

8th Grade Science – Midterm Study Guide

Unit 1 – Measurement = 5 Questions (11.1%)

- Understand how to interpret a graph of data.
- Be able to identify the independent and dependent variables on a table of data, experiment description, or graph of data.
- Be able to identify possible controls and constants used in an experiment.
- Be able to calculate the slope of a graph.
- Be able to make a clear conclusion from the evidence given in an experiment.

Unit 2 – Motion = 6 Questions (13.3%)

- Understand the difference between scalar and vector quantities and know examples of each.
- Be able to add vector arrows together by the “tail-to-tip” method.
- Understand that linear graph on a position-time graph shows constant velocity and be able to calculate the velocity using a position-time graph (by calculating the slope).
- Be able to calculate the average speed or average velocity of an object in motion.
- Be able to calculate the speed of an object that accelerates over a certain period of time.
- Be able to calculate the acceleration of an object in motion using the change of velocity over time.

Unit 3 – Forces and Momentum = 12 Questions (26.7%)

- Understand Newton’s First Law (Law of Inertia) and inertia’s sole dependence on mass.
- Understand Newton’s First Law in that an object in motion will stay in motion unless a net force acts upon an object.
- Be able to calculate the force of gravity (or weight) of an object.
- Be able to draw a free body diagram (both in equilibrium and accelerating)
- Be able to calculate the net force on an object given its mass and acceleration.
- Be able to calculate the net force on an object given multiple forces acting on the object.
- Be able to calculate the acceleration of an object given the mass of the object and the net force (determined from multiple forces acting on the object).
- Understand Newton’s Third Law and action-reaction forces being equal.
- Be able to calculate the momentum of moving objects.
- Be able to calculate the total momentum before a collision, total momentum after a collision, and the speed of an object after a collision (using a momentum chart). Also, understanding that there is always a conservation of momentum.

8th Grade Science – Midterm Study Guide

Unit 4 – Universal Gravitation = 11 Questions (24.4%)

- Understand that the net force on an object moving in circular motion is directed towards the center.
- Understand that the acceleration of an object moving in circular motion is directed towards the center.
- Understand that the velocity of an object moving in circular motion is directed tangent to the curve.
- Be able to calculate the centripetal force on an object moving in circular motion.
- Understand that the gravitational force between any two objects with mass is equal and opposite to each other.
- Know Kepler's Three Laws of Planetary Motion.
- Understand how we get our phases of the moon.
- Know the eight phases of the moon given the position of the moon and the Sun's rays.
- Know which positions of the moon, Sun, and Earth give both solar and lunar eclipses and be able to differentiate between those two eclipses.
- Know the positions of the moon, Sun, and Earth that give rise to spring and neap tides and be able to differentiate between those two specific tides.

Unit 5 – Energy = 11 Questions (24.4%)

- Be able to calculate the gravitation potential energy of an object at a height.
- Be able to calculate the kinetic energy of an object that is moving at a specific velocity.
- Understanding the mechanical energy is conserved (potential energy + kinetic energy) is the same at all points.
- Be able to identify the point on a roller coaster track that has the greatest gravitational potential energy, the greatest kinetic energy, the greatest velocity, and that the mechanical energy is the same for all points.
- Be able to calculate the heat that water can absorb or release given the mass and temperature change.
- Understand the difference between conduction, convection, and radiation and know examples of each.
- Understand that when a substance changes its state of matter the temperature remains constant until the change of state is complete.
- Understand that when a substance is changing its state of matter, a physical change is present which breaks or forms attractions with the molecules.
- Understand that frequency and wavelength are inversely proportional to each other.
- Be able to identify wavelength and amplitude of a wave.
- Be able to distinguish the relative magnitudes of wavelength, frequency, and energy given the electromagnetic spectrum.