

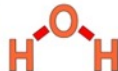
MS-PSI-1

STRUCTURE & PROPERTIES OF MATTER

DEVELOP MODELS TO DESCRIBE THE ATOMIC COMPOSITION OF SIMPLE MOLECULES AND EXTENDED STRUCTURES.



"Substances are made from different types of atoms, which combine with one another in various ways. Atoms can combine to form molecules."



MS-PSI-3

STRUCTURE & PROPERTIES OF MATTER

GATHER AND MAKE SENSE OF INFORMATION TO DESCRIBE THAT SYNTHETIC MATERIALS COME FROM NATURAL RESOURCES AND IMPACT SOCIETY.



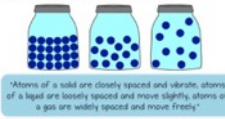
"Pure, natural substances are used to form new, synthetic substances with different properties."



MS-PSI-4

STRUCTURE & PROPERTIES OF MATTER

DEVELOP A MODEL THAT PREDICTS AND DESCRIBES CHANGES IN PARTICLE MOTION, TEMPERATURE, AND STATE OF A PURE SUBSTANCE WHEN THERMAL ENERGY IS ADDED OR REMOVED.



"Atoms of a solid are closely spaced and vibrate, atoms of a liquid are loosely spaced and move slightly, atoms of a gas are widely spaced and move freely."

MS-PSI-2

CHEMICAL REACTIONS

ANALYZE AND INTERPRET DATA ON THE PROPERTIES OF SUBSTANCES BEFORE AND AFTER THE SUBSTANCES INTERACT TO DETERMINE IF A CHEMICAL REACTION HAS OCCURRED.



"A pure substance has characteristic physical and chemical properties that can be used to identify it. Pure substances can react chemically to form different substances that have different properties."



MS-PSI-5

CHEMICAL REACTIONS

DEVELOP AND USE A MODEL TO DESCRIBE HOW THE TOTAL NUMBER OF ATOMS DOES NOT CHANGE IN A CHEMICAL REACTION AND THUS MASS IS CONSERVED.



"In a chemical reaction, the total number of each type of atom doesn't change. Thus, total mass is conserved."

MS-PSI-6

CHEMICAL REACTIONS

UNDERTAKE A DESIGN PROJECT TO CONSTRUCT, TEST, AND MODIFY A DEVICE THAT EITHER RELEASES OR ABSORBS THERMAL ENERGY BY CHEMICAL PROCESSES.



"Some chemical reactions release energy while other chemical reactions store energy."



MS-PS2-1

FORCES & INTERACTIONS

APPLY NEWTON'S THIRD LAW TO DESIGN A SOLUTION TO A PROBLEM INVOLVING THE MOTION OF TWO COLLIDING OBJECTS.



"For any pair of interacting objects, the force exerted by the first object on the second object is equal in strength to the force that the second object exerts on the first, but in the opposite direction."



MS-PS2-2

FORCES & 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.



"If the total force on the object is not zero, its motion changes. The greater an object's mass, the greater the force needed to achieve the same change in motion."



MS-PS2-4

FORCES & INTERACTIONS

CONSTRUCT AND PRESENT ARGUMENTS USING EVIDENCE TO SUPPORT THE CLAIM THAT GRAVITATIONAL INTERACTIONS ARE ATTRACTIVE AND DEPEND ON THE MASSES OF INTERACTING OBJECTS.



"Gravitational forces are always attractive. There is a gravitational force between any two masses, but it is very small except when one or both of the objects have large masses."



MS-PS2-5

FORCES & INTERACTIONS

CONDUCT AN INVESTIGATION AND EVALUATE THE EXPERIMENTAL DESIGN TO PROVIDE EVIDENCE THAT FIELDS EXIST BETWEEN OBJECTS EXERTING FORCES ON EACH OTHER EVEN THOUGH THE OBJECTS ARE NOT IN CONTACT.



"Forces that act at a distance can be explained by fields that extend through space and can be measured by their effect on a test object."



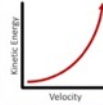
MS-PS3-1

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.



"Kinetic energy is called kinetic energy, it is proportional to the mass of a moving object and grows exponentially with speed."



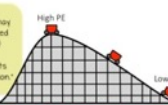
MS-PS3-2

ENERGY

DEVELOP A MODEL TO DESCRIBE THAT WHEN THE ARRANGEMENT OF OBJECTS INTERACTING AT A DISTANCE CHANGES, DIFFERENT AMOUNTS OF POTENTIAL ENERGY ARE STORED IN THE SYSTEM.



"An object may contain stored (potential) energy depending on its relative position."



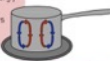
MS-PS3-3

ENERGY

APPLY SCIENTIFIC PRINCIPLES TO DESIGN, CONSTRUCT, AND TEST A DEVICE THAT EITHER MINIMIZES OR MAXIMIZES THERMAL ENERGY TRANSFER.



"Temperature is a measure of the average kinetic energy of particles in an object. This energy spontaneously transfers from hot regions or objects to colder ones."



MS-PS3-4

ENERGY

PLAN AN INVESTIGATION TO DETERMINE THE RELATIONSHIPS AMONG THE ENERGY TRANSFERRED, THE TYPE OF MATTER, THE MASS, AND THE CHANGE IN THE AVERAGE KINETIC ENERGY OF THE PARTICLES AS MEASURED BY THE TEMPERATURE OF THE SAMPLE.



"The amount of energy transfer needed to change the temperature of a matter sample by a given amount depends on the nature of the matter, the size of the sample, and the environment."



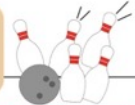
MS-PS3-5

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.



"When the motion energy of an object changes, there is necessarily some other change in energy of the same type."



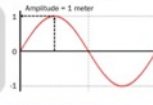
MS-PS4-1

WAVES & ELECTROMAGNETIC RADIATION

USE MATHEMATICAL REPRESENTATIONS TO DESCRIBE A SIMPLE MODEL FOR WAVES THAT INCLUDES HOW THE AMPLITUDE OF A WAVE IS RELATED TO THE ENERGY IN A WAVE.



"A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude."



MS-PS4-2

WAVES & ELECTROMAGNETIC RADIATION

DEVELOP AND USE A MODEL TO DESCRIBE THAT WAVES ARE REFLECTED, ABSORBED, OR TRANSMITTED THROUGH VARIOUS MATERIALS.



"When light shines on an object, it is reflected, absorbed, or transmitted through the object, depending on the object's material and the frequency of the light."



MS-PS4-3

WAVES & ELECTROMAGNETIC RADIATION

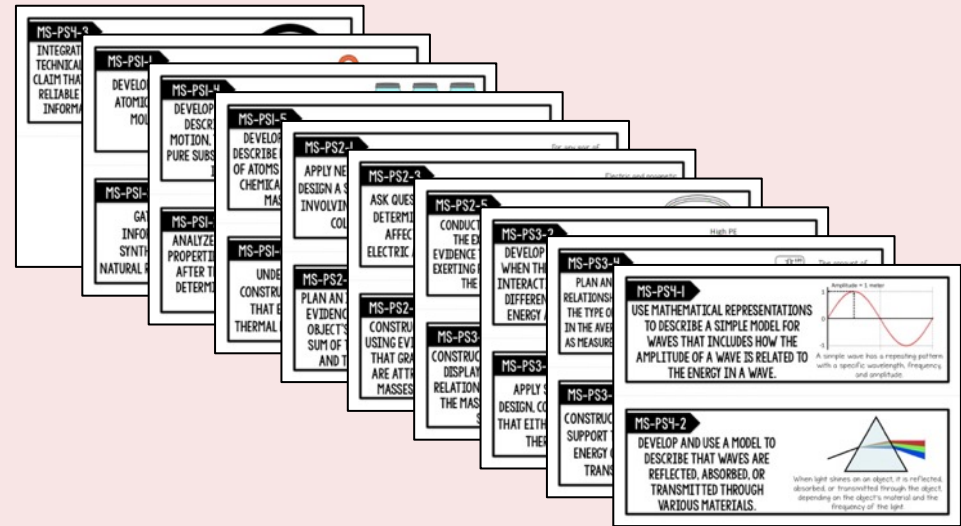
INTEGRATE QUALITATIVE SCIENTIFIC AND TECHNICAL INFORMATION TO SUPPORT THE CLAIM THAT DIGITIZED SIGNALS ARE A MORE RELIABLE WAY TO ENCODE AND TRANSMIT INFORMATION THAN ANALOG SIGNALS.



"Digital signals (sent as wave pulses) are a more reliable way to encode and transmit information compared to analog signals."



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STUDENT MINIS IN COLOR & B/W WITH & WITHOUT KEYHOLE PLACEHOLDER

