TINKERING LABS Est. 2015

NGSS and Common Core Standards Mapped to Electric Motors Catalyst and Booster Pack Challenges

ORGANIZED BY STANDARD (CLICK HERE TO SEE "ORGANIZED BY CHALLENGE")

NEXT GENERATION SCIENCE STANDARD	DISCIPLINE CORE IDEA	STUDENTS WHO DEMONSTRATE UNDERSTANDING CAN:	ELECTRIC MOTORS CATALYST & BOOSTER PACK CHALLENGES
3-5-ETS1-1	ENGINEERING DESIGN	Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.	Catalyst Challenges: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 Booster Pack #1 Challenges: 1, 2, 3, 4, 5
3-5-ETS1-2	ENGINEERING DESIGN	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	Catalyst Challenges: 1, 2, 3, 4, 5, 7, 8, 9 Booster Pack #1 Challenges: 1, 2, 3, 4, 5
3-5-ETS1-3	ENGINEERING DESIGN	Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.	Catalyst Challenges: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 Booster Pack #1 Challenges: 1, 2, 3, 4, 5
3-PS2-1	MOTION AND STABILITY: FORCES AND INTERACTIONS	Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.	Catalyst Challenges: 3, 5, 8 Booster Pack #1 Challenges: 1, 4
3-PS2-2	MOTION AND STABILITY: FORCES AND INTERACTIONS	Use evidence to construct an explanation relating the speed of an object to the energy of that object.	Catalyst Challenges: 3, 4, 5, 8, 9 Booster Pack #1 Challenges: 1, 4
4-PS3-1	ENERGY	Ask questions and predict outcomes about the changes in energy that occur when objects collide.	Catalyst Challenges: 3, 4, 5, 8, 9 Booster Pack #1 Challenges: 1, 4
4-PS3-3	ENERGY	Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.*	Catalyst Challenges: 3, 4, 5, 9 Booster Pack #1 Challenges: 1
4-PS3-4	ENERGY	Generate and compare multiple solutions that use patterns to transfer information.* Support an argument that the gravitational force exerted by Earth on objects is directed down.	Catalyst Challenges: 1, 2, 3, 4, 5, 7, 8, 9 Booster Pack #1 Challenges: 2, 3, 5
4-PS4-3	WAVES AND THEIR APPLICATIONS IN TECHNOLOGIES FOR INFORMATION TRANSFER	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.	Catalyst Challenges: 1, 3 Booster Pack #1 Challenges: 2, 5
5-PS2-1	MOTION AND STABILITY: FORCES AND INTERACTIONS	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.	Catalyst Challenges: 9 Booster Pack #1 Challenges: 4

ORGANIZED BY STANDARD cont.

NEXT GENERATION SCIENCE STANDARD	DISCIPLINE CORE IDEA	STUDENTS WHO DEMONSTRATE UNDERSTANDING CAN:	ELECTRIC MOTORS CATALYST AND BOOSTER PACK CHALLENGES
MS-ETS1-1	ENGINEERING DESIGN	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.	Catalyst Challenges: 1, 2, 3, 5, 7, 8, 9, 10 Booster Pack #1 Challenges: 1, 2, 3, 4, 5
MS-ETS1-2	ENGINEERING DESIGN	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.	Catalyst Challenges: 1, 2, 3, 5, 7, 8, 9, 10 Booster Pack #1 Challenges: 1, 2, 3, 4, 5
MS-ETS1-3	ENGINEERING DESIGN	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.	Catalyst Challenges: 1, 2, 3, 5, 7, 8, 9, 10 Booster Pack #1 Challenges: 1, 2, 3, 4, 5
MS-ETS1-4	ENGINEERING DESIGN	Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.	Catalyst Challenges: 1, 2, 3, 5, 7, 8, 9, 10 Booster Pack #1 Challenges: 1, 2, 3, 4, 5
MS-PS2-1	MOTION AND STABILITY: FORCES AND INTERACTIONS	Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.	Catalyst Challenges: 3, 5, 8, 9 Booster Pack #1 Challenges: 1
MS-PS2-2	MOTION AND STABILITY: FORCES AND INTERACTIONS	Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.	Catalyst Challenges: 3, 4, 5, 8, 9 Booster Pack #1 Challenges: 1, 4
MS-PS2-3	MOTION AND STABILITY: FORCES AND INTERACTIONS	Ask questions about data to determine the factors that affect the strength of electric and magnetic forces	Catalyst Challenges: 1, 2, 3, 4, 5, 8, 9 Booster Pack #1 Challenges: 1
MS-PS3-1	ENERGY	Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.	Catalyst Challenges: 3, 5, 8, 9 Booster Pack #1 Challenges: 1
MS-PS3-5	ENERGY	Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.	Catalyst Challenges: 1, 2, 3, 5, 8, 9 Booster Pack #1 Challenges: 1

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