**Kids’ Tech University Presents:**

**Science Tools**

**Introduction:**

Welcome, Instructors and Parents, to The Virtual Kids’ Tech University’s *Science Tools* Module! The goal of The Virtual Kids’ Tech University is to improve science literacy in primary education to ensure a strong STEM workforce of tomorrow. KTU targets elementary and middle school students at a critical point in their education where they may be intimidated by science and introduces them to a variety of fields through interactive modules and lessons online. This module, *Tools of Science*, includes three lessons; *The Scientific Method* (covers the steps and processes used in the scientific method, data analysis, and graphing activities)*, The Scientific Method Applied* (focuses on an interactive scientific experiment and looks into Queueing Theory), and *The Tools of Science* (measurement activities, units, and conversions for Volume, Length, Temperature, and Mass). The *Science Tools* Module is designed to provide an interactive introduction to some of the building blocks for scientific discovery and inquiry. The *Science Tools* Module as a whole aids in explaining the metric measurement system, the proper tools to utilize for the major domains of measurement, graphing/data analysis, the scientific method and much more. This module can be broken down by individual lesson and can be applied in a formalsetting or in an informal setting, allowing flexibility for both instructors and students.

**2012-2013 Virginia Standards of Learning:**

Scientific Investigation, Reasoning, and Logic

This module incorporates the following Standards of Learning for 4th-7th Grade under the Virginia Standards of Learning. Standards found at: <http://www.doe.virginia.gov/testing/sol/standards_docs/science/index.shtml>

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| **4th Grade** | **5th Grade** |
| * **4.1 a.** Distinctions are made among observations, conclusions, inferences, and predictions * **4.1 b.** Objects or events are classified and arranged according to characteristics or properties * **4.1 c.** Appropriate instruments are selected and used to measure length, mass, volume, and temperature in metric units * **4.1 e.** Predictions and inferences are made, and conclusions are drawn based on data from a variety of sources * **4.1 f.** Independent and dependent variables are identified * **4.1 h.** Hypotheses are developed as cause and effect relationships * **4.1 i.** Data are collected, recorded, analyzed, and displayed using bar and basic line graphs * **4.1 j.** Numerical data that are contradictory or unusual in experimental results are recognized * **4.1 k.** Data are communicated with simple graphs, pictures, written statements, and numbers * **4.1 l.** Models are constructed to clarify explanations, demonstrate relationships, and solve needs * **4.1 m.** Current applications are used to reinforce science concepts | * **5.1 b.** Estimates are made and accurate measurements of length, mass, volume, and temperature are made in metric units using proper tools * **5.1 c.** Estimates are made and accurate measurements of elapsed time are made using proper tools * **5.1 d.** Hypotheses are formed from testable questions * **5.1 e.** Independent and dependent variables are identified * **5.1 g.** Data are collected recorded, analyzed and communicated using proper graphical representations and metric measurements * **5.1 h.** Predictions are made using patterns from data collected, and simple graphical data are generated * **5.1 i.** Inferences are made and conclusions are drawn * **5.1 j.** Models are constructed to clarify explanations, demonstrate relationships, and solve needs * **5.1 k.** Current applications are used to reinforce science concepts |

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| **6th Grade** | **7th Grade** |
| * **6.1 a.** Observations are made involving fine discrimination between similar objects and organisms * **6.1 b.** Precise and approximate measurements are recorded * **6.1 c.** Scale models are used to estimate distance, volume, and quantity * **6.1 d.** Hypotheses are stated in ways that identify the independent and dependent variables * **6.1 e.** A method is devised to test the validity of predictions and inferences * **6.1 f.** One variable is manipulated over time, using many repeated trials * **6.1 g.** Data are collected, recorded, analyzed, and reported using metric measurements and tools * **6.1 h.** Data are analyzed and communicated through graphical representation * **6.**1 i. Models and simulations are designed and used to illustrate and explain phenomena and systems * **6.**1 j. Current applications are used to reinforce science concepts | * **LS.1 a.** Data are organized into tables showing repeated trials and means * **LS.**1 c. Triple beam and electronic balances, thermometers, metric rulers, graduated cylinders, and probeware are used to gather data * **LS.**1 d. Models and simulations are constructed and used to illustrate and explain phenomena * **LS.1 g.** Variables are controlled to test hypotheses and trials are repeated * **LS.1 h.** Data are organized, communicated through graphical representation, interpreted, and used to make predictions * **LS.1 i.** Patterns are identified in data and are interpreted and evaluated * **LS.**1 j Current applications are used to reinforce life science concepts |

**2009 Virginia Math Standards:**

Measurement, Geometry (Properties and Relationships), Probability and Statistics (Practical Applications)

This module incorporates the following Standards of Learning for 4th-7th Grade under the Virginia Standards of Learning. Standards found at:

<http://www.doe.virginia.gov/testing/sol/standards_docs/mathematics/index.shtml>

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| **4th Grade** |
| * **4.4 b.** Add, subtract, and multiply whole numbers * **4.4 c.** Divide whole numbers, finding quotients with and without remainders * **4.4 d.** Solve single-step and multistep addition, subtraction, and multiplication problems with whole numbers |
| **6th Grade** |
| * **6.14 c.** Compare and contrast graphs that represent information from the same data set * **6.16 a.** Compare and contrast dependent and independent events |

**Included Lesson Materials:**

Included in this document are all of the tools you will need to complete this module with your class. The following materials are incorporated within this lesson:

* **Online Module Link** – The link for the online module provides access to the online version of the Science Tools module, which includes the individual lessons, interactive activities, review games, and more!
* **Supplemental Instructor’s Notes** – In the Supplemental Materials section of this document there are Instructor’s Notes that provide additional information and key points for pages of each lesson within the module. (These notes are also included in the PowerPoint document).
* **PowerPoint Lesson** – Provides identical information as the online module in the form of slides, to allow for a lecture-based lesson. The document also includes instructor’s notes in the notes section on PowerPoint.
* **Worksheets** –The Follow-Along worksheet guides students through the online module by giving step-by-step instructions and fill-in-the-blank sentences that coordinate directly with the information in the lesson. The Applied Learning Worksheets provide questions that help students review the information from the module and applied what they have learned.
* **Interactive Lesson Activities**: Within each lesson are interactive online activities that help students with graphing, measurement, data tables, review questions, etc.

**Instructions:**

This module can be employed in two different settings: via computer or as a lecture. This module is primarily designed for online use because of the interactive activities; however, this lesson plan also provides identical information to the online module in a PowerPoint document to be given as a lecture. When using the lesson in a lecture format, you will need to have the capability to project the PowerPoint document provided for this module on to a projector screen for the student(s), accompanying your verbal lecture. If the Lesson will be used via computer, make sure to run the program on a compatible web browser (Chrome, Safari, Firefox, and Internet Explorer 10+ are all compatible). If there is a default setting for the browser on the computer(s) you will be using, be sure to have the scripts unblocked before running the module.