



Physics Unit 1- Measurements and Mathematics

Unit Overview: In this unit students will learn to use the SI units, metric prefixes, and scientific notation to accurately and precisely express measurements. Students will be able to construct and interpret graphs. Students will learn to use dimensional analysis, manipulate equations, and solve problems using scientific notation, standard notation, or fractions. Students will be able to use order of magnitude and estimation to determine the reasonableness of a result.

Essential Questions:

- What are standard and derived units in science and what are examples?
- What is the importance of significant figures and how are they manipulated?
- What is the difference between precision and accuracy?
- How can dimensional analysis assist in validating the solution?
- What is the value of and appropriate application of scientific notation?
- What information can be obtained from graphic representation of data?
- What is the value of symbolic representation and manipulation?

MST Standard 6 - Science

Key Idea 3

The grouping of magnitudes of size, time, frequency, and pressures or other units of measurement into a series of relative order provides a useful way to deal with the immense range and the changes in scale that affect the behavior and design of systems.

Math Standard 1

Key Idea 1

Abstraction and symbolic representation are used to communicate mathematically.

Key Idea 3

The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into phenomena.



Time Frame	Skills, Practices or Expectations	Specific Standards / Performance Indicators	Resources	Content Vocabulary	Measurement of Student Learning
<p>2 weeks 9.12.22 - 9.23.22</p>	<p>Measurement</p> <ul style="list-style-type: none"> Understand and use SI prefixes and metric units Express measurements in scientific notation. Use accuracy and precision to determine the number of significant figures in a measurement. Discuss accuracy of instruments <p>Mathematics</p> <ul style="list-style-type: none"> Use dimensional analysis Construct and interpret a graph Manipulate equations symbolically including fractions Perform arithmetic operations using scientific notation, Use order of magnitude and estimation to test the reasonableness of a result 	<p>M1.1, M2.1, M3.1, S3.2 3.1, 3.2</p>	<p>Castle Learning</p> <p>Interactive Simulations: http://phet.colorado.edu</p> <p>Holt Textbook Chapter Chapter 1, Appendix A – Math Review Appendix E – SI units</p>	<p>SI units accuracy precision significant figures scientific notation dimensional analysis symbols subscripts</p> <p>Higher Level Questions</p> <p><u>From June 2015 exam:</u></p> <p>Question #42</p> <p>Question #43</p>	<p>Ticket out the door Formative assessment using Castle Learning Unit test Weekly quizzes Homework using Castle Learning</p>

Resources

<http://ngss.nsta.org/Classroom-Resources.aspx>

<http://newyorkscienceteacher.com/sci/>



<p>English Language Learners (ELL) Enhancements</p> <p>To access hyperlinked material, you must be logged into your BPS Google Drive</p>	<p>Listening</p> <ul style="list-style-type: none"> ● <u>Cross- Linguistic Practices:</u> Gives students opportunities to make connections between what they hear and their home language (For example, allow students to listen to a passage and identify cognates.) ● <u>Build background knowledge</u> ● <u>Activating Prior Knowledge</u> Activating prior knowledge means both eliciting from students what they already know and building initial knowledge that they need in order to access upcoming content ● <u>Activating Prior Knowledge</u> ● <u>Visuals</u> - GIFs, pictures- will assist students in understanding what they are listening to. Use visual thinking strategies to set the lens for learning. ● Video to review or introduce a topic – use closed captioning to help students see the words and pronunciations while they listen to the content. ● <u>Word stretching / Vowel stretching</u> when instructing allows student to listen closely to the pronunciation of the word ● <u>Performance Level Descriptors</u> this document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of listening Scroll for grades 9-12. 	<p>Speaking</p> <ul style="list-style-type: none"> ● <u>Sentence Frames</u> - to begin a sentence - such as <i>Evolution is...</i> or <i>I think that evolution is...</i> ● <u>Academic Conversation Starters:</u> Have a visual of a list of academic sentence starters that students can refer to in a discussion. Examples include- I expect ____ to happen. My data shows that... This helps students have a more science focused dialogue. ● <u>Choral Reading</u> - To build fluency, self-confidence and motivation with reading/speaking ● Create movement to go with the word. Movement can be a motivating factor, as well as a kinesthetic tool for conceptualizing the rhythm and flow of fluent reading while triggering brain function for optimal learning ● <u>Performance Level Descriptors</u> This document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of speaking. Scroll for grades 9-12 	<p>Reading</p> <ul style="list-style-type: none"> ● <u>Supplementary Text</u> to help reinforce concepts. If necessarily, use lower Lexile levels to ensure comprehension. ● <u>Visual Aids</u> - Pictures or models to support vocabulary words and concepts ● Video to review or introduce a topic - use closed captioning to help students read along while they listen to the content ● <u>4 Square / Frayer models</u> to help students gain a deeper understanding of vocabulary. ● <u>Highlighting</u> important text to assist students in answering questions after the reading. ● <u>Chunking</u>-Break reading of text into chunks or paragraphs ● <u>Performance Level Descriptors</u> this document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of reading. Scroll for grades 9-12. ● <u>Vocabulary Morphology-</u> Morphology relates to the segmenting of words into affixes (prefixes and suffixes) and roots or base words, and the origins of words. Understanding that words connected by meaning can be connected by spelling can be critical to expanding a student’s vocabulary. 	<p>Writing</p> <ul style="list-style-type: none"> ● <u>Sentence Frames</u> - to begin a sentence- such as <i>Biodiversity is...</i> or <i>An example of competition is....</i> ● <u>Cloze passages</u> with word banks ● <u>Word banks</u> ● <u>Graphic Organizers</u> to help break down the writing process and organize thoughts ● <u>Standards-based sentence stems</u> ● <u>Performance Level Descriptors</u> this document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of writing. Scroll for grades 9-12. 	<p>Instructional Accommodations (depending on the student’s needs)</p> <ul style="list-style-type: none"> ● <u>Extended time</u> for tests in class, projects and assignments ● <u>Directions read.</u> Broken down as necessary ● <u>Model</u> how to complete the activity in the lesson ● <u>Oral simplification</u> of directions or questions ● <u>Translated version</u> of test when available. Student may have both version English and native language version ● Use of approved bilingual glossaries from NYS in each subject
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<p>Special Education Modifications</p> <p>Special Education students must have accommodations as per Individual Educational Plan (IEP)</p>	<p><u>Instructional</u></p> <ul style="list-style-type: none"> ● Pre-teach vocabulary ● Use picture vocabulary ● Scaffold Depth of Knowledge questions ● Provide copy of notes/notes in “cloze” form ● Use of Think, Pair, and Share strategy to help process information ● Scaffold written assignments with the use of graphic organizers ● Allow for multiple ways to respond (verbal, written, response board) ● Provide model of performance task ● Modify informational text to fit the needs of the students ● Provide a digital or paper interactive notebook ● Present complex tasks in multiple ways ● Provide mnemonic strategies for Physics concepts 	<p><u>Technology:</u></p> <ul style="list-style-type: none"> ● Audio reading of text ● Text to type functions ● Videos to clarify/visualize Physics concepts ● Record class lecture/discussions and make accessible to student ● Nearpod- interactive presentations of notes ● Playposit - show a video clip about the topic and add your own questions for them to answer as they watch ● Allow students to type answers in chat on Teams <p><u>Other:</u></p> <ul style="list-style-type: none"> ● Arrange seating for maximum engagement and minimum distraction ● Accessible lab space (counter level) 	<p><u>In Class Assessments</u></p> <ul style="list-style-type: none"> ● Provide review packet or review sheet of concepts covered on the test ● Practice similar questions prior to the test ● Provide multiple options for projects ● Give a timeline of when things are due and remind them of the process often. ● Use of timer in class ● Break all complex tasks into chunks
<p>BPS Science K-12 Schoology Group Resources Grades 9-12 Resources Physics Physics Curriculum Materials</p>	<p><u>SUTW Strategies</u></p> <ul style="list-style-type: none"> ● Informal Outline ● Color-Coding – Informative/Explanatory Text ● Two-column notes ● I-V-F Topic Sentence progressing to Four Step Summary Paragraph ● CUPS – Capitalization, Usage, Punctuation, Spelling ● Transitions 		