TN Department of Education

Physics Instructional Materials Scoring Rubric

Gateway: The publisher must provide a Tennessee standards alignment guide as a part of the scope and sequence for the material. If this gateway is not met, the materials will not be scored. All Tennessee standards must be addressed within the material. If this is not met, the material will not pass review by the Tennessee Textbook and Instructional Materials Quality Commission.

Introduction:

The following Instructional Materials Scoring Rubric for Science is designed to score materials in the following categories:

- Instructional Focus
- Attending to Multiple Dimensions of Science Instruction
- Accessibility Features
- Alignment of Content

Scoring:

Each section is to be scored using a 0, 1, or 2. Use the following scoring guideline.

Tables 1-2:

- Adhere to the provided rubric statements for scoring.

Tables 3-4:

- 0: The standard is not present within the material.
- 1: The standard is present within the material. The intent and/or frequency component of the standard is not fully met.
- 2: A rating of 2 indicates the standard is present and all aspects of the standard are fully met.

Table 1: Instructional Focus					
Directions: **Adhere to the provided rubric statements for scoring.**					
Indicator	**0**	**1**	**2**	**Score**	**Evidence**
Central Phenomenon	Unit has **no phenomenon, or only a "hook"** to capture student interest at the beginning of the unit.	All units include one or more **smaller phenomenon or design challenge(s) and/or not all lessons connect to the phenomenon** or design challenge.	All units have a central phenomenon or design challenge that **develops throughout every lesson** of the unit.		
Activity Purpose	Material contains hands-on activities **do not serve** to grade-level scientific ideas	Hands-on activities **reinforce** scientific ideas aligned with grade-level standards.	All hands-on activities serve to **uncover** scientific ideas aligned with grade level standards.		
Use of Science Engineering Practices (SEPs)	Some units **do not provide students opportunities** to use the SEPs.	SEPs are present in all units, but **loosely or not connected to central phenomenon**.	In every unit, the **primary use** of the SEPs ties directly to explaining the central phenomenon or solving the design challenge.		
Student Engagement	**Neither of the given features** are present.	**One of the given features** is present.	Materials give students opportunities to: • expressly connect the DCI content from each lesson to		

Table 1: Instructional Focus **Directions:** **Adhere to the provided rubric statements for scoring.**					
			relevant crosscutting concepts. • practice with the SEP that is relevant to that day's lesson.		
Concepts before vocabulary.	Materials **pre-teach vocabulary.**	In **some instances**, materials develop conceptual meaning first.	In **all instances**, materials provide experiences (e.g., investigations, data analysis, discussions) where students develop conceptual meaning of a scientific idea before introducing technical vocabulary.		
Connections across component ideas.	Materials **describe** connections for students, or connections are absent.	Some units include **standalone questions** in place of activities, where students communicate their understanding of connections between component ideas.	All units include **activities** where students communicate their understanding of connections between science ideas from *two or more component ideas* within the grade (e.g., LS1.A and LS2.C, ESS2.A and PS1.A).		
Connections across disciplines.	Materials **describe** connections for students,	Some units include **standalone questions** in place of activities, where	All units include activities where students communicate their		

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	or connections are absent.	students communicate their understanding of connections between component ideas.	understanding of connections between science ideas from *two or more disciplines* within the grade (e.g., LS and PS).		
Review opportunities	End of unit review is **not anchored to a phenomenon**.	End of unit review assesses learning of the **central phenomenon for the unit** only.	Materials provide opportunities for students to transfer new learning to **analogous phenomenon** in a review at the end of every unit.		
			Total		

Table 2: Attending to Multiple Dimensions of Science Learning					
Directions: **Adhere to the provided rubric statements for scoring.**					
Indicator	**0**	**1**	**2**	**Score**	**Evidence**
Distribution of SEPs as required by the standards	Materials **do not include** a focal SEP for one or more units.	One or more SEPs are **disproportionately** featured as the focal SEP.	Materials identify one or more focal science and engineering practices (SEPs) for every unit(s) with a **balanced** distribution of all SEPs as a focal SEP throughout the units.		

Table 2: Attending to Multiple Dimensions of Science Learning **Directions:** **Adhere to the provided rubric statements for scoring.**					
Support for a focal SEP	**No** student facing or teacher facing supports for the SEPs.	Relevant **support strategies are absent** from teacher materials.	Every unit contains a focal SEP is featured in **student-facing materials and teacher materials** including instructional strategies for the particular unit and focal SEP.		
Connections across to crosscutting concepts as required by the standards.	Materials **describe connections with CCCs** or do not specifically address CCCs.	In every unit students make connection between the CCCs and **either** the SEPs or DCIs.	In every unit, students make connections between the crosscutting concepts (CCCs) and **both** the SEPs and disciplinary core ideas (DCIs).		
Developing crosscutting concepts (CCCs)	Materials **provide examples** of other instances of the CCCs or CCCs absent.	Students make connections between CCCs and **content not addressed in other units.**	In every unit, the materials lead students to **make connections between the CCCs in that unit and appearances of the CCCs in other units**.		
			Total		

Table 3: Accessibility Features				
Directions: • **0: The standard is not present within the material.** • **1: The standard is present within the material. The intent and/or frequency component of the standard is not fully met.** • **2: A rating of 2 indicates the standard is present and all aspects of the standard are fully met.**				
Digital Materials	**0**	**1**	**2**	**Evidence**
All lessons within the materials are available in digital form and include a printable option.				
In every lesson, materials include recommended supports, accommodations, and modifications for Students with Disabilities and English language learners that will support their regular and active participation in accessing on grade level material (e.g., modifying vocabulary words within word problems, sentence starters, etc.).				
Total				

Table 4: Alignment of Content				
Directions: • **0: The standard is not present within the material.** • **1: The standard is present within the material. The intent and/or frequency component of the standard is not fully met.** • **2: A rating of 2 indicates the standard is present and all aspects of the standard are fully met.**				
Conceptual Understanding: The materials support the intentional development of students' conceptual understanding of key science ideas, practice, and concepts.	**0**	**1**	**2**	**Evidence**
PHYS1.PS2.1) Investigate and evaluate the graphical and mathematical relationship (using either manual graphing or computers) of one-dimensional kinematic parameters (distance, displacement, speed, velocity, acceleration) with respect to an object's position, direction of motion, and time.				

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PHYS1.PS2.2) Algebraically solve problems involving constant velocity and constant acceleration in one-dimension.				
PHYS1.PS2.3) Algebraically solve problems involving arc length, angular velocity, and angular acceleration. Relate quantities to tangential magnitudes of translational motion.				
PHYS1.PS2.4) Use free-body diagrams to illustrate the contact and non-contact forces acting on an object. Use the diagrams in combination with graphical or component-based vector analysis and with Newton's first and second laws to predict the position of the object on which the forces act in a constant net force scenario.				
PHYS1.PS2.5) Gather evidence to defend the claim of Newton's first law of motion by explaining the effect that balanced forces have upon objects that are stationary or are moving at constant velocity.				
PHYS1.PS2.6) Using experimental evidence and investigations, determine that Newton’s second law of motion defines force as a change in momentum, $F = \Delta p/\Delta t$.				
PHYS1.PS2.7) Plan, conduct, and analyze the results of a controlled investigation to explore the validity of Newton's second law of motion in a system subject to a net unbalanced force, $F_{net} = ma$ or $F_{net} = \Delta p/\Delta t$.				
PHYS1.PS2.8) Use examples of forces between pairs of objects involving gravitation, electrostatic, friction, and normal forces to explain Newton's third law.				
PHYS1.PS2.9) Use Newton’s law of universal gravitation, $F=G\frac{m_1 m_2}{r^2}$, to calculate the gravitational forces, mass, or distance				

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separating two objects with mass, given the information about the other quantities.				
PHYS1.PS2.10) Develop and apply the impulse-momentum theorem along with scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on an object during a collision (e.g., helmet, seatbelt, parachute).				
PHYS1.PS2.11) Use experimental evidence to demonstrate that air resistance is a velocity dependent drag force that leads to terminal velocity.				
PHYS1.PS2.12) Develop a model to predict the range of a two-dimensional projectile based upon its starting height, initial velocity, and angle at which it was launched.				
PHYS1.PS2.13) Plan and conduct an investigation to provide evidence that a constant force perpendicular to an object's motion is required for uniform circular motion (F = m v2 / r).				
PHYS1.PS3.1) Investigate conduction, convection, and radiation as a mechanism for the transfer of thermal energy.				
PHYS1.PS3.2) Use the principle of energy conservation and mathematical representations to quantify the change in energy of one component of a system when the energy that flows in and out of the system and the change in energy of the other components is known.				
PHYS1.PS3.3) Assess the validity of the law of conservation of linear momentum (p=mv) by planning and constructing a controlled scientific investigation involving two objects moving in one-dimension.				

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PHYS1.PS3.4) Construct an argument based on qualitative and quantitative evidence that relates the change in temperature of a substance to its mass and heat energy added or removed from a system.				
PHYS1.PS3.5) Define power and solve problems involving the rate of energy production or consumption ($P = \Delta E/\Delta t$). Explain and predict changes in power consumption based on changes in energy demand or elapsed time. Investigate power consumption and power production systems in common use.				
PHYS1.PS3.6) Recognize and communicate information about energy efficiency and/or inefficiency of machines used in everyday life.				
PHYS1.PS3.7) Compare and contrast the process, design, and performance of numerous next-generation energy sources (hydropower, wind power, solar power, geothermal power, biomass power, etc.).				
Total				