

MEEA's "Not the Standards" Guides to the Missouri Learning Standards – Physical Sciences (PS)

4 Core Ideas : 12 Components : 72 Learning Standards

Core Ideas > Components v	PS1 Matter and its Interactions (24)	PS2 Motion and Stability: Forces and Motion (19)	PS3 Energy (18)	PS4 Waves and their Applications in Technologies for Information Transfer (11)
A	Structure & Properties of Matter (15)	Forces & Motion (10)	Definitions of Energy (10)	Wave Properties (8)
B	Chemical Reactions (8)	Types of Interaction (9)	Conservation of Energy and Energy Transfer (5)	Electromagnetic Radiation (EMR) (2)
C	Nuclear Process (1)		Relationship between Energy and Forces (2)	Information Technologies and Instrumentation (1)
D			Energy in Chemical Processes and Everyday (1)	

Learning Standards

	PS1 Matter and its Interactions			PS2 Motion and Stability: Forces and Motion	
Grade (# MLS)	A Structure and Properties of Matter (15)	B Chemical Reactions (8)	C Nuclear Processes (1)	A Forces and Motion (10)	B Types of Interaction (9)
K (5)	1. qualitative observations of object properties			1. push/pull 2. desc ways to change direction and speed;	
1 (3)					
2 (4)	1. classify objects by properties 2. analyze materials for properties			1. Δ in object motion : Δ appl force or object's mass	
3 (3)	1. changes in states of water (gas, liquid, solid)	1. some changes caused by heating/cooling reversible, some not			1. cause/effect of magnetic, electrical forces acting at distance
4 (9)				1. predict future motion 2. effect of balanced or unbalanced forces on object	1. forces in Newtons to overcome friction 2. force or mass effect on motion
5 (7)	1. matter made of particles too small to see 2. prove conservation of mass	1. separate mixture by physical properties 2. whether combos of substances -> new substances			1. earth pulls objects to its center (down)
6-8 (18)	1. atomic composition simple molecules & extended structures 2. if chem rx has occurred 3. synthetics from nat res & their impact 4. thermal energy -> motion, temp, state	1. consv of atoms/mass 2. device that releases or absorbs thermal energy by chemical processes		1. solution to minimizing force during collision 2. change = sum of forces & object mass	1. factors affecting EM forces 2. graph gravity : mass of interacting objects 3. exp to show existence of EM fields, eval exp design
9-12 (23)	1. periodic table : element properties 2. periodic table -> simple chem rx products 3. substance properties -> attractive forces 4. +/- forces -> macroscopic properties 5. exo/endo thermic : bond energy change	1. temp or conc : rx rate 2. Δ conditions : product amt (Le Chatelier's Principle) 3. balanced chem equations, mole	1. changes in nucleus : fission, fusion, radioactive decay	1. $F=ma$ (2 nd Law) 2. consv of momentum 3. principles momentum and motion to minimize force during collision	1. predict grav forces using $F = G ((m_1*m_2)/r^2)$; 2. current > magnetic field & vice versa

Find more MEEA NtS Guides at <http://www.meea.org/resources/not-the-standards.html>

Learning Standards Continued

	PS3 Energy				PS4 Waves and their Applications in Technologies for Information Transfer		
Grade	A Definitions of Energy (10)	B Conservation of Energy and Energy Transfer (5)	C Relationship between Energy and Forces (2)	D Energy in Chemical Processes & Everyday (1)	A Wave Properties (8)	B Electromagnetic Radiation (EMR) (2)	C Waves and their Applications in Technology (1)
K	1. observations to detect effect of sunlight	1. structure to reduce warming by sun					
1	1. id energy source causing increase in temp				1. vibrations : sound & vice versa		1. light or sound comm device
2					1. vibration Δ : sound Δ		
3							
4	1. speed of object : energy of object	1. explain energy transform 2. energy transform device	1. how simple machines transform energy		1. patterns by ampl/wavelength, & that waves can move objects		
5				1. food is from sun	1. seeing needs light reflected from object		
6 - 8	1. kinetic energy : object mass, speed 2. pot energy storage : object position 3. optimal thermal energy transfer structure 4. energy transfer : matter type : mass : temp change	1. object's kinetic energy change : object's energy transfer			1. wave amplitude : wave energy 2. wave reflection, absorp, transmission thru various materials		
9-12	1. model of energy change in system 2. particle motions > macro motion 3. energy converting device	1. 2 nd Law of Energy	1. forces betw, energy changes in interacting objects		1. freq : wavelength : wave speed in var media 2. EMR either wave or particle, both useful	1. tech info how EMR interacts w/ matter 2. effects of absorbed EMR on matter	

Symbols and Abbreviations

: proportional to, in relation to
 -> causes or has an effect on
 = equals
 / separating items on a list
 Δ change in or change

Goals of the MEEA NtS Guides

1. To help narrow the search for a specific standard with which a lesson aligns,
 2. to make connections and guide curriculum development for standards covered in the same grade,
 3. and to provide a map for the development of a concept from Kindergarten to High School so educators know how a concept fits into the big picture, and when might be the best time to teach it based on students' developmental ages.

How to Use the MEEA NtS Guides

1. If you have a lesson to teach, scan for the core idea, the component and then the learning standard that fits best – then look up the full standard description at <https://dese.mo.gov/college-career-readiness/curriculum/missouri-learning-standards>
 2. If you have an audience to teach, scan across its grade level to see which standards might line up with a lesson you have or would like to create – then look it up

NGSS Science and Engineering practices

1. ask questions and define problems
 2. develop and use models
 3. plan and carry out investigations/fair tests
 4. analyze and interpret data
 5. use mathematics and computational thinking
 6. construct explanations and design solutions CEDS
 7. engage in argument from evidence
 8. obtain, evaluate and communicate information

NGSS Cross Cutting Concepts

1. Patterns
 2. Cause and Effect: Mechanism and explanation
 3. Scale, Proportion and Quantity
 4. Systems and System Models
 5. Energy and Matter: Flows, cycles and conservation
 6. Structure and Function
 7. Stability and Change
<https://www.nextgenscience.org>

Socio-scientific Issues

SSI are complex, contested social questions with a scientific component. They provide an authentic opportunity to dig into science concepts. All environmental issues are SSI.
<https://serc.carleton.edu/sp/library/issues/what.html>

5 E Model – Engage, Explore, Explain, Elaborate, Evaluate – <https://bscs.org/bscs-5e-instructional-model>