

Student Review

Matter & Energy Semester A 2009 Examination

Test Description

Length: 2 hours

Points: 54 SR, 4 BCRs Honors 55 SR, 4 BCRs

Unit	<u>Approximate</u> number of Selected Response Items	<u>Approximate</u> number of Constructed Response Items
Skills & Processes	20	1
Motion	6	1
Force	7	1
Forms of Energy	8	
Transformation of Energy	7	1
Magnetic & Electrical Forces	6	
Totals	54 (Honors 55)	4

Some Vocabulary for the Semester A Test

The vocabulary list includes words students may encounter when reading the items.

Acceleration	Gram	Potential energy
Ampere	Graph	Repulsion
Attraction	Gravitational Field	Resistance
Chemical energy	Gravity	Scientific notation
Circuit	Heat energy	Series circuit
Conduction	Hypothesis	Solar energy
Conductor	Independent variable	Sound energy
Constant	Induction	Speed
Control	Inertia	Thermal energy
Current	Insulator	Trial
Dependent variable	Kilogram	Velocity
Distance	Kinetic energy	Volt
Electrical energy	Lubricate	Volume
Electrical potential	Magnet	Weight
Electric Field	Mass	Work
Electricity	Mileage	
Electromagnet	Mechanical energy	
Electromagnetic radiation	Newtons	
Energy	Nuclear energy	
Energy transformation	Ohm	
Force	Parallel circuit	
Friction	Pendulum	
Generator	Phase Change	
Graduated cylinder	Polarization	

Student Review

Objectives

Matter & Energy Skills and Processes

Upon successful completion of Semester A the student should be able to:

- formulate a working hypothesis from an informal statement or opinion.
- given a testable question, select appropriate equipment to conduct an investigation.
- given a testable question, identify dependent and independent variables.
- given a technical reading passage, formulate a testable question.
- identify appropriate methods for conducting an investigation (repeated trials, appropriate sample size, etc.).
- recognize that a control is a standard for comparison.
- demonstrate skills in using lab equipment.
- recognize when it is required to wear safety goggles.
- recognize safe laboratory procedures.
- select appropriate units to describe quantities.
- given a graph, be able to read, analyze, and understand the data.
- given a set of data, select the appropriate type of graph (line, bar, circle, etc.).
- given a data table, recognize trends in data.
- organize data appropriately using graphs with axes labeled with appropriate intervals, independent and dependent variables on correct axes, and appropriate title.
- check graphs to determine that they do not misrepresent results.
- given a graph of time and distance, calculate a speed.
- given a graph or table, describe trends revealed by data.
- analyze data to make predictions or draw conclusions.
- critique arguments that are based on faulty, misleading data or on the incomplete use of numbers.
- recognize data that are biased.
- explain scientific concepts and processes through writing.
- read a technical selection and interpret it appropriately.
- manipulate quantities and/or numerical values in algebraic equations.
- express numbers in scientific notation.

Matter & Energy Concepts

- given a diagram with speed and direction labeled, distinguish between speed and velocity.
- given the formula $Acceleration = \Delta Velocity / \Delta Time$ and the variables $\Delta Velocity$ and $\Delta Time$ calculate the acceleration.
- understand positive and negative acceleration.
- given a graph of *Distance vs. Time* identify constant velocity and changing velocities.
- given a graph of *Velocity vs. Time* identify positive acceleration.
- given the formula $Velocity = Distance / Time$ and given any two of the quantities, calculate the missing quantity.
- define mass.
- define weight.
- compare mass and weight in terms of appropriate tools and units of measurement.

Student Review

- describe Newton's First Law.
- define inertia.
- describe Newton's Second Law.
- solve both qualitative and quantitative problems using force, mass, and acceleration.
- solve qualitative problems using the Law of Universal Gravitation.
- describe the sources and effects of friction.
- describe the effect of distance on the strength of gravitational force upon an object.
- describe work (Work = Force x Distance).
- describe the relationship between energy and work.
- provide qualitative descriptions of kinetic energy and potential energy.
- given a diagram of a pendulum, identify the source of potential energy.
- describe energy transformation in a system (e.g., potential < > kinetic).
- describe energy transformation in a system (e.g., chemical < > electric).
- distinguish between electromagnetic, chemical, heat, nuclear, mechanical energy.
- describe the properties of magnetic force, including poles and lines of force.
- describe the properties of electrical force, including charge and conduction.
- distinguish between open, closed, parallel, and series circuits.
- compare a conductor to an insulator.
- given a diagram of oppositely charged objects, predict the effect the charges will have on the objects.
- identify appropriate units for electrical potential.
- given the formula $Amperes = Volts / Ohms$ and given any two variables, calculate the missing variable.
- define *Electric Current*.
- describe the relationship between electric current and a magnetic field.
- compare electric fields and gravitational fields.
- understand kinetic energy in relation to molecular motion.
- compare heat energy and temperature in terms of molecular motion.
- describe the Law of Conservation of Mass and Energy.
- explain how changes in energy can result in physical changes in matter (density, volume, pressure).
- explain how differentials in energy can result in work (gravitational potential energy, electrical potential energy; heat).
- given a graph of temperature vs. time, explain the role of energy in phase changes.
- explain that chemical bonds store energy.
- identify common forms of radiation and their uses (alpha, beta, gamma).

Useful Websites

This document (Matter & Energy Semester A Examination Student Review sheet) can be found online at the MCPS Science website : <http://www.montgomeryschoolsmd.org/curriculum/science/>

EQUATIONS

$$\mathbf{I = V/R}$$

$$\mathbf{S = d/t}$$

$$\mathbf{a = \frac{v_f - v_i}{t}}$$

$$\mathbf{a = \Delta v/\Delta t}$$

$$\mathbf{F = ma}$$