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				
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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				
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Conceptual Understanding: The materials support the intentional development of students' conceptual understanding of key science ideas, practice, and concepts.	**0**	**1**	**2**	**Evidence**
PHYS2.PS1.1) Develop models to illustrate the changes in the composition of the nucleus of an atom and the energy released during the processes of fission, fusion, and radioactive decay.				
PHYS2.PS1.2) Recognize and communicate examples from everyday life that use radioactive decay processes.				

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PHYS2.PS1.3) Investigate and evaluate the expression for calculating the percentage of a remaining atom (N(t)=N0e-λt) using simulated models, calculations, and/or graphical representations. Define the half-life (t1/2) and decay constant λ. Perform an investigation on probability and calculate half-life from acquired data (does not require use of actual radioactive samples).				
PHYS2.PS2.1) Describe and mathematically determine the electrostatic interaction between electrically charged particles using Coulomb's law, $FF_{ee}=kk_{eeqq1qq2rr2}$. Compare and contrast Coulomb's law and gravitational force, notably with respect to distance.				
PHYS2.PS3.1) Identify and calculate different types of energy and their transformations (thermal, kinetic, potential, including magnetic and electrical potential energies) from one form to another in a system.				
PHYS2.PS3.2) Investigate and evaluate the laws of thermodynamics and use them to describe internal energy, heat, and work.				
PHYS2.PS3.3) Communicate scientific ideas to describe how forces at a distance are explained by fields (gravitational, electric, and magnetic) permeating space. Explain how energy is contained within the field and how the energy changes when the objects generating and interacting with the field change their relative positions.				
PHYS2.PS3.4) Describe, compare, and diagrammatically represent both electric and magnetic fields. Qualitatively predict the motion of a charged particle in each type of field, but avoid situations where the two types of				

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fields are combined in the same region of space. Restrict magnetic fields to those that are parallel or perpendicular to the path of a charged particle.				
PHYS2.PS3.5) Develop a model (sketch, CAD drawing, etc.) of a resistor circuit or capacitor circuit and use it to illustrate the behavior of electrons, electrical charge, and energy transfer.				
PHYS2.PS3.6) Investigate Ohm's law (I=V/R) by conducting an experiment to determine the relationships between current and voltage, current and resistance, and voltage and resistance.				
PHYS2.PS3.7) Apply the law of conservation of energy and charge to assess the validity of Kirchhoff's loop and junction rules when algebraically solving problems involving multi-loop circuits.				
PHYS2.PS3.8) Predict the energy stored by a capacitor and how charge flows among capacitors connected in series or parallel.				
PHYS2.PS4.1) Know wave parameters (i.e., velocity, period, amplitude, frequency, angular frequency) as well as how these quantities are defined in the cases of longitudinal and transverse waves.				
PHYS2.PS4.2) Describe parameters of a medium that affect the propagation of a sound wave through it.				
PHYS2.PS4.3) Understand that the reflection, refraction, and transmission of waves at an interface between two media can be modeled on the basis of characteristics of specific wave parameters and parameters of the medium.				

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PHYS2.PS4.4) Communicate scientific and technical information about how the principle of superposition explains the resonance and harmonic phenomena in air columns and on strings and common sound devices.				
PHYS2.PS4.5) Evaluate the characteristics of the electromagnetic spectrum by communicating the similarities and differences among the different bands. Research and determine methods and devices used to measure these characteristics.				
PHYS2.PS4.6) Plan and conduct controlled scientific investigations to construct explanations of light's behavior (reflection, refraction, transmission, interference) including the use of ray diagrams.				
PHYS2.PS4.7) Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model.				
PHYS2.PS4.8) Obtain information to construct explanations on how waves are used to produce, transmit, and capture signals and store and interpret information.				
PHYS2.PS4.9) Investigate how information is carried in optical systems and use Snell's law to describe the properties of optical fibers.				
Total				