and have students suggest reasons for the differences.</li> <li>▪ Have students determine the average speed for each type of ball.</li> <li>▪ Ask students: <i>Based on the available data, which two pieces of information would be the most important to represent with a graph? Why?</i></li> </ul>
Engage	<ul style="list-style-type: none"> <li>▪ Model the digital graphing tool students will be using to create a graph from the weight and speed data. If using a Web site, be sure to show students how to download and save information.</li> </ul>
Explore	<ul style="list-style-type: none"> <li>▪ Using the digital graphing tool, students should construct the data table and line graph for the results of the investigation.</li> </ul> <p><i>Teaching Tips and Accommodations</i></p> <ul style="list-style-type: none"> <li>▪ If you have only one or two student computers in class, assign computer time to each student so they can enter their data.</li> <li>▪ Students who require additional support might also benefit from a teacher-created electronic template.</li> </ul>

## Grades 3 – 5 Speed Racer

### Assessment for Science-Math-Educational Technology

<b>Session Three: Organize Data</b>	
Learning Plan, continued (60 minutes)	
Explain	<ul style="list-style-type: none"> <li>▪ Students should write a statement which summarizes the trend shown in the graph. You can use this as a Think-Pair-Share activity to provide students with an opportunity for peer feedback. Students can share feedback through an online forum, for example, a class blog.</li> </ul> <p><i>Teaching Tips and Accommodations</i></p> <ul style="list-style-type: none"> <li>▪ Sharing via online forums is still a viable option for the one computer classroom. Students can post their conclusions and graphs on a Web site such as a class blog, wiki, or other site one at a time. Once everyone has posted their material, students can revisit the site individually to post a comment or feedback.</li> </ul>
Evaluate	<ul style="list-style-type: none"> <li>▪ Have students draft their rules for the toy car race and provide supporting evidence from the graph.</li> <li>▪ Debrief with the class about using the digital tool. <i>What did they like or want to change about the digital tool? What helpful suggestions can they give to others who are having problems using the tool?</i></li> <li>▪ Review the <a href="#">Student Checklist</a>. Ask students to identify the skills and abilities they were developing during today’s lesson or where they might need more practice.</li> <li>▪ Do not score this session as part of the assessment—use for formative purposes only. Provide feedback to students on their skill with the digital graphing tool as a way to share ideas.</li> </ul>



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## Assessment for Science-Math-Educational Technology

### Session Four: Plan a Project

#### Background

During Sessions One through Three, students had the opportunity to explore the relationship between weight and speed, develop some basic skills with models and digital graphing tools, and collaborate with others to summarize their learning. They will now use this background knowledge to create their final solutions to the problem (Educational Technology GLEs 1.1.2, and 1.3.1). This session allows students to apply their knowledge of Science standard 4-PS3-1 (Use evidence to construct an explanation relating the speed of an object to the energy of that object.) by designing and testing a plan using a new model (Science and Engineering Practice 2). Students also have an opportunity to practice with CCSS\* Math standards 4.MD.4 and 5.MD.2 as they construct a line graph.

Before you begin this session, be sure students know how to save their electronic information.

Although you might have made whole-class observations during the formative section of the assessment, make sure that each student completes their own summative component. **Group products are not permissible.**

\*Common Core State Standards

Prep	<input type="checkbox"/> Select a rolling object for students to use during testing. Be sure that you have one object that can be permanently modified for each student.
Materials	<input type="checkbox"/> Rolling object, 1 per student (for example, 1” pieces of a wooden dowel, marbles, or foam balls from a craft store) <input type="checkbox"/> Materials for modifying the rolling object (for example, paint, tape, sandpaper) <input type="checkbox"/> Inclined ramp (for example, meter stick and books) <input type="checkbox"/> Timer or stopwatch <input type="checkbox"/> Balance or scale <input type="checkbox"/> Project Planning Tool (for example, Word or PowerPoint template, wiki). We have included a <a href="#">Sample Planning Tool</a> with this assessment. <input type="checkbox"/> Computers or devices for student use
<b>Learning Plan (90 minutes)</b>	
Engage	<ul style="list-style-type: none"> <li>▪ Provide a rolling object to each student. Tell the class they will design a solution and test the rules they drafted for the toy car race. Let students know which materials they can use to modify the object.</li> <li>▪ Tell students that, as a class, they will determine ramp properties that will work for all tests and the maximum weight possible for the rolling object.</li> </ul>
Explore	<ul style="list-style-type: none"> <li>▪ Students will use the digital tool to identify the problem to investigate and plan their project. The plan must include criteria for success that integrates their rules and describes how they will test and make adjustments to reach a solution.</li> </ul> <p><i>Teaching Tips and Accommodations</i></p> <ul style="list-style-type: none"> <li>▪ Provide a printed scaffold for students who need help organizing information.</li> </ul>
Evaluate	<ul style="list-style-type: none"> <li>▪ Allow students to partner to provide feedback on their designs, then have them revise the drafts.</li> </ul>
Extend	<ul style="list-style-type: none"> <li>▪ Give students time to test and modify their rolling object. Remind students to measure, collect, organize, and analyze their data.</li> </ul>
Evaluate	<ul style="list-style-type: none"> <li>▪ Remind students to save all work in a designated location and put their name on the rolling object.</li> <li>▪ Debrief with the class about using the digital tools. <i>What did they like or want to change about the digital tool? What helpful suggestions can they give to others who are having problems?</i></li> </ul>

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## Assessment for Science-Math-Educational Technology

### Session Five: Communicate Results

#### Background

During Session Four, students had the opportunity to test their rules and designs for a toy car race. In the final session of this assessment, students will use technology to present their solutions to the competition committee for the toy car race (Educational Technology Standard 1.1.1).

Before you begin this session, be sure that students know how to merge different pieces of information: for example, import a graph into a document.

Your decision to assess the additional science standards depends on how much practice students have had already with the concepts. If the skills are new to students, consider this session as an opportunity for introduction and formative assessment only.

Prep	<ul style="list-style-type: none"> <li><input type="checkbox"/> Determine a location for students to submit their digital work for scoring.</li> <li><input type="checkbox"/> Be sure they are familiar with the format(s) you will expect them to use. Here are examples of presentation formats students can use. <a href="#">Create and Publish</a> on the <a href="#">Resources</a> page has more information:             <ul style="list-style-type: none"> <li>▪ <i>Desktop Publishing</i>: Publisher, Powerpoint, Glogster, Blog, Wiki</li> <li>▪ <i>Digital Storytelling</i>: MovieMaker, iMovie, CamStudio, Voicethread</li> <li>▪ <i>Virtual Fieldtrip</i>: Google Earth, Bing Maps</li> <li>▪ <i>Podcasting</i>: Audacity, Garageband, Jamstudio</li> </ul> </li> <li><input type="checkbox"/> Computers or devices for student use</li> </ul>
Materials	<ul style="list-style-type: none"> <li><input type="checkbox"/> Tools to <a href="#">create and publish</a> a digital product</li> <li><input type="checkbox"/> Computers or devices for student use</li> </ul> <p><i>Optional</i></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Computer connected to LCD projector, if students will be presenting</li> <li><input type="checkbox"/> Document camera</li> <li><input type="checkbox"/> Internet access</li> </ul>

## Grades 3 – 5 Speed Racer Assessment for Science-Math-Educational Technology

Session Five: Communicate Results	
Learning Plan (90 minutes)	
Engage	<ul style="list-style-type: none"> <li>▪ Remind students of the original task they were given and the educational technology learning standards they are targeting with this assessment. Note that the presentation they create must persuade contest judges that the new rules will make the race fair.</li> </ul>
Explain	<ul style="list-style-type: none"> <li>▪ Have students review their project plan and data from Session Four to identify important information to include with the final product. If they have not already made notes in the “Communicate the Solution” part of the Project Plan, provide time for them to complete this section. It will serve as a pre-writing activity to help organize the information for the final digital product.</li> <li>▪ Have students develop a digital product that addresses the items in the checklist for GLE 1.1.1. Each student should create their own product.</li> </ul>
Evaluate	<ul style="list-style-type: none"> <li>▪ Ask students to reflect on this unit. <i>What important knowledge and skills have they learned? Why do they think these are important?</i></li> <li>▪ Have students submit their work to a designated location.</li> <li>▪ Score the Project Plans, Graph, and Digital Product using the <a href="#">Scoring Guide for Educational Technology</a>.</li> </ul>
Extend	<p><i>Optional</i></p> <ul style="list-style-type: none"> <li>▪ Conduct a class race using the student models. If other classrooms in your school are also doing this assessment, consider a school-wide event.</li> <li>▪ This investigation demonstrated the advantage of added weight as an object moves down a ramp. However, extra weight is not always desirable for a race. For example, NASCAR requires that cars be no lighter than 3,400 pounds. Ask students to think about how the rules developed for the toy car race would be different if the track was flat.</li> </ul>

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Name \_\_\_\_\_

Description	Checklist	How do I know?
I ask my own questions.	<input type="checkbox"/>	
I use the computer to plan a project.	<input type="checkbox"/>	
I collect the data I need to answer my question.	<input type="checkbox"/>	
I create a graph using the computer.	<input type="checkbox"/>	
I identify a pattern or trend from my research.	<input type="checkbox"/>	
I use the computer to communicate what I learn.	<input type="checkbox"/>	
I combine text, pictures, audio, or video to share information.	<input type="checkbox"/>	
I explain how my rules will make the race fair.	<input type="checkbox"/>	
I use different features of a program, such as size, color, and transitions, to show main ideas.	<input type="checkbox"/>	

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Assessment for Science-Math-Educational Technology

Name \_\_\_\_\_

**Define the Problem**

What is the problem you are trying to solve?

**Criteria for Solution**

How will you know if the problem has been solved? What evidence will you use?

**Tools and Materials**

List all of the tools and materials you will need to develop a solution to the problem.

**Design a Model**

Describe what you will do to create a model to test as a solution.

**Test the Solution**

Describe how you will test the solution. What steps will you take?

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**Results**

What are the results of your test? Use a combination of words, tables, graphs, or pictures to show the data and observations.

**Modify the Design**

What could you do to modify the design and improve the results?

**Communicate the Solution**

List the rules you developed for the toy car race. Be sure to include evidence that shows how weight, time, and distance affect the speed of an object rolling down a ramp.

# Posting Photos and Student Work Parental Permission Form

## Parental Consent Form

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In Washington State's K-12 schools, email, blogs, podcasts, collaborative document sites, such as GoogleDocs, and multimedia items that publish to school and class Web sites, have become an integral part of education, administration and communication with the community.

As educators, we are committed to practices that promote student safety and privacy of information—online and offline. We approach communication software and hardware, which allow students to connect with peers, experts and educators as important tools for student learning.

Given that web-based communication requires an online presence—not always anonymous—we ask parents and students to consider carefully the **acceptable level of access and participation** your student will have using digital tools at school.

These three statements summarize \_\_\_\_\_ school's policy related to the privacy of student content.

1. Publishing photos of students or samples of student work promotes an opportunity to share and learn with others. It is acceptable to publish images of students and student learning products on school Web pages without information that would identify the student. **Parents/guardians must provide written consent to publish their child's photo or school work on any school-related Web site before the item is published.**
2. All students and teachers must abide by the copyright laws of the United States.
3. All student files, created and stored on the school district's network, are the property of the school district. As district property, all files and multimedia items are open to the review and evaluation of district officials.

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## Permission

As a parent or legal guardian of, \_\_\_\_\_, I have read and understand the policy statement related to the posting of images of students and student work online.

I consent to the permission(s) I have initialed below:

\_\_\_\_\_ I grant permission for the publication of my student's photo or work without information that would identify the student.

\_\_\_\_\_ I grant permission for my student to use online tools provided by the teacher.

\_\_\_\_\_ I grant permission for my student to use a personal email account for assignments while at school.

Student Name (Print): \_\_\_\_\_

Student Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Parent (Guardian) Signature: \_\_\_\_\_

Date: \_\_\_\_\_

## Grades 3 – 5 Speed Racer Assessment for Science-Math-Educational Technology

Educational Technology Resources	
Digital Tools	
Description	Location
Create Graphs	
With <b>Create a Graph</b> , students input their data and labels, then select a graph that can be downloaded. No login is required.	<a href="http://nces.ed.gov/nceskids/createagraph/">http://nces.ed.gov/nceskids/createagraph/</a>
The <b>Online Chart Tool</b> allows students to generate and download a variety of graphs once they input their data and labels. No login is required.	<a href="http://www.onlinecharttool.com/">http://www.onlinecharttool.com/</a>
Create & Publish a Presentation	
You can use <b>Glogster</b> to develop an interactive poster.	<a href="http://edu.glogster.com/">http://edu.glogster.com/</a>
<b>Animoto</b> has educational accounts. Students can upload pictures, add text and music, and generate a presentation.	<a href="http://animoto.com/">http://animoto.com/</a>
With a <b>Voicethread</b> account, students are able to share documents, images, and videos with others.	<a href="http://voicethread.com/">http://voicethread.com/</a>
Students can create posts for a classroom <b>blog</b> . Here are examples of education-friendly sites, but there are others.	<a href="http://edublogs.org/">http://edublogs.org/</a> <a href="http://www.classblogmeister.com/">http://www.classblogmeister.com/</a> <a href="http://kidblog.org/home.php">http://kidblog.org/home.php</a>
<b>Wikis</b> are Web sites that are easy to create and edit. Many services offer free wikis for educators.	<a href="http://www.wikispaces.com/">http://www.wikispaces.com/</a> <a href="http://pbworks.com/">http://pbworks.com/</a>
Videos	
Description	Location
Derby Races	<a href="http://www.youtube.com/watch?v=YoJxvU0TQ1A">http://www.youtube.com/watch?v=YoJxvU0TQ1A</a> <a href="http://www.youtube.com/watch?v=CwTwSGQtVjw">http://www.youtube.com/watch?v=CwTwSGQtVjw</a> <a href="http://www.youtube.com/watch?v=o-b9WgoVALk">http://www.youtube.com/watch?v=o-b9WgoVALk</a>



## Grades 3 – 5 Speed Racer Assessment for Science-Math-Educational Technology

Educational Technology Resources	
Science Lesson Plans	
Description	Location
In <b>Eat Your Veggies</b> , students collect numerical data, generate graphs, and compare two data sets. They also find the mean, mode, median, and range of the data sets. Students communicate with each other and the teacher and practice their problem-solving skills.	<a href="http://illuminations.nctm.org/LessonDetail.aspx?ID=L355">http://illuminations.nctm.org/LessonDetail.aspx?ID=L355</a>
<b>The Effect of Gravity on Motion</b> targets the effect of gravity on objects like a luge moving down an incline. Students learn how to relate different gravitational forces to the speed of movement, predict gravitational force and explain why the average speed varies during a luge run.	<a href="http://sunshine.chpc.utah.edu/javalabs/java12/fnm/act2/tchrpage.htm">http://sunshine.chpc.utah.edu/javalabs/java12/fnm/act2/tchrpage.htm</a>
<b>Representing Data</b> asks students to use data to complete an organized chart, and create and interpret graphs to generalize a rule.	<a href="http://illuminations.nctm.org/LessonDetail.aspx?ID=U73">http://illuminations.nctm.org/LessonDetail.aspx?ID=U73</a>
Policy Guidance	
Description	Location
Children’s Internet Protection Act (CIPA)	<a href="http://www.e-ratecentral.com/CIPA/default.asp">http://www.e-ratecentral.com/CIPA/default.asp</a>
Children’s Online Privacy Protection Act (COPPA)	<a href="http://www.coppa.org/comply.htm">http://www.coppa.org/comply.htm</a>
Family Educational Rights and Privacy Act (FERPA)	<a href="http://www2.ed.gov/policy/gen/guid/fpco/ferpa/index.html">http://www2.ed.gov/policy/gen/guid/fpco/ferpa/index.html</a>