

## 8th Grade Honors Science : District Final Exam REVIEW Answers

### Science Process Skills

- Qualitative Data: characteristics of what is being studied (not measurable)
- Quantitative Data: refers to the amounts of what is being studied (measurable)
- Observation: gathering scientific information through the senses
- Control: experimental group that does not require the independent variable
- Independent variable: the variable that you change
- Dependent variable: the variable that you measure
- Constants: variables that stay the same in an experiment
- Mass: the amount of matter in an object
- Volume: how much space an object takes up
- Distance: how far apart 2 things are

### Review Questions

- a. Cody's dependent variable: length of gummy bears
- b. Cody's independent variable: water temperature (hot, cold, room temperature)
- c. Constants: gummy bears, water
- d. Possible hypothesis: If I place the gummy bears in hot water, then they will dissolve faster
- e. Qualitative observation about my pen/pencil: color, texture
- f. Quantitative observation about my pen/pencil: length, mass

### Units

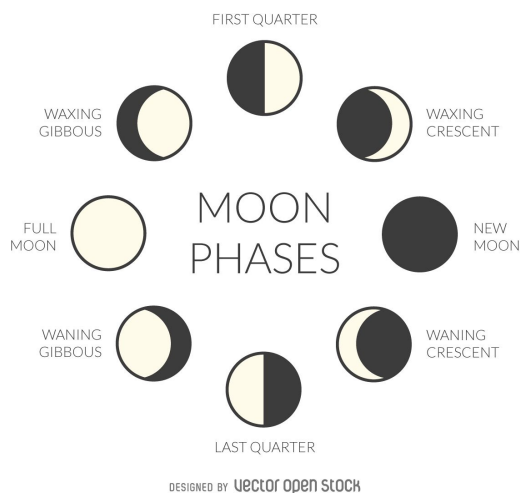
- a. Speed (m/s)
  - b. Speed (cm/s)
  - c. Speed (miles/hr)
  - d. Volume (55 ml)
  - e. Distance (67 cm)
  - f. Force (40 N)
  - g. Acceleration ( $3 \text{ m/s}^2$ )
  - h. Work (Joules)
  - i. Power (Watts)
  - j. Time (seconds)
  - k. Time (hours)
  - l. Grams (mass)
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## Earth in Space

- Orbit: curved path followed by space object as it revolves around another space object
- Revolve: the movement of an object around another object -- 365.25 days
- Rotate: the turning of an object on its central axis
- Moon: natural satellite revolving around a planet
- Axis: imaginary line running through the center of the Earth from the North
- Direct rays: light rays that hit the Earth directly (e.g. at the equator)
- Indirect rays: light rays that hit the Earth at an angle
- Day-Night Cycle: cycle caused by the Earth's rotation once on its axis
- Solar Eclipse: Moon is between the Earth and Sun casting a shadow on Earth
- Lunar Eclipse: Earth is between the Sun and Moon causing its shadow to fall on the Moon

## Review Questions

- 24 hours / 1 day
- Your shadow changes length and direction throughout the day. As the sun's position in the sky changes from East to West, the length and direction of shadows change in the opposite direction, West to East)
  - Morning - long shadow
  - Noon - shortest shadow
  - Afternoon - longest shadow
- Earth's revolution
- The tilt of Earth's axis and Earth's revolution
- 8 phases of the moon



f. We see different phases of the moon as a result of our position on Earth, and the changes in the angle of the sun's rays as they reflect on the Moon.

g. Extreme tides (spring tides) occur during either a New Moon or Full Moon. Extreme tides occur as a result of the gravitational pull of the Sun and Moon on the Earth's oceans. The strong gravitational pull of the Moon produces a tidal bulge on one side of the Earth.

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## Exploring the Solar System

- **Gravitational Force:** force of attraction between 2 objects that have mass
- **Piloted Mission:** mission involving technology piloted by human beings
- **Unpiloted Mission:** mission where the technology is controlled remotely
- **Spacecrafts:** equipment used to travel through solar space
- **Remote sensing:** process used to gather information from space on things that we are unable to see or touch
- **Planet:** large spherical object orbiting a star
- **Star:** celestial body made of hot gases in which nuclear fusion occurs
- **Moon:** natural satellite orbiting a planet
- **Solar system:** the collection of eight planets and their moons in orbit around the sun, together with smaller bodies in the form of asteroids, meteoroids, and comets

## Review Questions

- a. As mass increases, gravitational force increases
  - b. As distance increases, gravitational force decreases
  - c. Remote sensing can be used for:
  - d. Gravitational pull exists as long as there are objects with mass.
  - e. Planets need to keep moving in orbit to avoid collisions with other planets or space objects or being sucked into the Sun's center.
  - f. Planet: Mars
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## Energy

- **The Law of Conservation of Energy:** energy cannot be created or destroyed but instead is transformed or transferred.
- **Potential Energy:** stored energy
- **Kinetic Energy:** energy in motion
- **Conserving Energy:** reducing or saving the total energy transformed
- **Energy Transfer:** movement of energy from one object to another
- **Energy Transformation:** transfer of energy from one type to another
- **Temperature:** average temperature per molecule

## Review Questions

a.

<u>Potential Energy Type</u>	<u>Description</u>	<u>Example</u>
Chemical	Stored in the bonds of atoms	Fossil fuels / Food
Elastic	Stored by stretching or compressing	Rubber band, Compressed foam
Electric (static)	Stored by the buildup of charges (atoms /electrons)	Person walking on a rug / combing fine hair
Gravitational	Stored due to an object's mass and height	Train at the top of a roller coaster, water at the top of a waterfall
Nuclear	Stored in the nucleus of an atom	Hydrogen atoms in the center of the sun

b.

<u>Kinetic Energy Type</u>	<u>Description</u>	<u>Example</u>
Electric (current)	Movement of charge from one place to another	Lightning, electricity through wires
Light	Transferred by the rapid movement of electromagnetic fields	Sunlight, x-rays
Motion (kinetic)	Movement from one place to another	Moving train, wind
Sound	Transferred through vibration of an object	Music
Thermal	Transferred in transit from a hot to cold object	Water heating up, hot water cooling to room temperature



Toaster oven energy transformation diagram

c.

Electrical energy >>> sound, light, heat

d. When you open the door to the refrigerator, thermal energy from the outside flows into the refrigerator, increasing the temperature of the cold air inside. Therefore the food is at risk for being spoiled. The refrigerator will have to work harder to keep the food cool.



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## Force and Motion

- **Acceleration:** is a change in speed + direction (velocity)
- **Speed** = distance / time (note units)
- **Force:** mass x acceleration (note units)
- **Friction:** force created between objects that rub against each other
- **Balanced forces:** forces of the same magnitude acting on an object in opposite direction. Object stays at rest or if moving, moves at constant speed in the same direction.
- **Unbalanced forces:** two forces of different magnitude acting on object. Produces motion.
- **Center of mass:** where most of the mass is concentrated for an object.

## Review Questions:

### a. Newton's Laws of Motion:

- Law 1: **The Law of Inertia** (An object at rest stays at rest and an object in motion stays in motion unless acted on by an unbalanced force)
- Law 2: **F=ma** (An object's acceleration is dependent on its mass and the force being applied.)
- Law 3: **Action-Reaction** (For every action there is an equal and opposite reaction)

b. Trial 1: Speed = 25 m/s ; Trial 2: Speed = 2 m/s ; Trial 3: Speed = 80 m/s

c. A ball thrown into outer space would travel in a straight line. Due to **inertia**, the ball would keep moving in a straight line. Since there is no **friction** in space, the ball would continue to travel in a straight line infinitely.

### d. Force = m x a

$$\text{Force} = 10\text{kg} \times 7\text{m/s}^2 = 70\text{N}$$

### e.



Motion = moving in the direction of the larger force (right)

Net force =  $100\text{N} - 60\text{N} = 40\text{N}$  to the right. There is acceleration.

f. Speed of motion graph:  $10\text{m}/5 = 2 \text{ m/s}$

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## Waves

**Longitudinal wave:** mechanical wave that transfers energy by compressions and rarefactions

**Transverse wave:** electromagnetic wave which can travel with or without a medium.

**Amplitude:** the maximum distance of a wave from its resting point (loudness)

**Wavelength:** the distance between any 2 exact points on a wave (crest/crest) / (trough/trough)

**Frequency:** the # of waves or vibrations per second

**Visible Light Spectrum:** the colors of the rainbow (red-orange-yellow-green-blue-violet) - in that order.

**Medium:** material / matter through which a wave transfers its energy

**Absorbed:** light that goes into an object but does not come back out as light

**Reflection:** the bouncing of a wave off an object

**Transmission:** light passing through a vacuum or a material

**Refraction:** the bending of a wave as it passes through 2 mediums

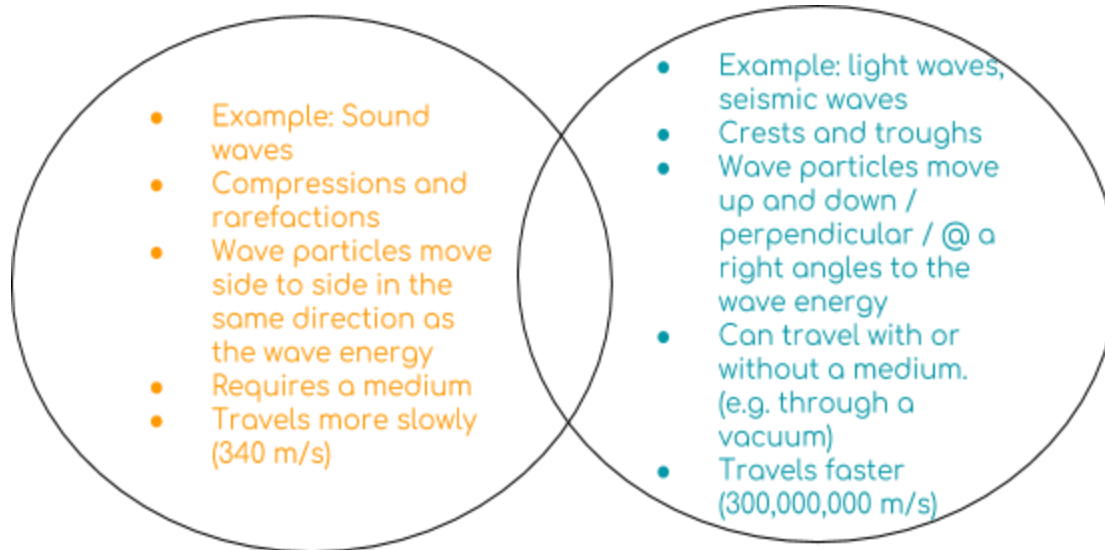
**Angle of Incidence:** the angle between the incident ray and the normal. Created when the incident ray hits a reflective surface (e.g. mirror)

## Review Questions

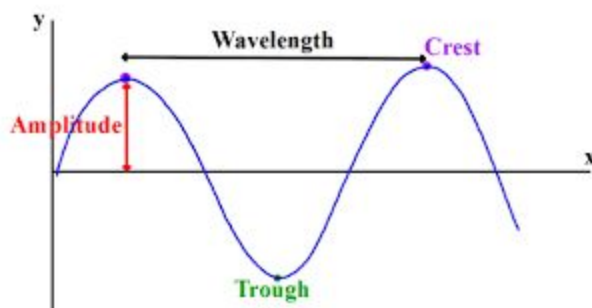
1. Venn diagram comparing and contrasting longitudinal and transverse waves.

Longitudinal

Transverse



2. Labeling the wave with wavelength and amplitude:



3. Watson should purchase a white car. *White objects reflect all the colors of the visible light spectrum* and as such, the visible light present in the sunlight hitting the car would be reflected. As a result, this light would not be transformed into the heat and the car would be kept cooler.

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## Evolution

Evolution: changes in species over time

Mutation: a change in the structure of a gene

Natural Selection: the process by which organisms who are better adapted survive and reproduce.

Population: all the organisms of a species living in the same environment and with the ability to reproduce

Inference: conclusion based on evidence or reasoning (what you think)

Trade-off: a negative result that you accept in order to gain something else.

## Review Questions

a. Organisms have changed over time as a result of evolution. Those changes have been structural (changes in skeletal structures) as well as genetic (changes in DNA - e.g. mutations). Some organisms have been able to adapt to those changes while others have gone extinct as a result.

b. Evidence to support evolution: DNA, skeletal structures and fossils

c. . An example of natural selection is the peppered moth. Peppered moths are usually white with black spots/speckles across their wings. Because of this coloring, it makes them able to camouflage against lichen (fungus) covered trees. A genetic mutation caused some of the peppered moth to have black wings. These black peppered moths were unable to camouflage themselves against the lichen trees and are more likely to be eaten by birds and lizards. Soon the population of black peppered moths declined. During the industrial revolution, the black (sooty) polluted air killed off lichens and blackened urban trees. As a result, black peppered moths were able to better camouflage than white peppered moths. Over successive generations, black peppered moths outnumbered white ones. This was natural selection in action. The color variation among the peppered moth species allowed the process of natural selection to occur.

d. Causes of extinction: competition, climate, human action (hunting), disease, lack of variation, inability to adapt

e. Trade-offs in bringing back extinct animals:

- could be an invasive species
- lack of resources to support a growing population of the species
- lack of adequate habitat
- disruption of the ecosystem.

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## Bioengineering

Prototype: the first, simplified, working version of a product.

Trade-off: a negative result that you accept in order to gain something else.

## Review Question

Bioengineers combine design and technology to solve problems in the life sciences.

*It's been a pleasure being your science teacher this year! Good Luck with Finals!*  
*Smile! It's almost over!*

Mrs. Ferdinand

