Grading standards for Physics (modified from KCM and others)

Mr. Forrest, 2020/21

For each learning objective, scoring will be on the following scale, with indicators of the score shown

Score	ADVANCED/MASTERY - Indicators representing the score for the standard include:
10 =	I nailed it!
	I can thoroughly explain/teach the standard/skills to another student.
	I have high confidence on how to demonstrate the standard/skills.
	I can have a conversation about the standard/skills showing complete understanding.
	I can independently demonstrate extensions of my knowledge.
	I can create analogies and/or find connections between different areas within the sciences or between science and other areas of study.
	My responses demonstrate in-depth understanding of main ideas and of related details.
	I could be a peer teacher.
	I understand the content/skills completely and can explain them in detail.
	I have shown all of the relevant aspects of the standard/skill successfully.
	The errors I had (if any) are merely cosmetic. Principles applied perfectly with attention to details with solutions that are mathematically accurate, including correct units on all numbers, and reporting answers to appropriate precision.

Score	PROFICIENT - Indicators representing the score for the standard include:
8 =	The basic concept is good.
	I understand the important things about the content/skills.
	I have confidence on how to do the standard/skills on my own most of the time, but I need to continue practicing some parts that still give me problems.
	I need my handouts, notes, or other references once in a while.
	I am proficient at describing terms and independently connecting them with correct concepts.
	I understand not just the "what," but can correctly explain the "how" and "why" of scientific processes.
	My responses demonstrate in-depth understanding of main ideas.
	I am developing understanding of the content/skills.
	I have shown several of the sub-skills/standard, but not all aspects of it.
	I have some errors and/or omissions in the execution of the work, but overall correct understanding is clearly demonstrated.

	I can demonstrate the standard well now, but my understanding may not be deep enough to demonstrate it in a few weeks time	
	I feel confident explaining the main concept to others, but would not be able to explain all the details	

Score **DEVELOPING - Indicators representing the score for the standard include:**

6 =	I have a general understanding of the content/skills, but I'm also confused about some important parts.
	I need some help from my teacher or peers (one-on-one or small group) to do the skills correctly.
	I do not feel confident enough to do the standard/skills on my own much of the time.
	I need my handouts, notebook, or other references most of the time.
	I can correctly identify concepts and/or define vocabulary; however I cannot not make connections among ideas and/or independently extend my own learning.
	My responses demonstrate basic understanding of some main ideas, but significant information is missing.
	I have a beginning understanding of the concept / skill.
	I am able to show some of the sub-skills.
	My understanding of the concept/skill is still developing as there are significant conceptual errors.
	I would not feel confident if asked to correctly explain the standard/skill to others in class.
	Attempts at problems show an understanding of the basic concept, but little correct follow through toward a correct solution.

Score **BEGINNING - Indicators representing the score for the standard include:**

5 =	I need lots of help from my teacher, classmates, or peers (one-on-one).
	I have low confidence on how to do the skills and need more instruction.
	I need my handouts, science notebook, or other references at all times.
	I do not understand the concepts/skills at the core of the standard.
	I cannot correctly identify concepts and/or define vocabulary related to the standard.
	I cannot make connections among ideas or extend the information provided.
	My responses lack detail necessary to demonstrate fundamental understanding.
	Attempts at problems are limited; little to no progress is shown toward a correct solution beyond the given information.

Score	NO BASIS/ NO DATA - Indicators representing the score for the standard include:
- =	I did not provide any responses for which a judgment can be made about my understanding.
	I did not attempt or work shows no understanding of this standard/skill.
	I did not provide data.
	I misunderstood a question that the content/skill I'm trying to show is not observable in my response.
	I have a completely correct solution without showing a work/particular content/skill that I was asked to demonstrate.
	I have not asked the teacher for help to understand the standard/skill

Mr. Forrest/Physics *Name:* _____

Physics standards

Habits of Mind: Unit 0-A

Standard	Description	Score
HM1	I actively participate in labs, small group discussions, and whole class discussions during synchronous sessions and/or in class to increase my own understanding as well as that of my peers. I also am active in discussion boards as they are used for online assignments.	
HM2	I focus on physics during physics required synchronous sessions and/or in class and use technology to help my understanding of physics. My attitude, involvement and actions help learning in synchronous sessions/in class and I am willing to offer and ask for help from my teacher and peers.	
HM3	I perform deliberate practice to improve my understanding of physics, as shown by: class involvement, contacting the teacher for extra help, and completing formative homework, labs/simulations, practice problems and classwork to the best of my ability. I review and reflect on my work, as shown by comments to feedback on graded assignments. I can implement a plan for improvement based on feedback from my teacher and peers. Compared to my best effort, I'm performing well.	
HM4	I am well prepared and put full effort into formative assignments such as homework and reading quizzes. I show evidence of self-directed preparation to allow me to be successful on the formative assessment.	
HM5	Persistence. If my understanding of a topic or performance on a project isn't at a high level, I make the effort to improve by attempting to get extra help in person or with a 1-on-1 Google Meet, complete extra work to show mastery, retake an assessment/standard if necessary, and revise and improve upon a project that performs poorly.	
HM6	I communicate at least weekly with my instructor about my progress in class. This includes successes, struggles, and questions and can take the form of in person communication (in class on a Google Meet) or via a Google Form.	
HM7	Netiquette and classroom atmosphere and respect. During synchronous sessions, in class, and during collaborative work (online or in person) I help foster an atmosphere conducive to learning by being respectful and treating others professionally. I treat my classmates and instructor with respect, dignity, and honesty.	
HM8	I am actively involved in any building, design, or other collaborative projects - including work needed asynchronously outside of class. I show effort, thought, creativity and a willingness to complete the project at a high level.	

Laboratory Skills and Scientific Reasoning: Unit 0-B

Standard	Description	Score
LSSR1	I can design and carry out experiments or online simulations based on the task at hand using a working hypothesis and selecting appropriate lab equipment or online tools and technology along with using those tools correctly. I'll maximize the amount and range of data collected within the time allowed and available materials. I can also communicate and represent the details of an experimental procedure clearly and completely using words, graphs, equations, and/or diagrams.	
LSSR2	I can make a reasonable judgement about the results of a given experiment or online simulation supported by evidence and reasoning and use this to revise a hypothesis when necessary. I can identify possible sources of uncertainty and/or error, evaluate how they affect my results, and suggest ways to minimize them. When asked, I can explain the difference between accuracy & precision, error & uncertainty, and identify experimental variables as independent, dependent or controlled and analyze these within a given experiment or online simulation.	
LSSR3	I can analyze data, and lab or online simulation results appropriately and analyze the information clearly and completely. I can make a claim about the data or results and support the claim with data, evidence and reasoning support the correct physical model in the situation. I can compare and analyze how an online simulation might be different than a similar hands-on lab activity and discuss what challenges there are with each format.	
LSSR4	I can identify patterns in data and represent the data mathematically and graphically, along with providing physical meaning to the slope, y-intercept, and area where appropriate. When making a graph, I can place variables correctly, label axes, and follow other graphing norms to show a possible relationship between two variables. I can explain the physical significance of a graph's slope, including if the slope is changing.	
LSSR5	I can correctly use a graphing program such as Graphical Analysis, Logger Pro, or spreadsheets to correctly plot data. I can choose a correct graphical relationship and write the mathematical model for the relationship, if any, that's shown. If necessary I can linearize a graph to better show the relationship.	

Math Skills and Vectors: Unit 0-C

Standard	Description	Score
	I can solve various algebraic equations for any variable. I can solve problems with right angle trigonometry (sine, cosine, tangent, Pythagorean theorem). I can interpret how the shape of a graph relates to a mathematical relationship. I can use conversion factors to express quantities in other units (metric-metric, English-metric). I can use proportional reasoning to explain mathematical models and formulas. NOTE: This will not be a separate standard, but it is the math that will be embedded within problem-solving for a number of the content standards.	
MV1	I can show a clear understanding of the similarities and differences between scalar and vector quantities, including representing vector quantities with diagrams.	
MV2	I can add, subtract, and find the vector product of multiple vectors both graphically and using mathematics such as the Pythagorean Theorem and trigonometry and I can break down a resultant vector into components using the same techniques.	

Forces: Unit 1

Standard	Description	Score
F1	I can solve both static and dynamic force problems using multiple models to check for consistency (e.g. Balanced Force Particle Model vs. Unbalanced Forces Particle Model) and relate gravitational force with the mass of an object to explain the concept of '*g*', gravitational acceleration.	
F2	I can correctly draw, label, and interpret Free Body Diagrams (FBD's) based on a situation, use FBD's to help describe the motion of an object, and identify different types of forces (applied, friction, drag, normal).	
F3	I can relate and apply Newton's Laws (1st [Law of Inertia], 2nd [Law of Acceleration] and 3rd [Law of Interaction]) to 1-D and 2-D motion using mathematics, graphs, diagrams, and verbal or written descriptions in various situations including those that involve static, kinetic or rolling friction and stretched or compressed springs.	

Momentum and Impulse: Unit 2

Standard	Description	Score
MI1	I can demonstrate that momentum is conserved in an isolated system before and after a collision or explosion, and that the change in momentum in a non-isolated system is equal to the impulse applied to the system by an outside force. I can also explain how force and collision time are inversely related and understand this can be used to protect an object in a collision (such as with an airbag) with the idea that for the same impulse a smaller force can be applied over a larger time interval.	
MI2	I can mathematically apply the law of momentum conservation to various types of collisions using correct vector resolution to determine the motion of center of mass of a system (which is conserved before and after a collision) and the speed and direction of individual objects that collide.	

1-Dimensional Motion: Unit 3

Standard	Description	Score
1D1	I can use mathematical models to solve physics problems involving 1-D motion and I can distinguish between vector and scalar quantities in 1-D motion to solve problems appropriately (e.g., the difference distance and displacement, average speed and average velocity)	
1D2	I can draw and interpret motion graphs (position, velocity, acceleration), motion maps, mathematical models, and verbal or written descriptions to represent the motions of constant velocity or accelerating objects, and to determine the correct model of motion (constant velocity, constant acceleration, uniform circular motion, etc.)	
1D3	I can explain the meaning of slope (changing or constant), area and y-intercept as needed for kinematics graphs representing constant speed or accelerated motion, as well as other types of graphs that come up during the course.	

2-Dimensional Motion and Universal Gravitation: Unit 4

Standard	Description	Score
2D1	I can explain the horizontal and vertical motion of a projectile using constant velocity and constant acceleration models and solve mathematical problems involving projectile motion using 1-D motion concepts in numerous ways learned earlier in the course, including mathematically, graphically, with motion maps, and through descriptions. I can demonstrate the independence of horizontal and vertical motion for projectiles.	
2D2	I can identify what factors affect the amount of torque on an object, and use proportional reasoning to solve problems involving torque and forces. (T = F x d)	
2D3	I can correctly use and apply Newton's Law of Universal Gravitation mathematically, and conceptually to predict how gravitational forces change as positions and masses of objects change	

Energy conservation and transfer: Unit 5

Standard	Description	Score
E1	I can demonstrate a deep understanding of the Law of Conservation of Energy by showing an understanding of a system, including that energy can't be created or destroyed, only transferred in or out of a system (in the form of work) or transformed to a different form of energy (such as kinetic energy being converted into thermal [heat] energy).	
E2	I can use Work-Energy bar charts to demonstrate an understanding of energy conservation, and as a way to demonstrate energy flow (in the form or work) in or out of a system. I can also define a system and use that to explain energy conservation and interaction with the outside environment.	
E3	I can perform calculations for objects involving one or more types of energy, including elastic potential energy, gravitational potential energy, and kinetic energy. I can calculate the work done by a system or on a system, and demonstrate that power is the rate at which work is done. I can also explain the fundamental difference between potential energy and kinetic energy.	

Charge and electrostatics: Unit 6

Standard	Description	Score
EL1	I can predict whether charged particles will be attracted, repelled or have no interaction with other particles based on my understanding of electrostatics.	
EL2	I can mathematically apply Coulomb's Law and my understanding of vectors to determine the net force (magnitude and direction) on a charged object.	

DC circuits: Unit 7

Standard	Description	Score
DC1	I can identify the conditions needed to form a complete circuit, and what factors will affect the brightness of a bulb (which represents the power) of a circuit. I can predict how the brightness of a bulb will change if another element in the circuit is added or removed.	
DC2	I can determine and explain the relationships of current, voltage, resistance and power in simple series, parallel, and combined circuits using Ohm's Law and power calculations. I can use Kirchoff's rules for voltage and current to demonstrate conservation of energy and conservation of matter.	
DC3	I can demonstrate an understanding of resistance (and what factors affect resistance) and resistivity. and whether a material is Ohmic or not. I can make predictions about the resistance of various materials and wires of different thicknesses and lengths.	

Unit 8 (Project Performance and other topics - TBD)

Standard	Description	
P1	The quality of your design/project/lab/simulation when compared to others in class or the course as demonstrated by the standards described in the project handout (for example, a video relating a certain topic of physics to a sport of your choosing).	
P2	For collaborative or summative projects, the student demonstrates progress toward a finished project at checkpoints along the way as specified in the teacher instructions.	
P3	Collaborative or design projects will show a full understanding of the physics learned up to that point in the year, as demonstrated by the performance of the project and/or analysis of the performance verbally or in writing.	