Kiddom OpenStax Physics

Kiddom OpenStax Physics Executive Summary

Section 1. Science-Related Texas Essential Knowledge and Skills (TEKS) and English Language Proficiency Standards (ELPS) Alignment

TEKS Student %	TEKS Teacher %	ELPS Student %	ELPS Teacher %
85.11%	85.11%	100%	100%

Section 2. Instructional Anchor

- The materials are designed to strategically and systematically integrate scientific and engineering practices, recurring themes and concepts, and grade-level content as outlined in the TEKS.
- The materials anchor the learning in phenomena and problems as the key lever for driving learning and student mastery of disciplinary knowledge and skills.

Section 3. Knowledge Coherence

- The materials are somewhat designed to build knowledge systematically, coherently, and accurately.
- The materials provide some educative components to support teachers' content and coherence knowledge.

Section 4. Productive Struggle

- The materials provide some opportunities for students to engage in productive struggle through sensemaking that involves reading, writing, thinking, and acting as scientists and engineers.

Section 5. Evidence-Based Reasoning and Communicating

- The materials somewhat promote students' use of evidence to develop, communicate, and evaluate explanations and solutions.
- The materials provide some teacher guidance to support student reasoning and communication skills.

Section 6. Progress Monitoring

- The materials include a variety of TEKS-aligned and developmentally appropriate assessment tools.
- The materials include some guidance that explains how to analyze and respond to data from assessment tools.
- The assessments are somewhat clear and easy to understand.

Kiddom OpenStax Physics

Section 7. Supports for All Learners

- The materials provide guidance on fostering connections between home and school.
- The materials include listening, reading, writing, and speaking supports to help Emergent Bilinguals meet grade-level science content expectations.
- The materials include some research-based instructional methods that appeal to a variety of learning interests and needs.
- The materials include some guidance, scaffolds, supports, and extensions that maximize student learning potential.

Section 8. Implementation Supports

- The materials include year-long plans with some practice and review opportunities that support instruction.
- The materials include some classroom implementation support for teachers and administrators.
- The materials provide some implementation guidance to meet variability in program design and scheduling.

Section 9. Design Features

- The visual design of materials is clear and easy to understand.
- The materials are intentionally designed to engage and support student learning with the integration of digital technology.
- The digital technology or online components are mostly developmentally and grade-level appropriate and provide support for learning.

Section 10. Additional Information

- The publisher submitted the technology, price, professional learning, and additional language supports.

Kiddom OpenStax Physics

Indicator 2.1

Materials are designed to strategically and systematically integrate scientific and engineering practices and course-level content as outlined in the TEKS.

1	Materials provide multiple opportunities for students to develop, practice, and demonstrate mastery of appropriate scientific and engineering practices as outlined in the TEKS.	M
2	Materials strategically and systematically develop students' content knowledge and skills as appropriate for the concept and grade level or course as outlined in the TEKS.	M
3	Materials include sufficient opportunities, as outlined in the TEKS, for students to ask questions and plan and conduct classroom, laboratory, and field investigations and to engage in problem-solving to develop an understanding of science concepts.	M

Meets | Score 4/4

The materials meet the criteria for this indicator. Materials are designed to strategically and systematically integrate scientific and engineering practices and course-level content as outlined in the TEKS.

Materials provide multiple opportunities for students to develop, practice, and demonstrate mastery of appropriate scientific and engineering practices as outlined in the TEKS. Materials strategically and systematically develop students' content knowledge and skills as appropriate for the concept and grade level or course as outlined in the TEKS. Materials include sufficient opportunities, as outlined in the TEKS, for students to ask questions and plan and conduct classroom, laboratory, and field investigations and to engage in problem-solving to develop an understanding of science concepts.

Evidence includes but is not limited to:

Materials provide multiple opportunities for students to develop, practice, and demonstrate mastery of appropriate scientific and engineering practices as outlined in the TEKS.

- Materials allow students to use phenomena to connect standards to engineering practices. The Phet simulation "The Moving Man," located in Lesson 3.1, is a virtual tool that students can use to manipulate and visualize relevant parameters affecting velocity and acceleration, making these concepts accessible. Students can also interpret, predict, and draw charts of position, velocity, and acceleration, as well as explain their meanings. The charts are later used when they study the graphical representation of motion, thus making clear connections with upcoming topics. The lesson did not provide students with opportunities to identify problems and design solutions.
- Chapter 8 offers two opportunities within Section 3 to investigate and demonstrate mastery of the topics of momentum and collisions. Students investigate collisions on an air hockey table. Students are given opportunities to experiment with changing masses and initial speeds of the balls. Questions guide student thinking by asking students to consider how momentum is affected by mass and speed. Lastly, students "experiment with changing the elasticity of the collision." The activity starts by familiarizing the learner with the mechanics of the simulator, and then it goes on to ask questions that lead the learner to investigate these concepts themselves.

- In Chapter 14, “Performance Task,” materials include the opportunity for students to practice grade-level scientific and engineering practices by designing an open-air resonator based on calculating a resonating frequency and multiple notes. Materials provide guidance for students to engineer the device based on the calculations and given materials.
- In Chapter 15, “Performance Task,” materials include the opportunity for students to develop grade-level scientific engineering practices by designing their own experiments to observe the phenomena of thin-film interference. Materials provide scaffolding questions for students during the design process.

Materials strategically and systematically develop students’ content knowledge and skills as appropriate for the concept and grade level or course as outlined in the TEKS.

- Chapter 3, “Acceleration,” starts by introducing the concept using connections with real-life situations familiar to students, as well as reviewing important skills necessary to master the concept at hand, like significant figures, scientific notation, unit conversion, coordinate systems and vectors. The chapter then presents the motion equations used to determine the direction and magnitude of acceleration in one dimension.
- In Chapter 8, the materials present the topic of momentum by defining the new variables and then relating these new variables to ones from previous units. The materials discuss the relationship of momentum to force, mass, and velocity. The materials explain the discovery of these concepts by Isaac Newton and explain how these formulas and relationships were discovered. The concepts all build in a logical progression to develop the content knowledge.
- In Chapter 20, materials develop content knowledge and skills about magnets by connecting prior knowledge of magnets and new content knowledge and skill. For example, the materials posing the questions, “What happens if you cut a bar magnet in half?” and “Do you obtain one magnet with two south poles and one magnet with two north poles?” for students to consider, followed by an explanation of a dipole. Materials provide guidance in students exploring refrigerator magnets in the Snap Lab by providing probing questions. Materials provide an explanation of magnetic field lines.

Materials include sufficient opportunities, as outlined in the TEKS, for students to ask questions and plan and conduct classroom, laboratory, and field investigations and to engage in problem-solving to develop an understanding of science concepts.

- Instructional materials provide students with sufficient opportunities to ask questions and plan and conduct investigations. For example, Lesson 7.1, Kepler's Laws of Planetary Motion, presents the virtual physics lab “My Solar System,” where students create their own solar system in a simulator. Students can investigate how the mass of stars, planets, asteroids, and moons have motion patterns influenced by the mass of the other celestial bodies. The activity encourages students to experiment with different settings and allows for observing the effects these changes have on the solar system and the relationships between the variables. Students can change the value of mass or the number of bodies to investigate and answer questions about how the celestial bodies affect each other's motion path.
- Lesson 7.3, “Virtual Physics: Gravity and Orbits,” allows students to experiment with virtual models and learn the effects of mass on orbital paths. The simulation allows students to visualize the effects of changing mass on the planetary path around the sun.
- In Chapter 21, materials provide a situation for students to engage in problem-solving using an understanding of science concepts. Materials task students with finding a way to determine the

positive and negative end of a battery terminal. Materials provide some leading questions, such as “How do you use these to determine which terminal is which?”

Indicator 2.2

Materials anchor the learning in phenomena and problems as the key lever for driving learning and student mastery of disciplinary knowledge and skills.

1	Materials embed phenomena and problems across lessons to support students in constructing, building, and developing knowledge through authentic application and performance of scientific and engineering practices and course-level content as outlined in the TEKS.	M
2	Materials intentionally leverage students' prior knowledge and experiences related to phenomena and engineering problems.	M
3	Materials clearly outline for the teacher the scientific concepts and goals behind each phenomenon and engineering problem.	M

Meets | Score 4/4

The materials meet the criteria for this indicator. Materials anchor the learning in phenomena and problems as the key lever for driving learning and student mastery of disciplinary knowledge and skills.

Materials embed phenomena and problems across lessons to support students in constructing, building, and developing knowledge through authentic application and performance of scientific and engineering practices and course-level content as outlined in the TEKS. Materials intentionally leverage students' prior knowledge and experiences related to phenomena and engineering problems. Materials clearly outline for the teacher the scientific concepts and goals behind each phenomenon and engineering problem.

Evidence includes but is not limited to:

Materials embed phenomena and problems across lessons to support students in constructing, building, and developing knowledge through authentic application and performance of scientific and engineering practices and course-level content as outlined in the TEKS.

- In Chapter 1, "Performance Tasks," materials provide an opportunity for students to create their own unit system. The materials provide further exploration of this phenomenon by recommending students create an equation to calculate values within their system of units. The phenomena of a system of units transcend all content units in science, thus examining this phenomenon authentically. Materials supply the teacher with instructions, providing a foundation for students to understand what a system of units represents.
- Materials include phenomena and problems that connect to real-world scenarios. For example, in Lesson 6.1, "Angle of Rotation and Angular Velocity," students work on a lab activity to learn how to measure angular speed. After the hands-on activity, students make connections with real-world scenarios by analyzing the angle of rotation on a clock tower.
- In Chapter 21, "Performance Tasks," materials include a student activity in which student models explain the phenomena of the dual nature light. In authentic application, the teacher instructs students to build models of light as both a particle and a wave, then use evidence from their design to justify/support their demonstration's model.

Materials intentionally leverage students’ prior knowledge and experiences related to phenomena and engineering problems.

- Materials elicit and leverage students' background knowledge and experience to address misconceptions. For example, Chapter 4, “Forces and Newton's' Law of Motion,” intentionally allows students to bring previous experiences when measuring their “weight” on bathroom scales to clarify the difference between mass and weight, addressing a common misconception.
- The introduction to Chapter 8 contains a teacher support section that covers prior knowledge and how to relate it to upcoming topics. The materials leverage the student's own real-world knowledge and past topics (Newton's laws) to build toward the new topic of momentum and the use of phenomena to study this topic.
- In Chapter 19, “Performance tasks,” materials intentionally leverage students' prior knowledge about graphing to analyze data. Teachers and students are provided with questions about the relationship of the plotted variables. These leading questions guide students to discover the linear relationship between voltage and current, which is the electrical phenomenon of Ohm’s Law.

Materials clearly outline for the teacher the scientific concepts and goals behind each phenomenon and engineering problem.

- Materials provide teacher guidance on scientific concepts and learning goals. For example, Section 2.1, “Relative Motion, Distance, and Displacement,” provides teacher goals and guidance about possible questions to ask in order to introduce the concepts of the lesson.
- In Chapter 11.2, the materials provide a Snap Lab that prompts the student to conduct a field investigation. Throughout the lab, the materials provide questions that frame the investigation around the scientific concepts and goals. The materials provide pre-investigation and post-investigation questions as well as questions during the investigation to guide the procedure and collection of data.
- In Chapter 19.1, the materials provide a hands-on activity to help simulate how electrical current works. The materials guide how to set up peas and straws to calculate the current. The materials explain the original formula as well as how it would relate to the lab version. The lab concludes with an activity for students to create their own way of modeling current and explaining it to a classmate.

Indicator 3.1

Materials are designed to build knowledge systematically, coherently, and accurately.

1	Materials are designed for students to build and connect their knowledge and skills within and across units.	M
2	Materials are intentionally sequenced to scaffold learning in a way that allows for increasingly deeper conceptual understanding.	M
3	Materials clearly and accurately present course-specific core concepts and science and engineering practices.	PM
4	Mastery requirements of the materials are within the boundaries of the main concepts of the course.	M

Partial Meets | Score 3/6

The materials partially meet the criteria of this indicator. Materials are designed to build some knowledge systemically, coherently, and accurately.

Materials are designed for students to build and connect their knowledge and skills within and across units. Materials are intentionally sequenced to scaffold learning in a way that allows for increasingly deeper conceptual understanding. Materials sometimes clearly and accurately present course-specific core concepts and science and engineering practices. Mastery requirements of the materials are within the boundaries of the main concepts of the course.

Evidence includes but is not limited to:

Materials are designed for students to build and connect their knowledge and skills within and across units.

- Materials increase in complexity as the lessons progress within the units, allowing students the opportunity to apply previous concepts. For example, in the student-facing materials presented in the introduction of Chapter 5, there is an explicit reference to previously acquired concepts and how they will be used during the present unit: “In Chapter 2, we learned to distinguish between vectors and scalars; the difference being that a vector has magnitude and direction, whereas a scalar has only magnitude. We learned how to deal with vectors in physics by working on straightforward one-dimensional vector problems, which may be treated mathematically in the same way as scalars. In this Chapter, we’ll use vectors to expand our understanding of forces and motion into two dimensions.”
- In Chapter 8, the introduction states: “As we learned when studying inertia, which is Newton's first law of motion, every object or system has inertia—that is, a tendency for an object in motion to remain in motion or an object at rest to remain at rest. Mass is a useful variable that lets us quantify inertia. Momentum is mass in motion.” The materials bring up the concept and re-explain it to give the prior knowledge the proper context for the coming unit.
- In Chapter 13, Introduction, materials build and connect knowledge across units and link prior knowledge to new concepts. Materials state, “[r]ecall from the Chapter on Motion in Two Dimensions that oscillations—the back-and-forth movement between two points—involve force and energy. Some oscillations create waves, such as the sound waves created by plucking a guitar string.” Materials support teachers by connecting with previous material by stating,

"[b]before starting the Chapter, it would help to review the concepts of force, oscillations, and simple harmonic motion." The materials anticipate connections between phenomena and concepts and strategically guide teachers to show students how to make those connections.
- In Chapter 19, Introduction, materials build and connect knowledge across units and link prior knowledge to new concepts. With the statement, "Whereas the previous Chapter concentrated on static electricity and the fundamental force underlying its behavior, the next two Chapters will be devoted to electric and magnetic phenomena involving current," materials provide a systematic connection between previous and future learning goals.

Materials are intentionally sequenced to scaffold learning in a way that allows for increasingly deeper conceptual understanding.

- Materials present content following a progression from concrete to abstract reasoning. For example, in Chapter 3, Acceleration, Lesson 3.1 starts with the concept of displacement and change in velocity to build the knowledge needed for the virtual lab "The Moving Man," where students can produce variations in velocity and acceleration. At the end of the lesson, students work in a more abstract way by using the acceleration formula to calculate acceleration in several practice problems.
- Materials consistently sequence instruction in a way that activates or builds prior knowledge before explicit teaching occurs. For example, Chapter 4, Lesson 4.2, starts with suggesting the review of concepts like force, external force, and the addition of forces to build knowledge in preparation for the concept of inertia. Afterward, it presents concrete examples like air hockey and pushing wagons before arriving at the virtual simulation "Forces and Motion," where students explore the concept of net force, visualize the effect of forces on objects, and discover how forces affect or change the state of motion of objects.
- In Chapter 8.1, the materials intentionally sequence and scaffold the concepts of mass and velocity to build toward momentum and impulse. The materials start with a review of Newton's Laws. Then they present the formula for momentum and break down the variables it contains, including a review of previous lessons about vector quantities. The materials then provide a thorough analysis of how Newton's Second Law was actually stated in terms of momentum and then derive the equation for impulse using this analysis. The materials thoroughly explain and build toward these concepts and formulas, including both conceptual and mathematical support.
- In Chapter 2.1, the materials very thoroughly scaffold the concepts of distance and displacement to help build an understanding of relative motion. The materials provide teacher support to help start the discussion of distance and displacement and then scalar and vector and eventually reference frames. It then offers a hands-on activity with basketballs to strengthen these concepts. After the activity, the materials discuss an example of Galileo using frames of reference as early as the 17th century. The materials offer many opportunities to discuss and practice these concepts throughout this entire Chapter to promote a deeper understanding.
- In Chapter 19, materials build knowledge coherently that allows for some deeper conceptual understanding. Materials present many formulas in an abstract way without context first, then move to concrete ideas. For example, in 9.1, materials present current in context with objects that use current in the phrase, "[a] large current, such as that used to start a truck engine, moves a large amount very quickly, whereas a small current, such as that used to operate a hand-held calculator, moves a small amount of charge more slowly. In equation form, electric current I is defined as…" However, materials give the mathematics next with little context as to why these currents differ. Later, the current is shown in a picture, followed by students solving

problems using the formula presented. Materials do not support students in developing an understanding of the relationship between the variables.

Materials clearly and accurately present course-specific core concepts and science and engineering practices.

- Instructional materials provide instruction clearly and accurately in course-specific core concepts. For example, Lesson 2.1, Relative Motion, Distance, and Displacement, clearly provides instruction on core concepts. After learning about the difference between distance and displacement, students then learn the meaning of positive and negative displacement, motion, position, and reference frame, all core concepts for understanding relative motion.
- Materials present some science and engineering practices making reference to engineering applications of physics concepts. For example, Lesson 8.1, Linear Momentum, Force, and Impulse, makes such references, mentioning the life-saving role of airbags and seat belts installed in cars, which prevent people from flying into the windshield in the event of a car crash. The importance of the physics concept of impulse is highlighted in the safety car features mentioned before, and there are some hands-on explorations or virtual simulations to explore science and engineering practices further.
- In Chapter 13, materials clearly and accurately present course-specific core concepts but do not clearly present the science and engineering practices (SEPs). For example, in Chapter 13, each section has clearly written content learning objectives and states the TEKS the students will master. However, SEPs are not clearly presented. Although materials allow for students to take observations from a “Snap Lab” and a PhET simulation, materials do not clearly present the SEPs involved. Materials provide for differentiating lessons based on different learners. Additionally, in Chapter 16, the materials clearly and accurately present course-specific core concepts but do not clearly present the SEPs. For example, in Chapter 16, each section has clearly written content learning objectives and states the TEKS the students will master, but the SEPs are not explicitly stated or labeled. The materials allow for students to take observations from a “Snap Lab” and a PhET simulation; however, the materials do not clearly present which SEPs are involved.

Mastery requirements of the materials are within the boundaries of the main concepts of the course.

- Materials include specific learning targets by providing unit objectives for each unit and student learning objectives for each lesson. For example, Section 18.1 explicitly lists the objectives for the lesson: “By the end of this section, you will be able to do the following:
    - Describe positive and negative electric charges
    - Use conservation of charge to calculate quantities of charge transferred between objects
    - Characterize materials as conductors or insulators based on their electrical properties
    - Describe electric polarization and charging by induction.”
- Mastery requirements of the materials remain within the boundaries of the scope of the lesson. For example, Lesson 7.2 aims to explain Newton’s law of universal gravitation, compare it to Einstein’s theory of general relativity, and perform calculations using Newton’s law of universal gravitation. Assessment and practice opportunities don't go beyond the stated objectives. Students must use Newton's law of universal gravitation to perform calculations involving the mass of two objects, the distance, and the gravitational force between them.

- In Chapter 9.1, the materials clearly state the learning objectives, the TEKS, the key terms, and the talking points for the concepts. The materials then clearly present the core concepts of work and power throughout the section. These concepts are in alignment with the TEKS. Mastery requirements of the materials align with the main concept boundaries of the course. The materials provide guidance to complete the objectives (“Describe and apply the work–energy theorem and Describe and calculate work and power”), which align with the TEKS and core concepts of the course.
- At the beginning of each section, the materials provide mastery requirements by section learning objectives and are accurately represented by the accompanying list of TEKS. The “Test Prep” section has multiple opportunities for students to practice their knowledge within the boundaries of the course. For example, in Chapter 18, Test Prep, students have an “Extended Response” section where multiple choice questions are congruent with the learning objectives. One question asks, “[i]magine that the magnitude of the charge on the electron differed very slightly from that of the proton. How would this affect life on Earth and physics in general?” Within the answer, students would need to satisfy the Lesson 18.1 section learning objective of “describe positive and negative electric charges.”

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Indicator 3.2

Materials provide educative components to support teachers' content and knowledge coherence.

1	Materials support teachers in understanding the vertical alignment of course-appropriate prior knowledge and skills guiding the development of course-level content and scientific and engineering practices.	DNM
2	Materials contain explanations and examples of science concepts, including course-level misconceptions to support the teacher's subject knowledge and recognition of barriers to student conceptual development as outlined in the TEKS.	M
3	Materials explain the intent and purpose of the instructional design of the program.	M

Partial Meet | Score 3/6

The materials partially meet the criteria for this indicator. Materials provide some educative components to support teachers' content and knowledge coherence.

Materials do not support teachers in understanding the vertical alignment of course-appropriate prior knowledge and skills guiding the development of course-level content and scientific and engineering practices. Materials contain explanations and examples of science concepts, including course-level misconceptions to support the teacher's subject knowledge and recognition of barriers to student conceptual development as outlined in the TEKS. Materials explain the intent and purpose of the instructional design of the program.

Evidence includes but is not limited to:

Materials support teachers in understanding the vertical alignment of course-appropriate prior knowledge and skills guiding the development of course-level content and scientific and engineering practices.

- There is no explicit evidence for vertical alignment references within lessons or chapters, nor documents supporting teachers with the understanding of how current learning connects with previous and future learning. For example, Chapter 2, Motion in One Dimension, does not contain explicit references to vertical alignment or links/documents explaining how learning activities connect with past or future concepts. For example, Chapter 3, Acceleration, does not contain explicit references to vertical alignment in any of its lessons or in the introduction section.
- In Chapter 8, the introduction contains a teacher's support at the very bottom that states: "Before students begin this chapter, it would be useful to review these concepts: mass, inertia, Newton's laws of motion, angular motion, and moment of inertia." The materials offer no other guidance than the suggestion of a few broad topics that would be useful to review. Beyond this one sentence in the introduction, the materials did not offer any vertical alignment. Each section presented the learning objectives for the current topic but did not make vertical connections to past or future lessons or engineering practices.

Materials contain explanations and examples of science concepts, including course-level misconceptions to support the teacher's subject knowledge and recognition of barriers to student conceptual development as outlined in the TEKS.

- Materials include background information for teachers that provides explanations and examples of science concepts. For example, Chapter 6, Circular and Rotational Motion, has an introduction section with teacher-supporting materials that mention previous foundational concepts, “You may recall learning about various aspects of motion along a straight line: kinematics (where we learned about displacement, velocity, and acceleration), projectile motion (a special case of two-dimensional kinematics), force, and Newton’s laws of motion.” This highlights to teachers important background information needed in the current chapter.
- In Chapter 5, instructional materials explain what is needed to understand motion in two dimensions and contain videos and guidance to address misconceptions teachers or students may have. The teacher tips documents contain extra support for teacher content knowledge, such as misconceptions, guidance to addressing student questions, and videos.
- In Chapter 7.1, the materials offer several talking points for the teacher to discuss prior knowledge and possible misconceptions about planets and planetary motion. The materials give probing questions and provide answers and explanations for teachers to give students. The materials offer explanations for all of the concepts being covered, and they also suggest Carl Sagan's *Cosmos*, Episode 3, for a deeper look at the topic of Kepler's discoveries. The materials give support for different student levels for every single concept covered in this section.
- Materials provide many explanations of concepts and provide support to address misconceptions. In each chapter, there are lists of possible misconceptions and guidance on what to say to students to address those misconceptions and barriers throughout the entire section. For example, in 13.1, materials provide an explanation and examples of a grade-level misconception in the “Teacher Support” section. Materials state, “Many people think that water waves push water from one direction to another. In reality, however, the particles of water tend to stay in one location only, except for moving up and down due to the energy in the wave. The energy moves forward through the water, but the water particles stay in one place. If you feel yourself being pushed in an ocean, what you feel is the energy of the wave, not the rush of water. If you put a cork in water that has waves, you will see that the water mostly moves it up and down.”
- In 19.1, materials provide for an explanation and examples of a grade-level misconception in the “Teacher Support” section. Materials state, “Make sure that students understand that current is defined as the direction in which positive charge would flow, even if electrons are most often the mobile charge carriers. Mathematically, the result is the same whether we assume a positive charge flowing one way or a negative charge flowing the opposite way. Physically, however, the situation is quite different (although the difference is reduced once holes are defined).”

Materials explain the intent and purpose of the instructional design of the program.

- Materials provide an explanation of the rationale for the structure and design of the course; this rationale is located in the Preface section, where the structure of the course is laid out along with the topics, concepts, and skills in a logical and engaging progression that should be familiar to most physics teachers. The instructional materials begin with a general introduction to physics and scientific processes, which is followed by several chapters on motion and Newton’s laws. After mechanics, the students move through thermodynamics, waves and sound, and light and optics. Electricity, magnetism, and nuclear physics complete the textbook.

- In the preface, the materials explicitly state the purpose and intent of the design of the resource. It states, "Like any [textbook] content, this textbook can be modified as needed for use by the instructor depending on the needs of the students in the course. Each set of materials created by [textbook] is organized into units and chapters and can be used like a traditional textbook as the entire syllabus for each course. The materials can also be accessed in smaller chunks for more focused use with a single student or an entire class. Instructors are welcome to download and assign the PDF version of the textbook through a learning management system or can use their LMS to link students to specific chapters and sections of the book relevant to the concept being studied." The materials also give an explanation of the features of the resource, including Snap Labs, Worked Examples, Fun in Physics, Work in Physics, Boundless Physics, Links to Physics, Watch Physics, Virtual Physics, and Tips for Success. This section explains the purpose and type of support that each feature offers.

Indicator 4.1

Materials provide opportunities for students to engage in productive struggle through sensemaking that involves reading, writing, thinking, and acting as scientists and engineers.

1	Materials consistently support students' meaningful sensemaking through reading, writing, thinking, and acting as scientists and engineers.	PM
2	Materials provide multiple opportunities for students to engage with course-level appropriate scientific texts to gather evidence and develop an understanding of concepts.	PM
3	Materials provide multiple opportunities for students to engage in various written and graphic modes of communication to support students in developing and displaying an understanding of scientific concepts.	M
4	Materials support students to act as scientists and engineers who can learn from engaging in phenomena and engineering design processes, make sense of concepts, and productively struggle.	M

Partial Meets | Score 2/4

The materials partially meet the requirements for this indicator. Materials provide some opportunities for students to engage in productive struggle through sensemaking that involves reading, writing, thinking, and acting as scientists and engineers.

Materials provide some opportunities for students to engage in productive struggle through sensemaking that involves reading, writing, thinking, and acting as scientists and engineers. Materials provide some opportunities for students to engage with course-level appropriate scientific texts to gather evidence and develop an understanding of concepts. Materials provide opportunities for students to engage in various written and graphic modes of communication to support students in developing and displaying an understanding of scientific concepts. Materials support students to act as scientists and engineers who can learn from engaging in phenomena and engineering design processes, make sense of concepts, and productively struggle.

Evidence includes but is not limited to:

Materials consistently support students' meaningful sensemaking through reading, writing, thinking, and acting as scientists and engineers.

- The preface contains a list of the activities that require reading, writing, thinking, and engineering practices. These practices include: Snap Labs, Worked Examples, Virtual Physics, Grasp Checks, Practice Problems, Check Your Understanding, and Performance Tasks. These activities support sensemaking through a wide variety of methods. Not every section contains every type of activity, but each chapter contains a varied mix of opportunities.
- Lesson 2.1, Relative Motion, Distance, and Displacement, contains a learning activity within the teacher support section. In this activity, the teacher walks from point A to point B in two different ways, one is in a straight line, and the other is following multiple turns before reaching the final point. This activity supports student sensemaking by differentiating distance and displacement.

- Chapter 3.1, Acceleration, has the Snap Lab “Measure the Acceleration of a Bicycle on a Slope.” The activity guides the sensemaking process with the pre-investigation questions asking students, “What problem are we trying to solve by conducting this investigation?” Students analyze and interpret data collected during the investigation.
- In Chapter 8.2, the materials provide clear text that helps support students through reading. The section offers multiple opportunities for students to think about, discuss, and write about the topic of conservation of momentum. The materials offer videos and diagrams to support the sensemaking of the topic. The performance task at the end of the chapter gives students an opportunity to explore these concepts as a scientist; however, opportunities to act as scientists and engineers are not consistent throughout the course.
- In the Chapter 18 Performance Task, students compare the formula for Coulomb's Law and Newton’s law of universal gravitation. Materials prompt students to think and write about how distance affects each force and compare the formulas in writing to arrive at a conclusion.

Materials provide multiple opportunities for students to engage with course-level appropriate scientific texts to gather evidence and develop an understanding of concepts.

- Lesson 5.3, Projectile Motion, provides key terms and a multi-modal form of acquiring knowledge using illustrations, pictures, and graphic representations of projectile motion. However, there are no other opportunities for students to engage with scientific text other than the content within the lesson. Overall, the materials don't provide many opportunities for students to engage with scientific text beyond the content that is delivered in the lesson.
- In Chapter 8.1, the materials offer some activities to calculate real-world examples of momentum and impulse. These activities give the students the information they need to make the appropriate calculations and make connections to the concepts. These activities promote data collection and analysis to act as a scientist.
- Materials provide no additional primary resources relating to scientific texts; however, a listing of key terms is given before each lesson. Materials provide “Key Terms” with key vocabulary and definitions; however, it is located after the lesson text. Within the lesson, materials provide key vocabulary in bold text; however, little visual or additional support is given. For example, in 14.4, the text states, “...natural frequency is the frequency at which a system would oscillate if there were no driving damping force.” The exact phrase is also given in the “Key Terms” section. No more guidance or support with the term is supplied.

Materials provide multiple opportunities for students to engage in various written and graphic modes of communication to support students in developing and displaying an understanding of scientific concepts.

- Materials provide some opportunities for students to engage in various written and graphical modes of communication for developing and displaying an understanding of scientific concepts. In Chapter 4, the materials offer many diagrams to aid in explaining the concepts of Newton's Laws. The diagrams shown provide support to explain these concepts. The materials use diagrams to help convey information and ask students questions about data.
- Materials sometimes provide opportunities for students to communicate thinking in writing or graphically other than multiple choice questions and practice questions. For example, in Lesson 12.2, First Law of Thermodynamics: Thermal Energy and Work, three of the four lesson objectives use the verb “describe,” and the lesson provides an opportunity for written response to share thinking in writing or graphically. The lesson starts with explaining and defining key

terms, followed by an explanation of how pressure, volume, and temperature relate to ideal gases. Several diagrams illustrate the relationships. During the lesson, students have several multiple-choice practice problems, and there is one activity requiring students to communicate their thinking using the draw functionality.

- In Chapters 8.1, 8.2, and 8.3, the materials offer 15 activities and problems to work out. There are three items that are answered using a draw function in the program. The materials offer various modes of communicating data collected or concepts explored. The activities are varied and allow alternate methods of displaying a student's understanding.
- In Chapter 19, “Performance Task,” materials provide students with the opportunity to graph data from a light bulb to find resistance (the slope of the graph). Materials ask students to respond to additional questions analyzing the shape of their graph.
- In Chapter 22, “Performance Task,” materials provide for students to research and write about annual radiation exposure, worker radiation exposure, and causes of radiation. Materials ask students to use data in their written responses from government websites.

Materials support students to act as scientists and engineers who can learn from engaging in phenomena and engineering design processes, make sense of concepts, and productively struggle.

- In Lesson 4.3, Snap Lab Mass and Weight, students use a bathroom scale to investigate mass and weight, first by challenging a common misconception in physics by asking them, “What do bathroom scales measure?” Students are confronted with the concepts of mass and weight and how the scale provides measurements in mass units. The cognitive struggle will take students to the conclusion that scales detect weight but are calibrated to display mass.
- In Lesson 6.1, Snap Lab Measuring Angular Speed, students create and measure uniform circular motion and then contrast it with circular motions with different radii. Students go through a productive struggle while finding the reason behind different velocities in the same object at different radii.
- In Chapter 7, the performance task provides a chance for students to design an experiment that shows the inverse square law for gravitation. This activity gives the students a goal but lets them productively struggle toward the solution. The activity gives tips and discussion points.
- In Chapter 9, the performance task gives students the task of designing a way to test the energy transfer of five simple machines. The activity tasks students with collecting data for each and charting all five. It then gives tips on how to thoroughly analyze the data and trends.
- In Chapter 21, “Performance Task,” materials provide for students to design models to show the wave and particle nature of light. Materials ask students also to transfer their understanding of their particle model of light to use their model to show the photoelectric effect.

Indicator 5.1

Materials promote students' use of evidence to develop, communicate, and evaluate explanations and solutions.

1	Materials prompt students to use evidence to support their hypotheses and claims.	PM
2	Materials include embedded opportunities to develop and utilize scientific vocabulary in context.	M
3	Materials integrate argumentation and discourse throughout to support students' development of content knowledge and skills as appropriate for the concept and course.	PM
4	Materials provide opportunities for students to construct and present developmentally appropriate written and verbal arguments that justify explanations to phenomena and/or solutions to problems using evidence acquired from learning experiences.	M

Partial Meets | Score 2/4

The materials partially meet the requirements for this indicator. Materials sometimes promote students' use of evidence to develop, communicate, and evaluate explanations and solutions.

Materials sometimes prompt students to use evidence to support their hypotheses and claims. Materials include embedded opportunities to develop and utilize scientific vocabulary in context. Materials sometimes integrate argumentation and discourse throughout to support students' development of content knowledge and skills as appropriate for the concept and course. Materials provide opportunities for students to construct and present developmentally appropriate written and verbal arguments that justify explanations to phenomena and/or solutions to problems using evidence acquired from learning experiences.

Evidence includes but is not limited to:

Materials prompt students to use evidence to support their hypotheses and claims.

- Lesson 3.1, Acceleration, contains the Snap Lab Measure the Acceleration of a Bicycle on a Slope. During this activity, students have the opportunity to collect data and use that data to calculate acceleration. Furthermore, students create a slideshow presentation where they interpret the results in terms of the collected data, defining if the acceleration of the bicycle is constant or not. They present to other groups.
- The SnapLab in Chapter 8.1 features an activity that has students test the change in momentum in various ways (with a ball and with water). The end of the activity prompts students to use the evidence from these activities to answer questions and explain the concept of change in momentum.
- In the Snap Lab for 13.2, materials provide the opportunity for the use of evidence to support hypotheses and claims. For example, the lab asks students to "Interpret your results" and provides leading questions and directions for how to use data. Students found wavelengths and periods of waves in the lab, and the materials prompt students to use data or observations to support their claims and results.

- In the “Performance Task” for Chapter 13, materials provide for the use of evidence to support hypotheses and claims, although this task needs to be interpreted. Materials provide instructions for students to build a model of a beach in a wave tank then follow up with these questions: “Give a qualitative analysis of the effects of the waves on the beach. What kind of wave causes the most damage? At what height, wavelength, and frequency do waves break? How does the steepness of the beach affect the waves?” Materials state to use data or observations to support their claim. While this evidence is present in Chapters 8 and 13, not all chapters include inquiry and exploratory activities that prompt students to interpret data or use it to support claims and reasoning.
- In the Snap Lab for 9.2, the lab lists pre- and post-investigation questions. The post-investigation questions include: “What additional questions do you have after conducting this investigation? Reference Chapter 1 - Scientific Communication to help with identifying additional questions. What went well in this investigation? What would you improve if you were going to repeat this investigation? How else can you evaluate this investigation? Refer to Chapter 1 - Evaluating Experimental and Engineering Designs. Think about another way you could conduct an investigation to calculate an object’s potential energy. Plan your investigation, listing materials and methods. Get approval from your teacher before conducting this investigation. Record the results in your notebook.” The lab questions do not include any mention of evidence, hypotheses, claims, or reasoning. The lab questions do not ask students to craft a claim and defend it with evidence from their investigation.

Materials include embedded opportunities to develop and utilize scientific vocabulary in context.

- Materials embed scientific vocabulary using multiple representations. For example, Lesson 4.2, Newton's First Law of Motion: Inertia, provides students with a multimodal form of experiencing scientific vocabulary. A PHet simulation and an illustration show the concept of applied force beyond the definition seen in the text of the lesson.
- Materials provide opportunities for students to apply scientific vocabulary within context. For example, Lesson 5.2, Vector Addition and Subtraction: Analytical Methods, introduces the key term analytical method, which is one of the ways to add vectors. Later, students have several opportunities to use the term within context when they must use the analytical method to add two vectors using the x and y components of each.
- In Chapter 8.1, the materials list the four key vocabulary terms before the reading. When those terms come up during the reading, they appear in bold font. The terms are explained, and multiple opportunities are given to use these key terms in grasp checks, worked examples, and links to physics.
- In 13.1, materials provide embedded opportunities to develop and utilize vocabulary. For example, in 13.1, materials supply a reading in which vocabulary words are used. After the section, materials provide a “Check Your Understanding” section which uses the vocabulary words.

Materials integrate argumentation and discourse throughout to support students’ development of content knowledge and skills as appropriate for the concept and course.

- Materials integrate some argumentation and discourse within stages of the learning cycle. For example, Lesson 3.1 allows students to include some argumentation and discourse within the slideshow they must create and present to other groups. It is expected that students show some argumentation when they support their claims using evidence gathered during the exploration activity.

- Materials provide opportunities for students to develop how to engage in the practice of argumentation and discourse. For example, Lesson 6.1, Angle of Rotation and Angular Velocity, provides students the opportunity to make some arguments during the Snap Lab Measuring Angular Speed. In these activities, students must make graphs of angular speed vs. radius along with linear speed vs. radius. Then they must describe what each graph looks like.
- At the end of Chapter 8, the materials provide a critical thinking section and a performance task that both ask questions such as “Cars these days have parts that can crumple or collapse in the event of an accident. How does this help protect the passengers?” and “A billiards ball rolling on the table has momentum p1. It hits another stationary ball, which then starts rolling. Considering friction to be negligible, what will happen to the momentum of the first ball?” These questions allow for student discourse, and there is some guidance provided to facilitate student discourse.
- In the “Introduction” for Chapter 22, materials provide for potential discourse with the instructions, “Have students briefly brainstorm a list of things they can recall about atoms.” This could potentially result in discourse, and some direction for teachers is given to create discourse within the moment or lesson.

Materials provide opportunities for students to construct and present developmentally appropriate written and verbal arguments that justify explanations to phenomena and/or solutions to problems using evidence acquired from learning experiences.

- Materials provide opportunities for students to justify solutions to problems using written and verbal arguments. For example, Lesson 2.3, Position vs. Time Graph, provides students the opportunity to explain to the class how the student's group could improve the accuracy of this investigation.
- Materials often require students to construct written responses, such as writing definitions or describing what happens during exploration activities. For example, the performance task in the chapter review of Chapter 6 asks students to describe what the activity results show about torque. Students have the opportunity to justify the statements using evidence gathered during the activity.
- In the “Performance Task” for Chapter 21, materials provide opportunities for students to construct appropriate written arguments that justify explanations of phenomena using evidence. Materials suggest students create a model, and by using their model, “in writing, explain how evidence from your demonstration supports the wave model of light.”

Indicator 5.2

Materials provide teacher guidance to support student reasoning and communication skills.

1	Materials provide teacher guidance on anticipating student responses and the use of questioning to deepen student thinking.	M
2	Materials include teacher guidance on how to scaffold and support students' development and use of scientific vocabulary in context.	M
3	Materials provide teacher guidance on preparing for student discourse and supporting students in using evidence to construct written and verbal claims.	PM
4	Materials support and guide teachers in facilitating the sharing of students' thinking and finding solutions.	M

Partial Meets | Score 2/4

The materials partially meet the requirements for this indicator. Materials provide some teacher guidance to support student reasoning and communication skills.

Materials provide teacher guidance on anticipating student responses and the use of questioning to deepen student thinking. Materials include teacher guidance on how to scaffold and support students' development and use of scientific vocabulary in context. Materials provide some teacher guidance on preparing for student discourse and supporting students in using evidence to construct written and verbal claims. Materials support and guide teachers in facilitating the sharing of students' thinking and finding solutions.

Evidence includes but is not limited to:

Materials provide teacher guidance on anticipating student responses and the use of questioning to deepen student thinking.

- Each chapter provides teacher supports to guide the conversation and some guidance on anticipated student responses. This guidance provides insight into possible student responses, topics to discuss, and questions to ask. For instance, materials say, "Ask for a definition of a planet. Prepare to discuss Pluto's demotion if it comes up. Discuss the first criterion in terms of the center of rotation of a moon-planet system. Explain that for all planet-moon systems in the solar system, the center of rotation is within the planet. This is not true for Pluto and its largest moon, Charon, because their masses are similar enough that they rotate around a point in space between them." This guidance helps teachers respond to student answers and mediate student discourse in the classroom.
- In Lesson 4.1, Force, there is a suggestion for teachers to ask students to give everyday examples of situations where multiple forces act together. Then, there is an explicit suggestion to the instructor to draw free-body diagrams for some of these situations, which will deepen student understanding of the effect of forces on objects, especially when there is more than one force involved. This guidance allows teachers to deepen student understanding of forces in the real world.
- In the introduction to Chapter 8, the materials provide several questions to deepen student thinking, such as "Point out to the students how players often collide with each other while playing American football. How do these collisions affect the players? Does colliding with

someone change your velocity? Does it change your mass? What about the force of collision? What does it depend on? Would it hurt more if a heavier person collided with you or a faster person? Tell students that in this chapter, they will learn about momentum, its relation to force, and about collisions." This guidance aids teachers in helping students make connections to previous chapters.
- In 23.1, materials provide guidance and questions to deepen student thinking. For example, the materials state, "Use these questions to assess student achievement of the section's learning objectives. If students are struggling with a specific objective, these questions will help identify which and direct students to the relevant content." This guidance helps teachers implement interventions.

Materials include teacher guidance on how to scaffold and support students' development and use of scientific vocabulary in context.

- Materials provide guidance for how to scaffold scientific vocabulary and provide guidance on how to support the students' use of scientific vocabulary in context. For example, Lesson 3.1, Acceleration, warns the teacher regarding possible confusion with the terms acceleration and deceleration. The materials instruct the teacher to make sure students understand that the word deceleration is not used in physics often and that acceleration may be either positive or negative. The teacher is asked to see if students can use the concept of acceleration.
- Teachers are provided a Word Window document with a support page explaining the purpose and uses of a Word Window. The document also includes all vocabulary that could be used for the Word Window throughout the course. The documents encourage the use of a Word Window for all students to support students as they learn to use scientific vocabulary in context.
- Instructional materials provide guidance on how to support the students' use of scientific vocabulary in context. For example, Lesson 5.1, Vector Addition and Subtraction: Graphical Methods, explicitly suggest that students work with partners to respond to one of the "by the end of this section" tasks using content-based vocabulary, which include the terms head, tail, resultant, graphical method, vector addition, and vector subtraction.
- Chapter 8.1 provides guidance for the development and use of scientific vocabulary in context. The terms relating to momentum are defined and explained. Newton's laws of motion are then explained. The materials connect these key terms to the scientific concepts being studied for context.
- In 23.1, materials provide for the introduction of vocabulary. For example, the materials state, "The term virtual particle actually refers to a disturbance in space created by the presence of the two nucleons. Use of the term virtual hints at the idea that the carrier particle should not be confused with a regular particle of mass. A full understanding of the true nature of virtual particles, however, relies on mathematics and theory beyond the scope of this text."

Materials provide teacher guidance on preparing for student discourse and supporting students in using evidence to construct written and verbal claims.

- In Lesson 6.1, Angle of Rotation and Angular Velocity provides some questions to prepare students to elaborate discourse and construct statements about the type of motion studied in the chapter. Some of the suggested questions are: "Ask students to come up with examples of circular motion. Ask students whether or not velocity changes in a uniform circular motion.

What about speed? What about acceleration?" These questions could be interpreted as teacher guidance, but that is not clearly stated.

- Lesson 7.1, Kepler's Laws of Planetary Motion, asks the teacher to explain that the pins in Figure 7.3 are the foci and explain what each of the three sections of string represents. It also warns the instructor that the pencil represents a planet and one of the pins represents the sun. Associated with the same supporting visual, the instructor asks students to use the figure to understand why planets and comets travel faster when they are closer to the sun. There is no explicit guidance on explaining the visual to students other than labeling which pin is which in the visual. In Chapter 8.2, the materials give teachers guidance on how to have discourse with students, including leading questions, possible misconceptions, and follow-up answers. For instance, materials instruct, "Caution students that momentum is only conserved when the entire system affected is taken into account. Explain an isolated system. Ask students to give examples of isolated systems. Ask them if these are perfectly isolated. Would it be possible to have perfectly isolated systems on Earth?"
- In Chapter 19, Performance Task, the materials provide opportunities for students to engage in written discourse using their evidence (data); however, they do not provide teacher guidance on preparation. For example, the materials state, "Use this data and the plot to answer the following questions: What is the resistance of the lightbulb? What is the range of possible errors in your result for the resistance? In a single word, how would you describe the curve formed by the data points?" A sample response is given, but no additional guidance, questioning, scaffolding, or tips are supplied.
- In Chapter 21, Performance Task, materials provide for students to engage in written discourse using their evidence. However, the chapter does not provide teacher guidance on preparation. For example, the materials state, "In writing, explain how evidence from your demonstration supports the particle model of light." A sample response is given, but no additional guidance, questioning, scaffolding, or tips are supplied.

Materials support and guide teachers in facilitating the sharing of students' thinking and finding solutions.

- In Chapter 4, Performance Task, the materials state, "NGSS HS-PS2-1: Students who demonstrate understanding can: Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration." This activity gives students a chance to share their thinking while finding solutions.
- Lesson 7.2, Newton's Law of Universal Gravitation, Teacher Support, prompts the instructor to ask students if it really is obvious why all things fall straight down. It also suggests asking students to back up their reasons and provides them with Comet Halley as a reminder of things to consider. It is not explicit how students will share their thinking.
- During Lesson 8.3, in preparation for a better student understanding of elastic and inelastic collisions, the materials suggest the instructor review the concept of internal energy and ask students what they understand about the words elastic and inelastic. Another suggestion aimed at guiding students in sharing their thinking is to start a discussion about collisions and ask students to provide examples of elastic and inelastic collisions.

Indicator 6.1

Materials include a variety of TEKS-aligned and developmentally appropriate assessment tools.

1	Materials include a range of diagnostic, formative, and summative assessments to assess student learning in a variety of formats.	M
2	Materials assess all student expectations over the breadth of the course and indicate which student expectations are being assessed in each assessment.	M
3	Materials include assessments that integrate scientific concepts and science and engineering practices.	M
4	Materials include assessments that require students to apply knowledge and skills to novel contexts.	M

Meets | Score 2/2

The materials meet the critieria for this indicator. Materials include a variety of TEKS-aligned and developmentally appropriate assessment tools.

Materials include a range of diagnostic, formative, and summative assessments to assess student learning in a variety of formats. Materials assess all student expectations over the breadth of the course and indicate which student expectations are being assessed in each assessment. Materials include assessments that integrate scientific concepts and science and engineering practices. Materials include assessments that require students to apply knowledge and skills to novel contexts.

Evidence includes but is not limited to:

Materials include a range of diagnostic, formative, and summative assessments to assess student learning in a variety of formats.

- In Chapter 2, under the chapter review section, a series of different assessments are listed. Concept items have eight multiple choice questions that assess the concepts of distance versus displacement, such as, “Can one-dimensional motion be described with a zero distance traveled but nonzero displacement? Conversely, can it be described with zero displacement but a nonzero distance traveled?” The answer, along with its justification, is provided. Also included is a Critical Thinking section. Students respond to questions assessing the frame of reference, like “Two boats are traveling at equal and opposite velocities when they pass each other. How would the captain of each boat describe the motion of the other boat?” The correct answer to the question is accompanied by its explanation. The questions mentioned above could be used for formative or summative assessment, as well as a form to diagnose conceptual understanding.
- Chapter 3 contains a performance task located in the chapter review section. The performance task is a multipart question where students design an experiment to measure displacement and elapsed time. Students use collected data to calculate final velocity, average velocity, and acceleration. This performance task allows students to analyze data to support the claim that Newton's Second Law of Motion describes the mathematical relationship between the net force on a macroscopic object, its mass, and its acceleration.

- The materials offer a comprehensive set of summative assessments at the end of each chapter. The materials include multiple-choice review, critical thinking questions, equation practice, and a performance task.
- The materials offer "check your understanding" sections within each section for formative assessments. Chapter 4.3 offers a Snap Lab with a grasp check, a Khan Academy video with questions, and worked examples for additional formative assessments.

Materials assess all student expectations over the breadth of the course and indicate which student expectations are being assessed in each assessment.

- The materials indicate the objectives for each section. At the beginning of Chapter 4.1, the materials state, "By the end of this section, you will be able to do the following: Differentiate between force, net force, and dynamics Draw a free-body diagram." At the end of Chapter 4.1, the teacher's support states, "Use the questions in Check Your Understanding to assess whether students have mastered the learning objectives of this section. If students are struggling with a specific objective, the Check Your Understanding assessment will help identify which objective is causing the problem and direct students to the relevant content." These line up with the objectives stated at the beginning of the chapter.
- Chapter 4, Lesson 4.3, Newton's Second Law of Motion, assesses the TEKS where students are expected to calculate the effect of forces on objects, including tension, using the relationship between force and acceleration as represented by Newton's Second Law of Motion. The further exploration activity allows students to visit an external online open resource (CK12.org) to explore the concept of force, mass, and acceleration. Students watch videos and practice with some problems to finally arrive at several concept questions like, "How can Newton's second law of motion be represented with an equation? If the net force acting on an object doubles, how will the object's acceleration be affected? Tony has a mass of 50 kg, and his friend Sam has a mass of 45 kg. Assume that both friends push off on their rollerblades with the same force. Explain which boy will have greater acceleration."
- Materials assess all student expectations per lesson. For example, in 13.2, materials list the objectives as "By the end of this section, you will be able to do the following: Define amplitude, frequency, period, wavelength, and velocity of a wave Relate wave frequency, period, wavelength, and velocity Solve problems involving wave properties."

Materials include assessments that integrate scientific concepts and science and engineering practices.

- In Chapter 6, the Performance Task located in the chapter review section asks students to "Design a lever arm capable of lifting a 0.5 kg object such as a stone. The force for lifting should be provided by placing coins on the other end of the lever. How many coins would you need? What happens if you shorten or lengthen the lever arm? What does this say about torque?" Students are allowed to upload an image or a video, as well as submit a written response with the design. This challenge demands students' mastery of the concept of torque. Their design should include the distance between the point of rotation (pivot point) and the location where the force is applied. Testing of the prototype will show that the force is maximized by applying it perpendicular to the lever arm and at a point as far as possible from the pivot point (fulcrum).
- Chapter 8.1 offers a Snap Lab with assessment questions embedded within. It states, "In this activity, you will experiment with different types of hand motions to gain an intuitive understanding of the relationship between force, time, and impulse."

- In a Chapter 13 Performance Task, materials state, "In this task, you will construct a wave tank and fill it with water. Simulate a beach by placing sand at one end. Create waves by moving a piece of wood or plastic up and down in the water. Measure or estimate the wavelength, period, frequency, and amplitude of the wave, and observe the effect of the wave on the sand. Produce waves of different amplitudes and frequencies, and record your observations each time. Use mathematical representations to demonstrate the relationships between different wave properties. Change the position of the sand to create a steeper beach, and record your observations. Give a qualitative analysis of the effects of the waves on the beach. What kind of wave causes the most damage? At what height, wavelength, and frequency do waves break? How does the steepness of the beach affect the waves?"

Materials include assessments that require students to apply knowledge and skills to novel contexts.

- Materials include assessments that require students to apply knowledge and skills to a new phenomenon or problem. For example, the Performance Task located in Chapter 3, Chapter Review, asks students to design an experiment to measure displacement and elapsed time, using the data they collect from the experiment to calculate velocity, average velocity, and acceleration. Using a marble, a garden hose, a measuring tape, and a stopwatch, students apply the recently acquired knowledge about acceleration to analyze data to support the claim that Newton's Second Law of motion describes the mathematical relationship among the net force on an object, its mass, and its acceleration.
- Materials include assessments that require students to apply knowledge and skills to a new phenomenon or problem. For example, the Performance Task, located in the review section of Chapter 12, asks students to design and construct a thermometer that works on the principle of thermal expansion. By applying knowledge and skills to this new problem, specifically, how linear expansion thermometers would differ from volume expansion thermometers, students identify how thermometers using solids would differ from those using liquids. Four materials are available for that, which has a clear indication depending on the sets of conditions and temperature ranges. The procedure calls for the design of a safe experiment to analyze the thermal expansion of copper, steel, water, and alcohol. Some of the guiding questions that integrate SEPs are: Can all the tested materials be used effectively in the same ranges of temperature? Which applications might be suitable for one or more of the tested substances but not the others?
- Materials include assessments that require students to apply knowledge and skills to novel contexts in the "Performance Tasks" sections. For example, in Chapter 20, the materials state, "Your family takes a trip to Cuba and rents an old car to drive into the countryside to see the sights. Unfortunately, the next morning you find yourself deep in the countryside, and the car won't start because the battery is too weak. Wanting to jump-start the car, you open the hood and find that you can't tell which battery terminal is positive and which is negative. However, you do have a bar magnet with the north and south poles labeled and you manage to find a short wire. How do you use these to determine which terminal is which? For starters, how do you determine the direction of a magnetic field around a current-carrying wire? And in which direction will the force be on another magnet placed in this field? Do you need to worry about the sign of the mobile charge carriers in the wire?"

Indicator 6.2

Materials include guidance that explains how to analyze and respond to data from assessment tools.

1	Materials include information and/or resources that provide guidance for evaluating student responses.	M
2	Materials support teachers' analysis of assessment data with guidance and direction to respond to individual students' needs, in all areas of science, based on measures of student progress appropriate for the developmental level.	DNM
3	Assessment tools yield relevant information for teachers to use when planning instruction, intervention, and extension.	M
4	Materials provide a variety of resources and teacher guidance on how to leverage different activities to respond to student data.	PM

Partial Meets | Score 1/2

The materials partially meet the criteria for this indicator. Materials include some guidance that explains how to analyze and respond to data from assessment tools.

Materials include information and/or resources that provide guidance for evaluating student responses. Materials do not support teachers' analysis of assessment data with guidance and direction to respond to individual students' needs, in all areas of science, based on measures of student progress appropriate for the developmental level. Assessment tools yield relevant information for teachers to use when planning instruction, intervention, and extension. Materials sometimes provide a variety of resources and teacher guidance on how to leverage different activities to respond to student data.

Evidence includes but is not limited to:

Materials include information and/or resources that provide guidance for evaluating student responses.

- In Lesson 2.1, the Teacher Support listed at the end of the lesson suggests that teachers use the questions under Check Your Understanding to assess students' achievement of the section's learning objectives. It also suggests that if students are struggling with a specific objective, the formative assessment will help direct students to the relevant content.
- The materials give teachers guidance on possible student responses to discussions. In Chapter 4.2, the materials state, "Ask students to speculate what happens to objects when they are set in motion. Do they remain in motion or stop after some time? Why? Students may believe that objects that are in motion tend to slow down and stop. Explain the concept of friction. Talk about objects in outer space, where there is no atmosphere and no gravity. Ask students to describe the motion of such objects."
- In Chapter 13, Performance Task, the materials state, "Answers will vary. Sample answer: Students should find that large-amplitude waves do the most damage, with erosion occurring more rapidly as the wave frequency increases. The steepness of the beach will impact how the waves break. Students should find that shallow slopes lead to gentler, longer breaks, while steep slopes cause steeper breaks that expend the wave energy more quickly. If the sand is composed of grains of varying size, they may find that the smaller grains are moved significantly, leaving larger grains behind."

Materials support teachers' analysis of assessment data with guidance and direction to respond to individual students’ needs, in all areas of science, based on measures of student progress appropriate for the developmental level.

- Materials do not support teachers' analysis of assessment data, and only provide correct responses along with the rationale for them. For example, Chapter 5, Test Prep section, has 20 multiple choice questions, all of them presented with the correct answer and the explanation for the correct choice. Some of such question items are true or false: “We can use Pythagorean theorem to calculate the length of the resultant vector obtained from the addition of two vectors which are at right angles to each other. Note for evaluating responses: The correct answer is (B) False. The length of the resultant vector is obtained from the addition of the squares of the magnitude of two vectors at right angles to each other.” There is no direction for responding to individual student needs or student data.
- Beyond indicating the right answers, along with their explanation, there is no teacher support for the analysis of assessment data. For example, Chapter 4 contains a series of lessons having small assessments as part of the learning activities. The location for teacher support could be found in the Notes For Evaluating Responses, available in the chapter review sections, where teachers can find correct answers along with the rationale for the correct answer. There is no explanation for scoring, no diagnostic tests, or assessment reports to facilitate tracking of student progress.
- Although materials support different learners and opportunities for assessment data, in 18.3, materials do not provide specific guidance and direction to respond to individual student needs. For example, the materials state, “[BL][OL]Point out that all electric field lines originate from the charge.[AL]Point out that the number of lines crossing an imaginary sphere surrounding the charge is the same no matter what size sphere you choose. Ask whether students can use this to show that the number of field lines crossing a surface per unit area shows that the electric field strength decreases as the inverse square of the distance.” However, this interpretation is not based on assessment data for the lesson. Practice questions are supplied at the end of the lesson, but materials only supply answers, not guidance, to teachers.

Assessment tools yield relevant information for teachers to use when planning instruction, intervention, and extension.

- Chapter 7, Test Prep section, has questions containing notes for evaluating student responses. such as question two: “The focal point of the elliptical orbit of a moon is 50,000 km from the center of the orbit. If the eccentricity of the orbit is 0.25, what is the length of the semi-major axis? The Note for evaluating responses is listing option C as the correct answer. Here students will need to use the equation e=f/a (e is eccentricity, f is the distance between the center of the ellipse and each focus, and a is the length of the semimajor axis).” The teacher can infer that if a student selects the wrong choice, the student needs support using the formula, identifying each term, or solving for the unknown when the student needs to switch terms within the formula.
- The instructional materials provide suggestions in the teacher support section at the end of the lesson prompting teachers to use the Check Your Understanding questions to assess whether students master the learning objectives of this section. If students are struggling with a specific objective, the formative assessment will help identify which objective is causing the problem and direct students to the relevant content. Based on that suggestion, if a student fails the question listed in this narrative, then the student will need support with the learning objective.

- The materials offer multiple forms of assessment tools. The chapter summary has multiple choice, short answer, and extended response sections. These sections have notes for teachers to evaluate responses. However the materials do not offer guidance on how to use these responses for planning or intervention.

Materials provide a variety of resources and teacher guidance on how to leverage different activities to respond to student data.

- The Chapter 2 Section Summary contains important information grouped by topic that teachers could use during intervention. Some of the clarifying statements found in the section summary include: “A description of motion depends on the reference frame from which it is described. The slope of a position vs. time graph is the velocity. Average velocity is displacement over the time period during which the displacement occurs. If the velocity is constant, then average velocity and instantaneous velocity are the same.”
- Materials provide student resources for teachers to use in responding to performance data. For example, Chapter 5 contains a section called Key Equations, which teachers could use during small group instruction and review sessions. The key equation listed includes “force of static friction, force of kinetic friction, perpendicular component of weight on an inclined plane, parallel component of weight on an inclined plane, Hooke's law, and period in simple harmonic motion.”
- Although assessment options are provided, no teacher guidance is supplied on how to leverage different activities to respond to student data. For example, in Chapter 21, “Multiple Choice” material just states the answers. Short answer materials explain the answer but do not explain how to use the data obtained by the assessment.

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Indicator 6.3

Assessments are clear and easy to understand.

1	Assessments contain items that are scientifically accurate, avoid bias, and are free from errors.	M
2	Assessment tools use clear pictures and graphics that are developmentally appropriate.	M
3	Materials provide guidance to ensure consistent and accurate administration of assessment tools.	DNM
4	Materials include guidance to offer accommodations for assessment tools that allow students to demonstrate mastery of knowledge and skills aligned to learning goals.	DNM

Partial Meets | Score 1/2

The materials partially meet the criteria for this indicator. Materials contain assessments that are somewhat clear and somewhat easy to understand.

Assessments contain items that are scientifically accurate, avoid bias, and are free from errors. Assessment tools use clear pictures and graphics that are developmentally appropriate. Materials do not provide guidance to ensure consistent and accurate administration of assessment tools. Materials do not include guidance to offer accommodations for assessment tools that allow students to demonstrate mastery of knowledge and skills aligned to learning goals.

Evidence includes but is not limited to:

Assessments contain items that are scientifically accurate, avoid bias, and are free from errors.

- Materials contain assessment items that are free from errors. For example, Lesson 2.2, Speed and Velocity, has several practice problems that present accurate information and the correct answer within the presented answer choices. Some such questions include "A pitcher throws a baseball from the pitcher's mound to home plate in 0.46 s. The distance is 18.4 m. What was the average speed of the baseball?" The answer choices contain the accurate response, including the correct units, 40 m/s.
- The materials provide questions that are scientifically accurate, avoid bias, and are free from errors. In the chapter review of Chapter 8, the materials have the following question: "A 145-g baseball is incoming at a velocity of 35 m/s. The batter hits the ball as shown in the image. The outgoing baseball has a velocity of 40 m/s at the angle shown. What is the magnitude of the x-component of the impulse?" This question is free of bias, as no pictures or names of the hypothetical batter are given. It is free from errors, and the correct answer is supplied in the key.
- In Chapter 13, Problems, materials provide items that are accurate and avoid bias. For example, the problem states, "If a seagull sitting in water bobs up and down once every 2 seconds and the distance between two crests of the water wave is 3 m, what is the velocity of the wave?" The answer of 1.5 m/s is correct. In addition, the explanation of "bobbing up and down" gives a clear descriptor for students who may not live near water or have not witnessed this situation.
- In Chapter 21, Problems, materials provide items that are accurate and avoid bias. For example, the materials state, "The momentum of light is exactly reversed when reflected straight back

from a mirror, assuming negligible recoil of the mirror. Thus the change in momentum is twice the initial photon momentum. Suppose light of intensity 1.00 kW/m2 reflects from a mirror of area 2.00 m2 each second. Using the most general form of Newton's second law, what is the force on the mirror?" The answer given is correct, and the materials provide an assumption that some students may not understand the phrase "assuming negligible recoil."

Assessment tools use clear pictures and graphics that are developmentally appropriate.

- For example, Lesson 2.3, Position vs. Time Graphs, contains practice questions that require the use of a visual. The graph presented is clear and developmentally appropriate. The graph utilizes units and terminology the students are familiar with. The question reads, "Calculate the average velocity of the object shown in the graph below over the whole time interval." The correct answer is one of the answer choices, 0.25 m/s.
- Assessment tools use clear pictures that are developmentally appropriate. For example, Chapter 4, Extended Responses section, uses a visual to provide context for a question about force and springs; the question reads, "In the figure given, what is $F_{restore}$? What is its magnitude?" All possible variables are labeled clearly and include units when necessary.
- The materials provide appropriate pictures when necessary. In Chapter 9, the materials add a picture to help explain a question: "Design an investigation to make these measurements for these simple machines: lever, inclined plane, wheel and axle, and a pulley system. In addition to these machines, include a spring scale, a tape measure, and a weight with a loop on top that can be attached to the hook on the spring scale. A spring scale is shown in the image." This is helpful to all students since many may not have seen a spring scale before, especially students that are emergent bilinguals or students that need visual accommodations.
- In Lesson 13.2, materials provide clear pictures and graphics that are developmentally appropriate. For example, the wave depicted is correct and uses algebraic terms and commonly used Greek symbols, which are both appropriate for this level of study. The visuals include units when necessary, modeling this practice of including units for students.
- In Lesson 21.1, materials provide a graph of blackbody radiation which is appropriate for students and the content. The graph shows trends of three different temperatures for which students can interpret the peak for each temperature is different, and the location of the peak changes as well. General trends are essential for students to see and explain at this level.

Materials provide guidance to ensure consistent and accurate administration of assessment tools.

- The preface includes a short synopsis of each section and assessment type. They do not offer instruction or guidance, but just a quick summary: "Practice, Assessment & Progress Monitoring Grasp Checks: Formative assessments that review the comprehension of concepts and skills addressed through reading features, interactive features, and snap labs. Practice Problems: Challenge students to apply concepts and skills they have seen in a Worked Example to solve a problem. Check Your Understanding: Conceptual questions that, together with the practice problems, provide a formative assessment on key topics in each section. This allows students to monitor their own progress as they proceed through each section of a chapter. Performance Tasks: Challenge students to apply the content and skills they have learned to find a solution to a practical situation. Test Prep: Helps prepare students to successfully respond to the format and rigor of standardized tests. The test prep includes multiple choice, short answer, and extended response items. This allows teachers to closely monitor student progress at the end of a section and/or chapter."

- The section "Practice, Assessment & Progress Monitoring" provides a description of the types of assessments offered in the materials. The test prep includes multiple choice, short answer, and extended response items. There is no guidance for educators on the administration of the assessments, such as timing or grading guidance.
- The materials do not provide guidance on the implementation of assessments. The Chapter Review section in Chapter 4 has four review sections, and none of them offer any instructions or guidance. Chapter 4 also features a Test Prep section with three sections, and none of those offer instructions or guidance for educators on how to utilize or administer assessments. It is left entirely up to the teacher for interpretation.
- Materials do not present explicit guidance to ensure consistent and accurate administration of assessment tools. For example, Lesson 5.1, Vector Addition and Subtraction: Graphical Methods, presents assessment items during the lesson at different points, but no guidance is given about implementation. Some of the items include "Vector A→, having magnitude 2.5m, pointing 37∘ south of east, and vector B→ having magnitude 3.5m, pointing 20∘ north of east are added. What is the magnitude of the resultant vector? A person walks 32∘ north of west for 94m and 35∘ east of south for 122m. What is the magnitude of his displacement?" Only the assessment questions are present, yet no implementation guidance is given for educators.

Materials include guidance to offer accommodations for assessment tools that allow students to demonstrate mastery of knowledge and skills aligned to learning goals.

- Materials do not include guidance to offer accommodations for assessment tools that allow students to demonstrate mastery of knowledge and skills aligned with learning goals. For example, Lesson 3.1, Acceleration, has several assessment items, but there are no options for accommodations at any point during the lesson.
- Materials do not include guidance to offer accommodations for assessment tools that allow students to demonstrate mastery of knowledge and skills aligned with learning goals. For example, Lesson 4.1, Force, has several assessment items, but there are no options for accommodations at any point during the lesson, nor is any guidance provided on how to provide accommodations.
- The materials do not provide guidance on the implementation of accommodations. The Chapter Review section in Chapter 4 has four review sections, and none of them offer any accommodations. Chapter 4 also features a Test Prep section with three sections, and none of those offer guidance on accommodations.
- In Chapter 20, Magnetism, the assessment materials only contain the assessment questions. There is a multiple choice, short answer, and extended response section. The materials do not supply any guidance for implementing accommodations for students that may need them, such as students that are emergent bilinguals, special education, or students with disabilities, while using the assessment tool.

Indicator 7.1

Materials include guidance, scaffolds, supports, and extensions that maximize student learning potential.

1	Materials provide recommended targeted instruction and activities to scaffold learning for students who have not yet achieved mastery.	M
2	Materials provide enrichment activities for all levels of learners.	M
3	Materials provide scaffolds and guidance for just-in-time learning acceleration for all students.	M

Meets | Score 2/2

The materials meet the requirements for this indicator. Materials include guidance, scaffolds, supports, and extensions that maximize student learning potential.

Materials provide recommended targeted instruction and activities to scaffold learning for students who have not yet achieved mastery. Materials provide enrichment activities for all levels of learners. Materials provide scaffolds and guidance for just-in-time learning acceleration for all students.

Evidence includes but is not limited to:

Materials provide recommended targeted instruction and activities to scaffold learning for students who have not yet achieved mastery.

- In Chapter 7.2, the materials give nine separate suggestions for differentiation and scaffolding during the explanation of the law of gravitation. It covers misconceptions, relates the material to common experiences, and improves the understanding of how and why to use the formula for gravitation.
- In Chapter 8.1, the materials provide teachers support to scaffold material to different levels of learners. The materials give suggestions for reviewing or explaining basic concepts for below-level (BL) and on-level (OL) learners. It also gives discussion points for on-level and above-level (AL) learners.
- Materials provide recommended targeted instruction and scaffolding for students who have not yet achieved mastery through many opportunities to practice what they have learned at the end of each section in the Test Prep section. For example, Chapter 17 has a section for multiple choice review, short answer review, and extended response review for the entire chapter. Materials provide worked examples and additional concept check practice questions at the end of 17.1 as well as other sections.
- In 17.1, materials provide teacher support for differentiation. For example, in the Teacher Support section, ideas for BL, OL, and AL are broken down into suggested segments for teachers. Materials provide the same support in the next Teacher Support section, where BL and OL instructions/activities are suggested. Materials label sections with the abbreviation listed above.

Materials provide enrichment activities for all levels of learners.

- In Lesson 3.2, Representing Acceleration with Equations and Graphs, in the Further Exploration section, students can explore additional resources through several links to learn more about generating and interpreting motion graphs, including position versus time, velocity versus time, and acceleration versus time using real-time technology.
- Chapter 8.3 provides several enrichment activities embedded in the lesson. Each concept has at least one supplemental material or activity. These include videos, a snap lab activity (lower level), and worked-out examples. For higher-level learners, the materials also include a virtual lab and more worked-out examples.
- In addition to the embedded activities throughout the sections in Chapter 8, the chapter review section contains many practice problems for various levels of learners. The review culminates with a performance task to reinforce the role of mass in momentum. Following the chapter review is a section for test preparation. Throughout the chapter, the materials provide plenty of activities for each section to help the progression of different levels of learners.
- In the Chapter 17 Performance Task, materials provide guidance for students to build a one- and two-slit diffraction grading and observe interference wave behavior as described in the readings within the materials. Materials provide additional extensions, such as open-ended response questions related to the observed interference patterns.

Materials provide scaffolds and guidance for just-in-time learning acceleration for all students.

- Lesson 6.1, Angle of Rotation, provides support and resources for students who are ready to accelerate their learning. The teacher guidance states: “The video offers an opportunity for students to accelerate their learning.” After the video “Angular Velocity vs. Speed,” students have the opportunity to engage in the Snap Lab Measuring Angular Speed, which allows students to accelerate their learning by creating and measuring uniform circular motion and then contrasting it with circular motions with different radii. This activity allows for learning acceleration as well.
- Lesson 6.3, Rotational Motion, allows students to engage in the activity “Fun in Physics, Storm Chasing,” which includes learning about real-world examples of rotational motion. Students learn about the high-speed winds within a tornado and their devastating effects.
- In Chapter 8.1, the materials provide teachers support to scaffold material to different levels of learners. It gives discussion points for OL and AL learners. These are embedded throughout the lessons to give the teacher questions, ideas to re-engage students, and advice to help get past misconceptions or barriers. The materials give guidance on how to use activities for enrichment, acceleration, etc.

Kiddom OpenStax Physics

Indicator 7.2

Materials include a variety of research-based instructional methods that appeal to a variety of learning interests and needs.

1	Materials include a variety of developmentally appropriate instructional approaches to engage students in the mastery of the content.	M
2	Materials consistently support flexible grouping (e.g., whole group, small group, partners, one-on-one).	M
3	Materials consistently support multiple types of practices (e.g., modeled, guided, collaborative, independent) and provide guidance and structures to achieve effective implementation.	M
4	Materials represent a diversity of communities in the images and information about people and places.	M

Meets | Score 2/2

The materials meet the requirements for this indicator. Materials include a variety of research-based instructional methods that appeal to a variety of learning interests and needs.

Materials include a variety of developmentally appropriate instructional approaches to engage students in the mastery of the content. Materials consistently support flexible grouping (e.g., whole group, small group, partners, one-on-one). Materials consistently support multiple types of practices (e.g., modeled, guided, collaborative, independent) and provide guidance and structures to achieve effective implementation. Materials represent diversity of communities in the images and information about people and places.

Evidence includes but is not limited to:

Materials include a variety of developmentally appropriate instructional approaches to engage students in the mastery of the content.

- Lesson 4.4, Newton's Third Law of Motion, allows students to engage in learning activities that help them master how to calculate the effect of forces on objects, including the law of inertia and the relationship between force and acceleration. These learning activities bring physics concepts to life by including real-life examples. Instructors have the option to include a variety of approaches, worked examples, videos, and virtual simulations, along with links to resources to learn more about illustrating simultaneous forces between two objects as represented in Newton's Third Law of Motion in an experimental design scenario.
- Lesson 5.1,n m Vector Addition and Subtraction: Graphical Method, launches learning starting with clear learning goals and learning activities that align with the goals. After revising important key terms such as the head of a vector and resultant vector, students dive into the graphical method of vector addition and subtraction. Supporting videos allow students to visualize vector addition with the use of several examples. Students finally have the opportunity to show mastery of the concepts with practice problems and by experimenting with a virtual simulation. All these activities are developmentally appropriate and promote student conceptual understanding.

- In Chapter 8.1, the materials provide many teacher supports embedded into the lessons. These teacher supports help guide the instructional approach. They give tips for different levels of learners as well as topics that can be brought up to engage students. These teacher supports help guide the teacher to help maximize student mastery. For example, one of the teacher supports in this section explains a way to show the students how Newton's Second Law formula was derived.
- In many sections, the Tips For Success section guides students in a variety of instructional ways. For example, in 21.1, Tips For Success states, "When encountering a new graph, it is best to try to interpret the graph before you read about it. Doing this will make the following text more meaningful and will help to remind you of some of the key concepts within the section." Materials provide guidance that helps struggling learners who may need assistance reading the graph and connecting it to something familiar.

Materials consistently support flexible grouping (e.g., whole group, small group, partners, one-on-one).

- Lesson 3.1, Acceleration, includes the virtual physics lab, "The Moving Man," where students can explore either in groups or individually, as well as use it as a teacher demonstration tool to introduce the concept. The video found in the Watch Physics section shows the basic calculation of acceleration and some useful unit conversions; this activity includes questions that can be addressed individually or in small groups as well as used during whole class instruction as conversation starters and discussion points.
- In Chapter 8, the materials give the students multiple Snap Labs and PhET simulations. They give instructions for grouping students strategically. All of the activities could be partner, group, or one-on-one activities. There is flexibility in all of the activities, leaving space for educators to make decisions that are best for their students.
- In the SnapLab in 18.2, materials are provided for lab and observational questions. The materials also provide a grouping structure, suggesting groups of two. The materials supply guidance for each different kind of activity as well, including SnapLabs, homework, thought questions or experiments, etc.

Materials consistently support multiple types of practices (e.g., modeled, guided, collaborative, independent) and provide guidance and structures to achieve effective implementation.

- In the Preface, materials list the categories of multiple types of activities provided. In addition, a short description of each follows. Materials supply phrasing that implies guidance on how they are to be used. For example, in Check Your Understanding, conceptual questions that, together with the practice problems, provide a formative assessment of key topics in each section. This structure allows students to monitor their own progress as they proceed through each section of a chapter.
- In Lesson 1.2, Scientific Methods, some of the many teacher supports offered in the lesson make reference to pre-assessment for the section, explaining that it could involve students sharing or writing down an anecdote about when they used the methods of science. The guidance goes as far as suggesting to teachers that the class could also discuss their definitions of theory and law, both outside and within the context of science.
- The teacher support sections, associated with several activities within the lesson, guide teachers on implementation aspects and what to expect from the learning activities. For example, in Lesson 2.2, Speed and Velocity, in relation to practice problems, teacher supports include

guidance about what to expect during the independent practice and suggest emphasizing the importance of using the correct number of significant figures in calculations.
- In Chapter 8.2, the materials offer teacher guidance for implementing the various instructional strategies. The materials give guidance on leading discussions such as: “Caution students that momentum is only conserved when the entire system affected is taken into account. Explain an isolated system. Ask students to give examples of isolated systems. Ask them if these are perfectly isolated. Would it be possible to have perfectly isolated systems on Earth?” It also gives guidance for giving visual demonstrations involving students, such as: “You can demonstrate a similar exercise in class using a revolving stool or chair. Ask a student to sit on the stool with outstretched arms, holding some weight in each hand. Rotate the stool and once a good speed is achieved, ask him to bring his hands close to his body. He will start spinning faster.”

Materials represent a diversity of communities in the images and information about people and places.

- The materials show diversity in the lessons and photographs. There is no bias towards one gender or race throughout the materials.
- In Chapter 4, image 4.5, the cartoon of a man that could be either a Hispanic or African American is depicted in a free-body diagram.
- Lesson 6.3 shows an Asian person figure skating in image 6.9 in the context of rotational kinematics.
- In Chapter 8.1, the materials show two clip-art-style pictures of men, one of whom is playing baseball. It also shows a photograph of Venus Williams at the US Open. In Chapter 8.2, it shows a woman figure skating, and in Chapter 8.3 it shows a man playing ice hockey. Men and women are represented equally.

Indicator 7.3

Materials include listening, speaking, reading, and writing supports to assist emergent bilingual students in meeting course-level science content expectations.

1	Materials include guidance for linguistic accommodations (communicated, sequenced, and scaffolded) commensurate with various levels of English language proficiency as defined by the ELPS.	M
2	Materials encourage strategic use of students' first language as a means to linguistic, affective, cognitive, and academic development in English.	PM

Partial Meets | Score 1/2

The materials partially meet the criteria for this indicator. Materials sometimes include listening, speaking, reading, and writing supports to assist emergent bilingual students in meeting course-level science content expectations.

Materials include guidance for linguistic accommodations (communicated, sequenced, and scaffolded) commensurate with various levels of English language proficiency as defined by the ELPS. Materials sometimes encourage strategic use of students' first language as a means to linguistic, affective, cognitive, and academic development in English.

Evidence includes but is not limited to:

Materials include guidance for linguistic accommodations (communicated, sequenced, and scaffolded) commensurate with various levels of English language proficiency as defined by the ELPS.

- The English Language Learner Support section in Lesson 2.1, Relative Motion, Distance, and Displacement, includes suggestions such as reminding students to take notes during class lectures and offers tips for organizing notes, including the use of headings and subheadings. For students who require additional support, the lesson suggests periodically checking notebooks and offering ideas for better organizing or clarifying notes.
- In 13.2, materials provide guidance for linguistic accommodations in the phrasing, "[w]hen encountering new scientific terms with Greek and Latin roots, it is a good exercise to ask students, 'What words do you know that sound like or are spelled like this word?' Then encourage the students to discern what the word might mean based on its relatives."
- In 19.2, materials provide guidance for linguistic accommodations in the phrasing, "[a}fter reading aloud and discussing the Work in Physics section, ask students for their opinion on whether they would enjoy the career described. Beginning language learners may respond with a simple word or phrase such as 'Yes,' 'Sounds good to me' or 'I think it would be boring.' Intermediate and advanced language learners may express their opinions in an extended discussion with peers."

Materials encourage strategic use of students' first language as a means to linguistic, affective, cognitive, and academic development in English.

- Materials allow focused discussion of illustrations and images looking for familiar concepts, but it does not encourage strategic use of students' first language as a means of linguistic, affective, cognitive, and academic development in English. For example, the English Language Learner Support section in the introduction of Chapter 3 suggests that teachers "ease students into new content by starting with the familiar, using the photographs and diagrams in the text as a guide, ask students if they have ever seen something like the image in the photo or diagram," but no reference to use of first language was made.
- In Chapter 5, the introduction has a section called English Language Learner Support. This section encourages teachers to provide accommodations and to look online for more accommodations. Students are encouraged to respond in their first language but are not instructed to translate their responses or utilize their first language responses in any other way to acquire English or scientific academic language.
- Materials allow English language learners to match illustrations and photographs with concepts from the text, and students are encouraged to use their first language. For example, in the Introduction of Chapter 8, the English Language Learner Support section encourages students to keep their own list of unknown words across the reading, and even suggests students create their own picture glossary. It says, "Have students use their native language as means of cognitive development," but it does not encourage students to translate their picture glossary into English.
- In 13.2, materials provide strategic use of another language by the phrasing, "[w]hen encountering new scientific terms with Greek and Latin roots, it is a good exercise to ask students, 'What words do you know that sound like or are spelled like this word?' Then encourage them to think about what the word might mean based on its relatives."

Kiddom OpenStax Physics

Indicator 7.4

Materials provide guidance on fostering connections between home and school.

1	Materials provide information to be shared with students and caregivers about the design of the program.	PM
2	Materials provide information to be shared with caregivers for how they can help reinforce student learning and development.	DNM
3	Materials include information to guide teacher communications with caregivers.	PM

Partial Meets | Score 1/2

The materials partially meet the criteria for this indicator. Materials provide some guidance on fostering connections between home and school.

Materials provide some information to be shared with students and caregivers about the design of the program. Materials do not provide information to be shared with caregivers for how they can help reinforce student learning and development. Materials include some information to guide teacher communications with caregivers.

Evidence includes but is not limited to:

Materials provide information to be shared with students and caregivers about the design of the program.

- In the Preface section, although not specifically addressing caregivers, course information is given that could be shared with them. The preface states how the learning materials originated as OpenStax, a nonprofit based at Rice University, how to customize the digital resources, the coverage of the Texas Essential Knowledge and Skills (TEKS), along with a pacing guide providing the suggested length in days for each chapter, a description about lesson implementation and the student-centered features it contains. The materials do not mention the design in any capacity outside the preface, which is directed at the instructor. It makes no mention at all of sharing the design of the course with family members or caregivers.
- In each section, materials contain a “Section Summary” for students and possibly caregivers to view, showing key concepts contained within the section. For example, in 13.1, materials provide the list, “A wave is a disturbance that moves from the point of creation and carries energy but not mass. Mechanical waves must travel through a medium. Sound waves, water waves, and earthquake waves are all examples of mechanical waves. Light is not a mechanical wave since it can travel through a vacuum. A periodic wave is a wave that repeats for several cycles, whereas a pulse wave has only one crest or a few crests and is associated with a sudden disturbance. Periodic waves are associated with simple harmonic motion. A transverse wave has a disturbance perpendicular to its direction of propagation, whereas a longitudinal wave has a disturbance parallel to its direction of propagation.”

Materials provide information to be shared with caregivers for how they can help reinforce student learning and development.

- In the Preface, the materials highlight materials that can be shared with the family of the students. The preface suggests that these summaries may be used as discussion points when sharing the topics being covered with family members.
- Chapter 1, Section Summary, contains family summaries which are designed to provide students and their families with a brief overview of each section: “Students can utilize the section summaries as discussion starters as they share their knowledge of Physics with their families and caregivers.” An example of such discussion starters listed in Chapter 1 is: “Physics is the most fundamental of the sciences, concerning itself with energy, matter, space and time, and their interactions. Science seeks to discover and describe the underlying order and simplicity in nature. Theories are scientific explanations that are supported by a large body of experimental results.” These section summaries are not required, and are not provided directly to caregivers, but assigned through the student.
- Although materials provide an explanation to teachers on how to use the Section Summary at the beginning of the book in 1.1, “These summaries are designed to provide students and their families with a brief overview of each section. Encourage students to utilize them as discussion starters with their family while sharing what they've learned in Physics,” additional information for caregivers was not found. There is no indication of how caregivers could reinforce students’ learning or developing concepts.

Materials include information to guide teacher communications with caregivers.

- In the Preface, the materials highlight materials that can be shared with the family of the students. There is nothing guiding the teacher in communicating with the parents. This suggestion is for the students to share with their caregivers. For example, the Preface has some information to guide communication with a caregiver when they state that “Family materials can be assigned through the Section Summary section. Students can utilize the section summaries as discussion starters as they share their knowledge of Physics with their families and caregivers.”
- As stated in the Preface of the materials, there is information in the Section Summary that could be used as discussion starters with the family to communicate the topics addressed during class. Some of the topics listed in the Section Summary of Chapter 2 include “A description of motion depends on the reference frame from which it is described. The distance an object moves is the length of the path along which it moves. Displacement is the difference in the initial and final positions of an object.” These topics are present, and there is some guidance for the teacher on communicating the topics to families or caregivers given in the preface, including the suggestion to assign the section summaries so students may share the topics with their families or caregivers, but that guidance is only seen in the preface, and nowhere else in the materials.

Kiddom OpenStax Physics

Indicator 8.1

Materials include year-long plans with practice and review opportunities that support instruction.

1	Materials are accompanied by a TEKS-aligned scope and sequence outlining the order in which knowledge and skills are taught and built in the course materials.	PM
2	Materials provide clear teacher guidance for facilitating student-made connections across core concepts and scientific and engineering practices.	M
3	Materials provide review and practice of knowledge and skills spiraled throughout the year to support mastery and retention.	M

Partial Meets | Score 1/2

The materials partially meet the criteria of this indicator. Materials include some year-long plans with practice and review opportunities that support instruction.

Materials do not contain an overview of the scope and sequence; however, TEKS are present at the beginning of chapters and sections. Materials provide clear teacher guidance for facilitating student-made connections across core concepts and scientific and engineering practices. Review and practice of knowledge and skills are spiraled throughout the year to support mastery and retention.

Evidence includes but is not limited to:

Materials are accompanied by a TEKS-aligned scope and sequence outlining the order in which knowledge and skills are taught and built in the course materials.

- The preface section under "Teacher Guide" states, "Physics covers the scope and sequence requirements of a typical one-year physics course. The text provides comprehensive coverage of physical concepts, quantitative examples and skills, and interesting applications. High School Physics has been designed to meet and exceed the requirements of the relevant Texas Essential Knowledge and Skills (TEKS) while allowing significant flexibility for instructors." It then provides the sequence overview of the chapters that will be covered. It does not provide the actual TEKS sequence. It only provides the relevant TEKS at the beginning of each section.
- On the landing page of Section 2.3, TEKS are listed and referenced by number and letter. This list is sequentially followed by 2.4, which uses the same TEKS and is contained in the same unit. Materials are provided to the teacher in each lesson in a logical sequence to build the course materials, providing the teacher with enough support to design a year-long plan.

Materials provide clear teacher guidance for facilitating student-made connections across core concepts and scientific and engineering practices.

- In Section 2.1, the beginning of the lesson gives several teacher supports. The teacher support begins by listing the TEKS and learning objectives. Before getting to the lesson, the teacher support section lists individualized suggestions for emergent bilingual, on-level, below-level, and above-level students. It also lists suggestions for questions to guide and enhance the lab activity that follows.

- In Section 4.2, the beginning of the lesson gives multiple ways of guiding a teacher in discussing useful review topics and possible misconceptions. It provides frequent stops to give suggestions on guiding questions to relate the material to core concepts and everyday experiences.
- In Section 14.1, the materials provide teacher guidance to help students make connections across concepts. For example, in the lesson on the speed of sound, the materials contain clear opportunities for students to make connections between sound waves, music, and echolocation used by animals to navigate and find food, as well as the sonar used in submarines to detect objects underwater and measure water depth.

Materials provide review and practice of knowledge and skills spiraled throughout the year to support mastery and retention.

- Section 3.1 begins with a review of previous concepts for below-level learners. It includes vocabulary and concepts that will be expanded upon in the current section. It also includes a general review of units to reinforce previous lessons. The lesson contains many references and recalls the previous chapter on velocity and displacement as it builds toward acceleration.
- In Section 4.2, the materials provide reviews of past concepts (force) and provide a look ahead to the next section (Newton's second law). The content is organized to provide spiraling and reinforcement as well as lead students into future units.
- In Section 8.3, students have multiple opportunities to practice what they learn during the lesson. For example, in the Elastic and Inelastic Collisions lesson, students can practice and check their understanding by answering questions at the end of the lesson and interacting with virtual simulations, where students can manipulate variables and predict how objects will behave after simulated collisions.
- In Section 18.1, opportunities build on previous concepts. For example, when introducing the concept of charge, previous concepts like electrons and protons, as well as the laws of conservation, are included. In a completed example, students can see a diagram illustrating charges before and after an interaction, clearly illustrating the law of conservation of charge. Additionally, the materials suggest discussion topics that support mastery and retention, for instance, “Like all conservation laws, conservation of charge is an accounting scheme that helps us keep track of electric charge.”

Indicator 8.2

Materials include classroom implementation support for teachers and administrators.

1	Materials provide teacher guidance and recommendations for use of all materials, including text, embedded technology, enrichment activities, research-based instructional strategies, and scaffolds to support and enhance student learning.	M
2	Materials include standards correlations, including cross-content standards, that explain the standards within the context of the course.	PM
3	Materials include a comprehensive list of all equipment and supplies needed to support instructional activities.	M
4	Materials include guidance for safety practices, including the course-appropriate use of safety equipment during investigations.	M

Partial Meets | Score 1/2

The materials partially meet the criteria of this indicator. Materials include some classroom implementation support for teachers and administrators.

Materials provide teacher guidance and recommendations for use of all materials, including text, embedded technology, enrichment activities, research-based instructional strategies, and scaffolds to support and enhance student learning. Materials include standards correlations that explain the standards within the context of the course; however, they do not include cross-content standards. Materials include a comprehensive list of all equipment and supplies needed to support instructional activities. Materials include guidance for safety practices, including the course-appropriate use of safety equipment during investigations.

Evidence includes but is not limited to:

Materials provide teacher guidance and recommendations for use of all materials, including text, embedded technology, enrichment activities, research-based instructional strategies, and scaffolds to support and enhance student learning.

- In the preface, the materials provide teachers with an overview of the types of materials. For example: “Snap Labs: Give students the opportunity to experience physics through hands-on activities. The labs can be completed quickly and rely primarily on readily available materials so that students can do them at home as they read.” Materials provide teacher guidance by including an “Introduction” page for each unit outlining key terms and objectives within each section. Materials provide the option for digital or print versions. Materials state additional resources for guidance and recommendation for teachers, such as Getting Started Guides, PowerPoint slides, and an instructor answer guide, are available but could not be located. Materials state these are supplemental to the material.
- Section 2.1, “Relative Motion, Distance, and Displacement,” provides teacher guidance on what questions to ask in order to introduce the concepts of the lesson. The Snap Lab: Looking at Motion from Two Reference Frames, located in the same section guides the teacher about the procedures and the characteristics of the location needed for the lab.

- In Section 4.2, immediately after listing the TEKS, a guidance note explains common misconceptions students have about motion. Before the first paragraph of the informative text, the material gives explicit teacher guidance on the opening concepts for above-level, on-level, and below-level students. After this section, the materials offer more explicit teacher guidance for connecting the information to the next topic. In this same section, the materials link to a video and a PhET simulation that covers the topic, and both include a detailed guide on the purpose and use of these resources.

Materials include standards correlations, including cross-content standards, that explain the standards within the context of the course.

- The preface contains an overview of the material's relationship to the TEKS: “Physics covers the scope and sequence requirements of a typical one-year physics course. The text provides comprehensive coverage of physical concepts, quantitative examples and skills, and interesting applications. High School Physics has been designed to meet and exceed the requirements of the relevant Texas Essential Knowledge and Skills (TEKS) while allowing significant flexibility for instructors.” It provides the sequence and pacing guide in the next section. The materials do not show which TEKS are covered in which units. This information is limited to the opening of each section.
- The materials make no reference to cross-content TEKS or correlations between the relevant physics TEKS. For example, in Section 19.2, materials provide steps for deriving components of a series circuit; however, materials do not supply a sidebar or direct correlation to math standards. Formulas are stated and reworked without additional math guidance or implementation support for teachers.
- In the “Chapter Review” sections for units, performance tasks include a written response. However, a direct correlation to writing standards is not included. For example, in Chapter 19, the performance task is to supply a written response to three questions “What is the resistance of the lightbulb? What is the range of possible errors in your result for the resistance? In a single word, how would you describe the curve formed by the data points?” Additional teacher support relating to cross-content standards to writing is not included.

Materials include a comprehensive list of all equipment and supplies needed to support instructional activities.

- Materials provide a comprehensive list of supplies needed for classroom activities. For example, in Section 1.2, The Scientific Methods, the Snap Lab has students construct a model of how air flows in their classroom; all the supplies needed are listed in a comprehensive manner.
- In Section 4.3, the materials provide a hands-on activity to help reinforce the concepts of mass and weight. The activity includes a full list of materials needed to complete the activity. It also includes a set of instructions guiding how to use the materials and a set of “grasp check” questions.

Materials include guidance for safety practices, including the course-appropriate use of safety equipment during investigations.

- Materials include guidance for safety practices. The use of safety equipment is listed in the Texas Safety Standards Kindergarten through Grade 12 and hyperlinked in Chapter 1, Scientific Process, in the Safety Protocol section.

- In Chapter 1, under the Scientific Processes section, Safety Protocol subsection, the materials list general safety practices and equipment for classroom labs and field investigations. It lists seven safety recommendations to follow for classroom laboratory activities and another seven safety recommendations for field investigations.
- In Chapter 15, under the performance task tab, materials list safety warnings containing information about safety practices. For example, "FUMES—Certain chemicals or chemical reactions in this lab create a vapor that is harmful if inhaled. Follow your teacher's instructions for the use of fume hoods and other safety apparatus designed to prevent fume inhalation. Never smell or otherwise breathe in any chemicals or vapors in the lab." Materials are student-facing and provide students with guidance on the use of safety equipment.

Kiddom OpenStax Physics

Indicator 8.3

Materials provide implementation guidance to meet variability in program design and scheduling.

1	Materials support scheduling considerations and include guidance and recommendations on required time for lessons and activities.	PM
2	Materials guide strategic implementation without disrupting the sequence of content that must be taught in a specific order following a developmental progression.	DNM
3	Materials designated for the course are flexible and can be completed in one school year.	PM

Partial Meets | Score 1/2

The materials partially meet the criteria of this indicator. Materials provide some implementation guidance to meet variability in program design and scheduling.

Materials support some scheduling considerations and include some guidance and recommendations on required time for lessons and activities. Materials do not guide strategic implementation without disrupting the sequence of content that must be taught in a specific order following a developmental progression. Materials designated for the course provide some flexibility and can be completed in one school year.

Evidence includes but is not limited to:

Materials support scheduling considerations and include guidance and recommendations on required time for lessons and activities.

- In the preface, the Customization section states, “Because our books are openly licensed, you are free to use the entire book or pick and choose the sections that are most relevant to the needs of your course. Feel free to remix the content by assigning your students certain chapters and sections in your syllabus in the order that you prefer. You can even provide a direct link in your syllabus to the sections in the web view of your book.” The materials suggest that a teacher may adjust to fit their schedule and pacing, but the materials do not offer guidance on how that may be achieved. The materials make suggestions for the number of days each chapter/unit needs and state it does allow flexibility but do not provide specific guidance on how to implement that flexibility, such as which activities are required or supplemental.
- In the preface, the Coverage, Scope, and Pacing Guide gives a sequential list of the chapters and how many days each chapter should take. There is no guidance on how these days may be altered to accommodate scheduling. There is also no reference to individual times for lessons or activities in the preface or any other section of the materials. For example, Section 5.1, “Vector Addition and Subtraction: Graphical Methods,” doesn't list suggested times for any of the learning activities.

Materials guide strategic implementation without disrupting the sequence of content that must be taught in a specific order following a developmental progression.

- In the preface, the lesson implementation section states: “Each set of materials created by OpenStax is organized into units and chapters and can be used like a traditional textbook as the entire syllabus for each course. The materials can also be accessed in smaller chunks for more focused use with a single student or an entire class. Instructors are welcome to download and assign the PDF version of the textbook through a learning management system or can use their LMS to link students to specific chapters and sections of the book relevant to the concept being studied." There is no explicit guidance offered for strategic implementation without disrupting the sequence of content. This broad suggestion can be implemented at the chapter and lesson level in each section via the Assign and Personalize buttons at the top of each section.

- Materials provide a suggested sequence of units that considers the connections between the concepts, allowing students to build upon knowledge from previous lessons. For example, Chapter 5, "Motion in Two Directions," provides lessons organized in a sequential order to be taught, allowing students to learn about vector addition and subtraction followed by projectile motion and inclined planes to finally arrive at simple harmonic motion. There is no guidance on changing the order of lessons or deleting lessons to accommodate scheduling issues.
- In Chapter 13, materials present a logical progression of sections: "Types of Waves," "Wave Properties," and "Wave Interactions." However, materials do not include guidance for the teacher on if this topic can be presented in a different order or how to make any other modifications as needed. Materials do not reference or describe developmental progression.

Materials designated for the course are flexible and can be completed in one school year.

- Instructional materials come in a virtual format that provides flexibility for implementation as defined by the teacher of record or the school district's pacing guides. Students can complete the learning activities relevant to the course in the order dictated by the TEKS.
- In the Preface, the pacing guide gives the chapter list with the corresponding time to complete each chapter. The sum of these times is 176 days. Materials do not list a range of dates to complete each unit and do not provide the teacher with guidance as to how to implement materials for varying school year lengths. The Lesson Implementation section states, "Like any OpenStax content, this textbook can be modified as needed for use by the instructor depending on the needs of the students in the course." This structure shows that it can not only be done in one year but can also be modified to accommodate different schedules.

Kiddom OpenStax Physics

Indicator 9.1

The visual design of materials is clear and easy to understand.

1	Materials include an appropriate amount of white space and a design that supports and does not distract from student learning.	Yes
2	Materials embed age-appropriate pictures and graphics that support student learning and engagement without being visually distracting.	Yes
3	Materials include digital components that are free of technical errors.	Yes

Not Scored

The visual design of materials is clear and easy to understand.

Materials include an appropriate amount of white space and a design that supports and does not distract from student learning. Materials embed age-appropriate pictures and graphics that support student learning and engagement without being visually distracting. Materials include digital components that are free of technical errors.

Evidence includes but is not limited to:

Materials include an appropriate amount of white space and a design that supports and does not distract from student learning.

- Materials provide an appropriate amount of white space, the flow of information is organic, and when students have to scroll down, they find the text easy to read, with good contrast, and free of distracting artifacts. For example, Lesson 3.1, Acceleration, has a uniform font size and good contrast for readability. There are no distracting items that don't support learning. All the digital assets are relevant for learning.
- Materials provide a good amount of white space to make scrolling easy. Topics and activities are labeled, and the images found in the lesson support learning. For example, Lesson 4.1, Force, uses a diagram that illustrates tension weight and a free body diagram.
- Materials provide an appropriate design that supports learning. For example, in Chapter 9, materials provide prominent and clear headings, and sections are clearly marked. Subheadings have a clear hierarchy and are organized in a logical progression.

Materials embed age-appropriate pictures and graphics that support student learning and engagement without being visually distracting.

- Pictures and all visual materials are age appropriate and relevant to the learning goals. For example, Lesson 2.1 has a picture of an airplane with clouds in the background to illustrate the concept of a frame of reference for motion. This lesson also contains a video that introduces and differentiates between vectors and scalars. It introduces quantities that will be covered during the study of kinematics.
- The materials make use of generic, clip-art style diagrams. In Chapter 8, the materials show a cartoon depiction of a man hitting his airbag.

- Materials provide age-appropriate graphics that support student learning. For example, in 17.1, materials introduce students to wave interference. Two visual examples of wave interference follow the description.

Materials include digital components that are free of technical errors.

- The instructional materials are digital and free of technical errors. For example, Lessons 1.2 and 6.1 include functional embedded images and videos.
- The materials provide links to Khan Academy videos. These videos are embedded into the lessons. These videos can be played by clicking the Khan Academy link at the bottom left of the video. All Khan Academy video links open in a separate window and play.
- The materials provide PhET activities embedded directly into the lessons. In Chapter 8, a Forces and Motion activity is embedded into the lesson. The simulation and its buttons all function properly in the embedded activity.

Indicator 9.2

Materials are intentionally designed to engage and support student learning with the integration of digital technology.

1	Materials integrate digital technology and tools that support student learning and engagement.	Yes
2	Materials integrate digital technology in ways that support student engagement with the science and engineering practices and course-specific content.	Yes
3	Materials integrate digital technology that provides opportunities for teachers and/or students to collaborate.	Yes
4	Materials integrate digital technology that is compatible with a variety of learning management systems.	Yes

Not Scored

The materials are intentionally designed to engage and support student learning with the integration of digital technology.

Materials integrate digital technology and tools that support student learning and engagement. Materials integrate digital technology in ways that support student engagement with the science and engineering practices and course-specific content. Materials integrate digital technology that provides opportunities for teachers and/or students to collaborate. Materials integrate digital technology that is compatible with a variety of learning management systems.

Evidence includes but is not limited to:

Materials integrate digital technology and tools that support student learning and engagement.

- The virtual platform integrates digital technology and tools that support student learning and engagement. For example, Lesson 3.1, Acceleration, contains digital learning assets that support student learning. These assets include a virtual PhET Animation, the “Walking Man,” a video lesson from Khan Academy called “Acceleration,” and several interactive assessment items.
- The virtual platform integrates digital technology and tools that support student learning and engagement. For example, Lesson 4.2, Newton's First Law of Motion, contains digital learning assets that support student learning. These assets include a virtual PhET Animation, “Forces and Motion Basics,” a video lesson from Khan Academy called “Newton's First Law of Motion,” and several interactive assessment items.
- Chapter 7.1 integrates a PhET simulation into the lesson: “This simulation allows you to create your own solar system so that you can see how changing distances and masses determine the orbits of planets.” The materials also offer follow-up questions to support student learning. “When the central object is off center, how does the speed of the orbiting object vary?”
- Chapter 8.3 integrates two videos and one PhET simulation into the lesson. These tools are embedded directly, and they support student learning engagement.

Kiddom OpenStax Physics

Materials integrate digital technology in ways that support student engagement with the science and engineering practices and course-specific content.

- Materials integrate digital technology in ways that support student engagement with science and engineering practices and course-specific content. This support is achieved by including interactive learning assets like PhET animations, video lessons, and interactive assessment items. For example, 4.3, Newton's Second Law of Motion, has digitally created images that support student learning, illustrating some free-body diagrams.
- Materials integrate digital technology in ways that support student engagement with science and engineering practices and course-specific content. This support is achieved by including interactive learning assets like PhET animations, video lessons, and interactive assessment items. For example, Lesson 6.1 contains an embedded YouTube video called "Angular Velocity vs Speed."
- Chapter 8.3 integrates two videos and one PhET simulation into the lesson. These tools are embedded directly, and they support student learning engagement with course-specific content (elastic collisions in this chapter) by immediately providing a visual and interactive moment of learning. This structure allows students to learn the ideas and concepts within the context of the phenomena.
- Materials provide integration of digital technology by providing numerous videos. For instance, in 17.1, materials provide a link to a video describing one slit interference. The materials also provide focus questions.

Materials integrate digital technology that provides opportunities for teachers and/or students to collaborate.

- There is a class interactive whiteboard for teachers and students to utilize for collaboration. The teacher has control over whether or not students can write or interact with the board at any given moment. The teacher can monitor student collaboration while also being able to collaborate with students themselves.
- The materials include a class chat function. The teacher can allow students to use the chat function as a whole class or chat one-on-one with students. This function allows class discussions or students to ask questions during a lesson, and if students are shy or embarrassed, they can ask teachers questions one-on-one without the whole class seeing. The teacher can also change the chat settings to only one-way communication, like the teacher making an announcement.
- The materials offer the option for teachers to digitally assign lessons and activities. The lessons can be launched while the class is using the interactive whiteboard. The student view is unclear, but the teachers can see the lesson materials while the interactive whiteboard is open. This feature allows the teachers to assign or ask questions at the moment and respond to student data in real time.

Materials integrate digital technology that is compatible with a variety of learning management systems.

- The materials are compatible with Chrome and Firefox browsers and are accessible from machines using MacOS, ChromeOS, and Windows operating systems.
- The materials can also be accessed from any mobile device with an internet connection and a web browser, such as a smartphone or tablet.

- Materials do not state if are compatible with any other learning management systems such as Canvas, Google Classroom, Schoology, etc.

Indicator 9.3

Digital technology and online components are developmentally and course-appropriate and provide support for learning.

1	Digital technology and online components are developmentally appropriate for the course and align with the scope and approach to science knowledge and skills progression.	Yes
2	Materials provide teacher guidance for the use of embedded technology to support and enhance student learning.	Yes
3	Materials are available to parents and caregivers to support student engagement with digital technology and online components.	No

Not Scored

Digital technology and online components are somewhat developmentally and course-appropriate and provide support for learning.

Digital technology and online components are developmentally appropriate for the course and align with the scope and approach to science knowledge and skills progression. Materials provide teacher guidance for the use of embedded technology to support and enhance student learning. Materials are not available to parents and caregivers to support student engagement with digital technology and online components.

Evidence includes but is not limited to:

Digital technology and online components are developmentally appropriate for the course and align with the scope and approach to science knowledge and skills progression.

- Digital technology and online components are developmentally appropriate for the course. Digital text, pictures, graphics, embedded videos, and virtual animations are developmentally appropriate for the course. For example, Lesson 2.4, Velocity vs. Time Graphs, contains two virtual PhET animations and numerous graphs that are developmentally appropriate.
- Digital technology and online components are developmentally appropriate for the course. Digital text, pictures, graphics, embedded videos, and virtual animations are developmentally appropriate for the course. For example, Lesson 3.1, Acceleration, contains a virtual PhET animation (“The Moving Man”) and several graphs that are developmentally appropriate.
- Chapter 4.2 integrates a video and a PhET simulation into the lesson. These tools help support skill progression. In this chapter, the video helps introduce types of forces, and then the simulator progresses to using these different types of forces to find the net force. This structure is developmentally appropriate and helps students learn the knowledge and skills required to master the standards in the course.
- In 10.1, materials supply a video that is developmentally appropriate for the course and aligns with the scope of science knowledge and skills. The video is relevant to the lesson and aids students in learning the science knowledge and skills required for mastery of the unit.
- In 13.2, materials provide a PhET Simulation called “Waves on a String” that is developmentally appropriate for the course and aligns with the scope of science knowledge and skills. The simulation focuses on how wavelength, frequency, and amplitude are related.

Materials provide teacher guidance for the use of embedded technology to support and enhance student learning.

- Materials include guidance on the use of the embedded animations. For example, Lesson 4.2, Newton's First Law of Motion: Inertia, has a PhET simulation, "Forces and Motion—Basics." This tool comes with guidance that explains that in this simulation, students first "explore net force by placing blue people on the left side of a tug-of-war rope and red people on the right side of the rope (by clicking people and dragging them with [the] mouse). Experiment with changing the number and size of people on each side to see how it affects the outcome of the match and the net force. Hit the 'Go!' button to start the match and the 'reset all' button to start over."
- Lesson 5.1, Vector Addition and Subtraction: Graphical Methods, includes a Watch Physics section with a video called "Visualizing Vector Addition Examples." This video provides context and guidance in a text prior to the video that reads: "This video shows four graphical representations of vector addition and matches them to the correct vector addition formula."
- The materials provide guidance for the use of embedded technology. For the PhET simulation in Chapter 9.2, the materials state: "In this simulation, you will first explore net force by placing blue people on the left side of a tug-of-war rope and red people on the right side of the rope (by clicking people and dragging them with your mouse). Experiment with changing the number and size of people on each side to see how it affects the outcome of the match and the net force. Hit the 'Go!' button to start the match and the 'reset all' button to start over."

Materials are available to parents and caregivers to support student engagement with digital technology and online components.

- The Preface mentions the types of activities (which include technology), but the materials do not offer any guidance for caregivers on how to log in and use them.
- It is unclear whether there is a parent portal available or if parents need credentials to log in to the materials. As of now, parents could simply have access to the website and perhaps the instructional materials. There is no guidance offered for caregivers to support engagement.
- The materials do not offer caregivers guidance or support within each lesson apart from the basic instructions. For example, in Chapter 2.4, the materials offer a virtual lab. The instructions state: "In this simulation, you will use a vector diagram to manipulate a ball into a certain location without hitting a wall. You can manipulate the ball directly with position or by changing its velocity. Explore how these factors change motion. If you would like, you can put it on the setting, as well. This is acceleration, which measures the rate of change of velocity. We will explore acceleration in more detail later, but it might be interesting to take a look at it here." The materials do not give any support or resources to caregivers to support student engagement.