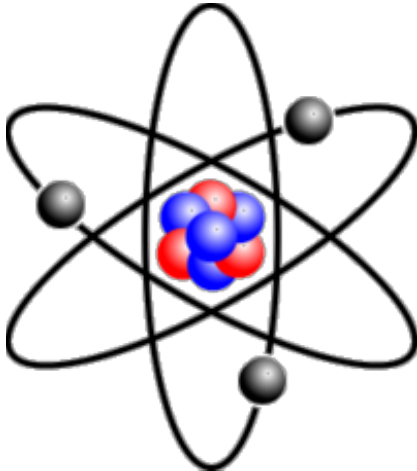


8th Grade Science

Chemistry

(5A-F) Matter and energy. The student knows that matter is composed of atoms and has chemical and physical properties.



Questions 5A: (5A) describe the structure of atoms, including the masses, electrical charges, and locations, of protons and neutrons in the nucleus and electrons in the electron cloud;

1. What is the mass of the atom above?
2. What is the charge of the atom above, explain?
3. What are subatomic particles, what are their charges, and where are they found?
4. What is the nuclear model of the atom?
5. What is the mass of an atom and how is that determined?
6. How do atoms define (or determine) elements?

Questions 5B: (5B) identify that protons determine an element's identity and valence electrons determine its chemical properties, including reactivity

1. How do protons determine an element's identity?
2. How do valence electrons determine an element's chemical properties?

Questions 5C: (C) interpret the arrangement of the Periodic Table, including groups and periods, to explain how properties are used to classify elements

1. How are elements arranged on the Periodic Table?
2. What does the atomic number represent?
3. What determines the atomic mass of an element?
4. What do the columns on the Periodic Table represent, and how is the information used?
5. What do the rows on the Periodic Table represent, and how is the information used?
6. What physical and chemical properties are determined by investigating the Periodic Table?

Questions 5D: (D) recognize that chemical formulas are used to identify substances and determine the number of atoms of each element in chemical formulas containing subscripts

1. What is a chemical formula? What specific information does it illustrate?
3. What is a chemical equation? What specific information does it illustrate?
4. What does it mean to “balance” a chemical equation?
5. What is the Law of Conservation Mass? How does this relate to a balanced chemical equation?

Questions 5E: (E) investigate how evidence of chemical reactions indicate that new substances with different properties are formed; and

1. In a chemical reaction, how do the reactants recombine to form products?
2. What new properties might you see when a new substance is formed?

Questions 5F: (F) recognize whether a chemical equation containing coefficients is balanced or not and how that relates to the law of conservation of mass.

1. What defines a chemical reaction?
2. What is a chemical equation?
3. What are the reactants and products of a chemical equation?
4. What are the four signs that indicate a chemical reaction has taken place?
5. What are the five kinds of chemical reactions?

Ecology

(11 A-D) Organisms and environments. The student knows that interdependence occurs among living systems and the environment and that human activities can affect these systems.

Questions 11A: (A) describe producer/consumer, predator/prey, and parasite/host relationships as they occur in food webs within marine, freshwater, and terrestrial ecosystems.

1. How does energy flow in a food chain and food web?
2. Within a given food web, what are the primary producers (autotrophs) and heterotrophs, including the primary consumers, secondary consumers, and tertiary consumers?
3. What are examples of predator/prey relationships and parasite/host relationships found within a food web?
4. What are examples of primary producers and primary and secondary consumers within a marine and freshwater food web?
5. What are examples of primary producers and primary and secondary consumers within a terrestrial food web?

Question 11B: (B) investigate how organisms and populations in an ecosystem depend on and may compete for biotic and abiotic factors such as quantity of light, water, range of temperatures, or soil composition

1. How do organisms depend on abiotic and biotic factors to survive?
2. What happens when two species in the same environment occupy the same niche?
3. How are habitat resources affected by competition?

Questions 11C: (C) explore how short- and long-term environmental changes affect organisms and traits in subsequent populations

1. How are organisms and populations affected by human-induced environmental changes?
2. How are organisms and populations affected by natural environmental changes?
3. How do populations respond to long-term environmental changes?
4. How do populations respond to short-term environmental changes?
5. What is the difference between diversity and abundance?

Questions 11D: (D) recognize human dependence on ocean systems and explain how human activities such as runoff, artificial reefs, or use of resources have modified these systems.

1. What ocean systems do humans depend on, and how do they rely on these systems?
2. How have human activities modified the ocean systems on which they depend?
3. What are the consequences of human impact on ocean systems?

Geology

(9 A-C) Earth and space. The student knows that natural events can impact Earth systems. The student is expected to:

Questions 9A: (A) describe the historical development of evidence that supports plate tectonic theory

1. What was the early theory of continental drift; who developed it, and when was it developed?
2. What were the discoveries that led to a theory of plate tectonics, and when were these discoveries made?

Questions 9B: (B) relate plate tectonics to the formation of crustal features

1. What is Earth's lithosphere made of, and how does it affect crustal features?
2. What features of Earth's crust do convergent, divergent, and transform boundaries form?
3. What land features formed by the movement of tectonic plates can be observed using images from space?

Questions 9C: (C) interpret topographic maps and satellite views to identify land and erosional features and predict how these features may be reshaped by weathering.

1. What is a topographic map? How is it used?
2. How can a scientist study erosional changes in a landform over time?
3. How can scientists predict changes caused by sediment deposition, glacier movement, and river courses?
4. How can topographic maps and satellite views help scientists study landforms?

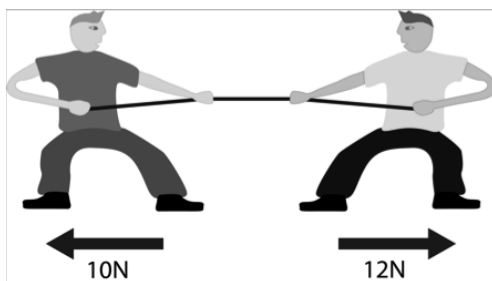
PHYSICS

(6 A-C) Force and motion Force, motion, and energy. The student knows that there is a relationship between force, motion, and energy

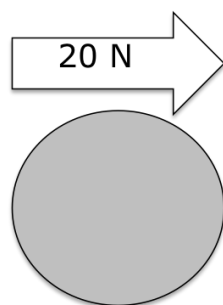
(A) demonstrate and calculate how unbalanced forces change the speed or direction of an object's motion

1. Examine the image provided. Marcelo and Jesus are playing tug of war. Marcelo is pulling left on one end of a rope with 10N of force. Jesus is pulling the rope in the opposite direction with 12N of force.

Who is pulling the rope harder and by how many more Newtons of force?



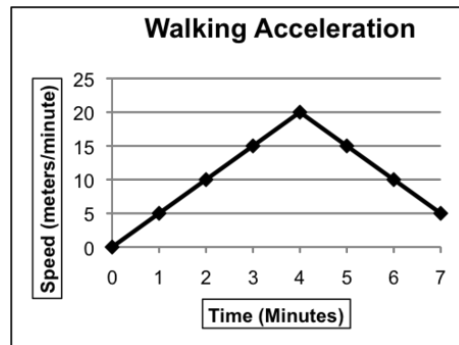
2. A ball is rolling across a field with a force of 20 N. If the force of friction from the field is 3.7 N, what would be the net force of the ball?



3. Gollner is riding his bike home after soccer practice. The force with which he was pushing down on the bike pedals allowed him to travel at a speed of 5 miles per hour. Suddenly, his speed increased to 8 miles per hour when he remembered that he had to get home earlier to help set the table. Why did Gollner's speed increase?

(B) Speed, velocity and acceleration The student is expected to differentiate between speed, velocity, and acceleration.

1. What is the difference between speed, velocity, and acceleration?
2. William rode his bicycle 100 meters south in 20 seconds and then went east another 100 meters in 20 seconds. Which of the terms can best be used to describe these changes- speed, velocity, acceleration?
3. How can one differentiate between speed, velocity, and acceleration on a graph?
4. Describe the walker's motion by using the graph below:



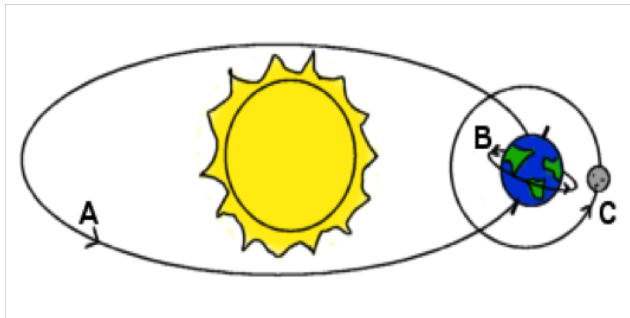
(C)Laws of force and motion- The student is expected to investigate and describe applications of Newton's law of inertia, law of force and acceleration, and law of action-reaction such as in vehicle restraints, sports activities, amusement park rides, Earth's tectonic activities, and rocket launches.

1. How does the mass of a body at rest affect its tendency to remain at rest?
2. How does the force required to move an object change with mass?
3. How does the force acting on an object affect its tendency to remain at rest?

Earth and space

(7 A-C) The student knows the effects resulting from cyclical movements of the Sun, Earth, and Moon.

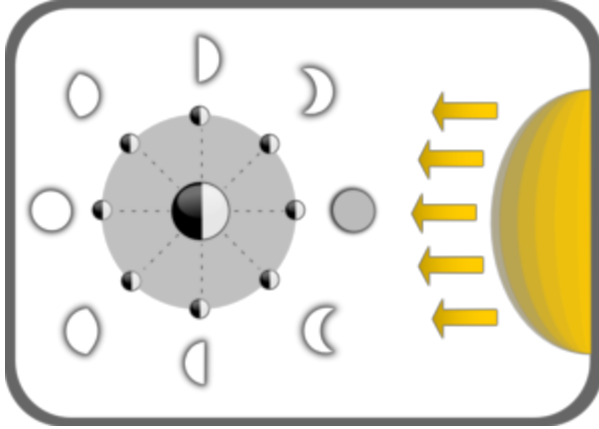
(A) rotation and revolution: model and illustrate how the tilted Earth rotates on its axis, causing day and night, and revolves around the Sun causing changes in seasons



1. Using the above diagram, which letter best depicts rotation?
2. Using the above diagram, which letter best depicts revolution?
3. What causes day and night?
4. What causes seasons?

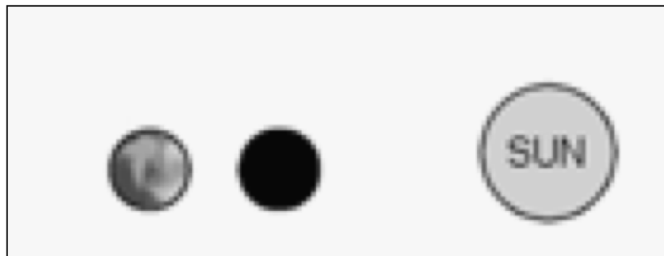
(B) lunar cycle: demonstrate and predict the sequence of events in the lunar cycle

1. What do the terms waxing and waning mean?
2. Label the moon phases in the diagram below:



3. Why do we see different viewpoints of the moon throughout the month?
(C) relate the position of the Moon and Sun to their effect on ocean tides

1. What are the two main causes of ocean tides?
2. When the Moon, Earth, and Sun system are in the positions as shown in the diagram below, what kind of tide does Earth's waters experience?

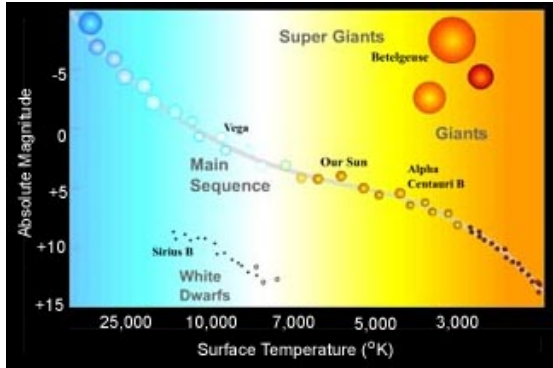


3. Why are we able to predict tides?

Universe

(8 A-D) The student knows the characteristics of the universe

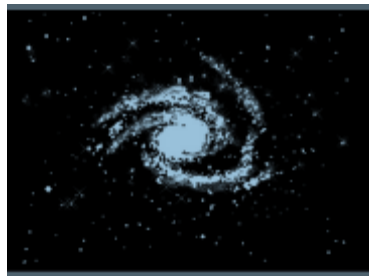
(A)The student is expected to describe components of the universe, including stars, nebulae, and galaxies, and use models such as the Hertzsprung-Russell Diagram for classification.



1. How are stars classified?
2. Examine the Hertzsprung-Russell diagram above. What information does the diagram provide for you about the Sun?
3. What is the nebulae of the star?
4. How are galaxies classified?

(B) recognize that the Sun is a medium-sized star near the edge of a disc-shaped galaxy of stars and that the Sun is many thousands of times closer to the Earth than any other

1. Examine the galaxy below. Where is our Sun located?



2. How does the distance of the Sun from Earth compare to the distances of other stars from Earth?

(C) explore how different wavelengths of the electromagnetic spectrum such as light and radio waves are used to gain information about distances and properties of components in the universe

1. Explain how different wavelengths of the electromagnetic spectrum are used to gain information about distances and properties of components in the universe.

2. When astronomers look at the spectral lines of galaxies, they find all of them to be shifted toward the red end of the spectrum. What does this redshift tell us about the motion of the galaxies?
3. A student made a model of the electromagnetic spectrum much like the one provided here. The visible light spectrum is near the center of the electromagnetic spectrum. Where would you predict the wavelength of red to be?

Student's Model of the Electromagnetic Spectrum

radio microwave infrared visible ultraviolet x-rays gammarays

(D) model and describe how light years are used to measure distances and sizes in the universe

1. What is the speed of light and how far does it travel in one Earth year?
2. How do astronomers measure distance?
3. How long has light from other stars been traveling toward Earth?

(E) research how scientific data are used as evidence to develop scientific theories to describe the origin of the universe

1. What pieces of evidence did scientists discover throughout the universe that supported the Big Bang theory about the creation of the universe?
2. An astronomer is able to determine the approximate age of the universe based on photos from telescopes. Why is this possible?
3. What does the formation of stars and other celestial objects tell us about the age of the universe?

Meteorology

(10A-C) The student knows that climatic interactions exist among Earth, ocean, and weather systems.

(A) Sun's energy- The student is expected to recognize that the Sun provides the energy that drives convection within the atmosphere and oceans, producing winds and ocean currents.

1. What is the major source of thermal energy on Earth?
2. What is convection?
3. How is wind formed?
4. How are ocean currents formed?

(B) weather maps- The student is expected to identify how global patterns of atmospheric movement influence local weather using weather maps that show high and low pressures and fronts.

1. Why and how are weather maps used for predicting weather?
2. How are cold fronts different from warm fronts?
3. What is the role of air pressure in the formation of weather conditions?
4. Illustrate the following weather symbols: warm front, cold front, stationary front, low pressure, high pressure

(C) oceans and weather- The student is expected to identify the role of the oceans in the formation of weather systems such as hurricanes

1. Why does the Panhandle of Texas have one type of weather while the Gulf Coast region has another?

Panhandle



Gulf Coast

2. What is a hurricane, and how does it form?
3. How are the effects of cold ocean currents on the weather in an area different from the effects of warm ocean currents?
4. Look at the picture of a cold climate. Tierra del Fuego, at the southern tip of South America, is very cold with not much vegetation. What could cause this type of climate?



5. A student planning to visit the rainforest in Costa Rica packed cool clothing for the hot, humid climate. Why does Costa Rica have warm and muggy weather?

