

## Review for Mid-Year Exam

### The Material World

1. Define mass and give 2 examples of objects with the units mg, g, and kg.  
Mass is the amount of matter in an object. You could mass powder or a sewing needle in mg, a pencil or a juice box in g, and a human or a bag of sugar in kg.
2. Define volume and describe how to find the volume of a regular object and irregular object. What are the units associated with each method?  
Volume is the amount of space occupied by an object (or substance).  
The volume of a regular object (cube, rectangular prism, etc.) can be calculated by multiplying the length by the width by the height. ( $V = l \times w \times h$ ) The units associated with this method are  $\text{cm}^3$   
The volume of an irregular object (e.g. a rock with no straight sides) can be measured using an overflow can, and a graduated cylinder. The amount of water displaced in the overflow can can be collected in the graduated cylinder and read. The units associated with this method are mL.
3. Define density and give the formula to calculate it. Be able to compare densities using numerical data or by diagrams.  
Density is the relationship between mass and volume. It is the amount of mass in a certain amount of volume. It can also be described by how compact particles are within a certain volume. Density =  $\frac{\text{Mass}}{\text{Volume}}$   
Comparing densities using numerical data can be found in the following question (4c) and using diagrams in your density quest.
4. Express the following information as a density
  - a) An irregular object with a mass of 18 kg displaces 2.5 L of water.  $7.2\text{kg/L}$
  - b) A 250 g piece of rock has a volume of  $50\text{ cm}^3$ .  $5\text{g/cm}^3$
  - c) Metal A has a mass of 600 g and displaces  $100\text{ cm}^3$  of water while Metal B has the same mass and has a volume of 75 mL. Which metal has a higher density?  
 $\text{Metal A} = 6\text{g/cm}^3$  or  $6\text{g/mL}$        $\text{Metal B} = 8\text{g/mL}$  or  $8\text{g/cm}^3$        $1\text{cm}^3=1\text{mL}$

Therefore Metal B has a higher density.
5. What happens to the density of air in a balloon if the volume is increased while the mass remains constant?  
The density will decrease since there will be more space and the particles will be less compact.

6. What is the difference between a physical change and a chemical change? Give 3 examples of each.

Physical changes do not change the nature or characteristic properties of a substance, and they do not produce new substances. Chemical changes will change the nature or characteristic properties of a substance, and new substances will be produced.

Physical changes: Ice melting, mud separating to water and dirt, mixing cut up vegetables

Chemical changes: Rust on a bike, burning wood, photosynthesis

7. What kind of changes are the phase change?

Phase changes (evaporation, condensation, melting, freezing, sublimation) are physical changes.

8. What are the indications or signs that a chemical change has occurred?

Formation of a gas, formation of a solid, colour change, emission of light, change in temperature.

9. Compare rocks and minerals using the words pure substance, heterogeneous mixture, and homogeneous mixture.

Rocks are heterogeneous mixtures of minerals, while minerals are pure substances, natural and homogeneous substances.

10. State the name and symbol of the first 20 elements from the periodic table.

Refer to the periodic table on p. 21 of your notebooks.

11. What is a molecule?

A molecule is a group of two or more chemically bonded atoms.

12. What is the smallest particle of matter that can exist on its own?

The atom

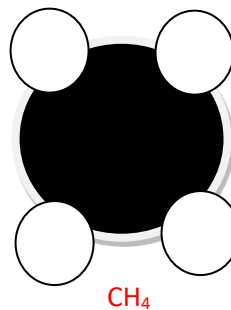
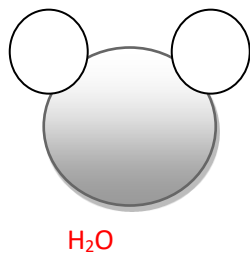
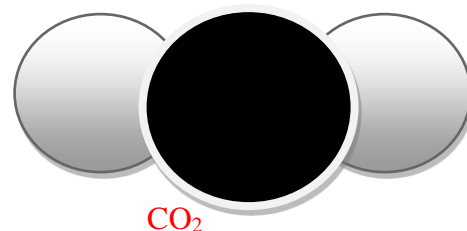
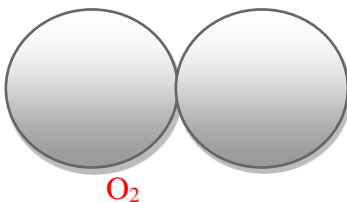
13. Match the formula with the following molecular model given that:

O<sub>2</sub>, CO<sub>2</sub>, H<sub>2</sub>O, CH<sub>4</sub>

gray = oxygen

white = hydrogen

black = carbon



14. For each of the molecules in the previous question, state the number of atoms of each element.

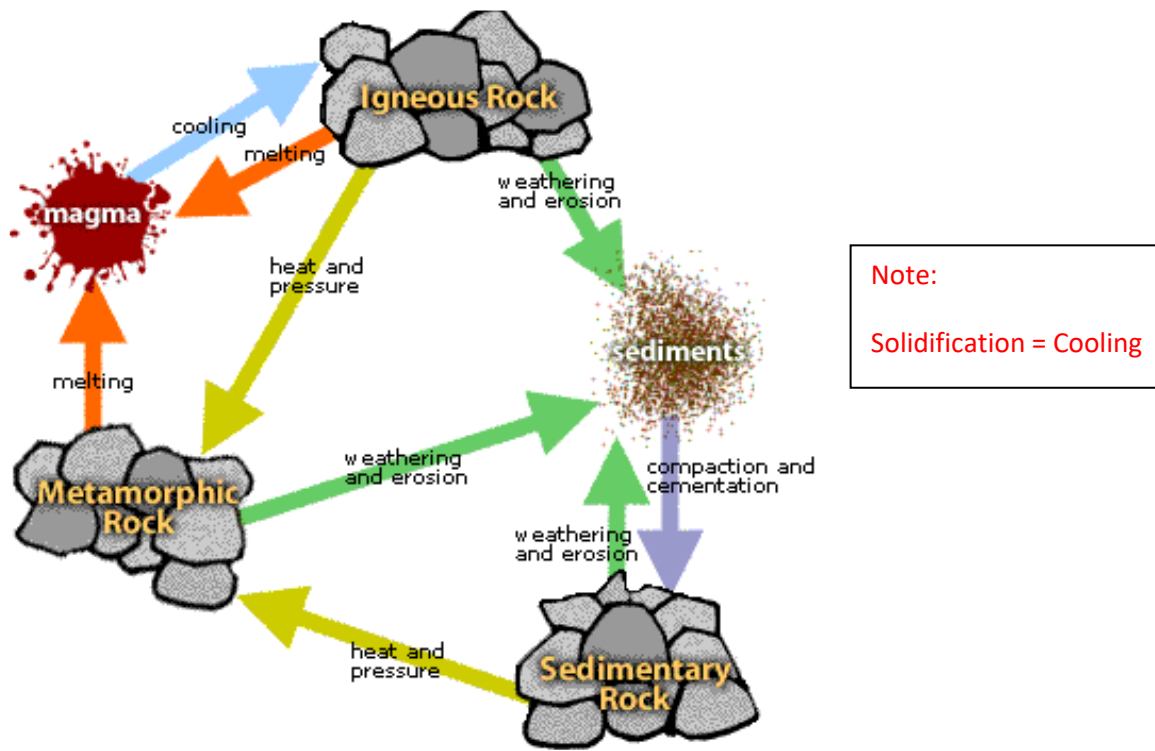
O<sub>2</sub> = 2 atoms CO<sub>2</sub> = 3 atoms H<sub>2</sub>O = 3 atoms CH<sub>4</sub> = 5 atoms

15. For each of the following, state the location and charge.
- a) Proton **In the nucleus; positive**
  - b) Electron **In the orbitals; negative**
  - c) Neutron **In the nucleus; neutral**

## Earth

1. Compare and contrast the terms rocks and minerals.  
**Minerals are pure (made from one substance), natural homogeneous substances. Rocks are mixtures of minerals.**
2. List the 3 types of rocks and describe how they are formed.  
**Igneous rocks are made from cooling magma or lava.**  
**Sedimentary rocks are made from the gradual accumulation of sediments (eroded/weathered rocks).**  
**Metamorphic rocks are formed due to a transformation caused heat or pressure.**
3. What are the 3 types of igneous rock and what are their characteristics?  
**Extrusive = form on the Earth's surface from lava**  
**Intrusive = form inside the lithosphere from magma**  
**Porphyritic = has two cooling phases, which makes the difference grain size of crystals obvious**
4. What are the tests that we do on minerals in order to identify them? Briefly describe each test.  
**Colour: Observe the colour of the rock.**  
**Lustre: Observe whether there is metallic, pearly, glassy, oily or non-metallic lustre on the mineral when put in the light.**  
**Streak Colour: Rub the mineral on a piece of ceramic. Observe the colour of the streak.**  
**Magnetism: Slowly approach the mineral with a magnet. Observe if there is an attraction or a repulsion with the magnet. OR Approach the mineral with a compass and observe the movement of the needle. If it always points towards the mineral, it is magnetic.**  
**Hardness: Scratch the mineral with other substances of known hardness to determine the hardness of the mineral on the Mohs Scale. Start with the softer substances of known hardness and work up to the harder substances to compare with the unknown.**  
**Reaction with an acid: Put a drop of acid on the mineral. Observe whether there is a reaction (bubbles) or not.**  
**Density: Find the mass and the volume of the mineral to calculate its density. Use this information to compare it to known densities of minerals.**
5. Which scale is used to determine the hardness of a mineral?  
What would a value of 1 indicate? What would a value of 10 indicate?  
**The Mohs Scale is used. A value of 1 would indicate a soft material meaning that it can easily be scratched or broken by other substances. A value of 10, however, would indicate that the mineral is very hard and can only be scratched by itself and other materials with the same hardness.**

6. Draw the rock cycle using the following words: sedimentary rocks, igneous rocks, magma, sediments, metamorphic rocks, weathering and erosion, heat and pressure, melting, solidification



7. How is soil formed?

Soil is formed due to the slow erosion of parent rock and the decomposition of organic matter (humus).

8. Order the soil particles from small to large: sand, gravel, clay, loam.

Clay -> loam -> sand -> gravel

9. What are the 4 types of soil and what are their general characteristics?

**Clay Soil:** Mostly made up of clay. Most particles are very small and stuck together. Not much space for circulation of water/air, but quickly soaks up water during heavy rain.

**Loamy Soil:** Mostly made up of loam. Particles are slightly larger than clay, and stick together. However, they can crumble into small pieces if disturbed. Space for circulation of air/water is done with ease, but it will also erode more easily during rain.

**Sandy Soil:** Mostly made up of sand. Particles are large, and do not stick together. Circulation of air/water is quick, so it does not hold water very well.

**Humus-Bearing Soil:** Mostly made up of organic matter. Soaks up rain water very well: this is ideal for plants.

10. Define renewable sources of energy and non-renewable sources of energy. Give 3 examples of each.

Renewable sources of energy: an energy source that can replenish naturally at the approximate rate it is used. E.g. solar energy, wind energy, hydraulic energy, geothermal energy, biomass, etc.

Non-renewable energy resource: an energy source that does not replenish naturally, or replenishes more slowly than the rate at which it is used. E.g. nuclear energy, fossil fuels (fossil energy – can be separated into carbon, coal, oil, natural gas...), biomass (if we do not replace the plants that are being used), etc.

11. Name 2 events that can cause wind.

Earth's rotation

Pressure differences between two air masses

### Technological World

1. Give 2 examples for each of the following simple machines: wedge, pulley, wheel and axle, inclined plane, and lever

Wedge: knife, axe, wing of a plane

Pulley: clothes line, well pulley, construction pulley

Wheel: bicycle wheel, car wheel, door knob

Inclined plane: ramp, slide, sloping roads on a mountain

Lever: scissors, pliers, wheelbarrow

2. Use arrows to show each of the following types of motion: unidirectional translation, bidirectional translation, unidirectional rotation, bidirectional rotation.

unidirectional translation,



unidirectional rotation,



bidirectional translation,



bidirectional rotation.



3. Define the term "simple machine".

A simple machine is a device made of a few pieces that allows energy to be used (work to be done) more efficiently or comfortably by reducing the force required for a task or by changing the direction of the motion.

4. List the three classes of levers and give two examples of each.

First class lever: scissors, pliers

Second class lever: nut cracker, wheel barrow

Third class lever: tweezers, hockey stick

5. How is the class of lever determined?

The class is determined by the component of the lever that is between the other two.

First class: fulcrum between the effort force, and the resistance force

Second class: resistance between the fulcrum, and the effort force

Third class: effort force between the fulcrum and the resistance force

6. State whether each statement is true or false:
- Simple machines allow humans to use less force **True**
  - Simple machines allow human to do less work **False**
  - The closer to the fulcrum is to the load, the more effort force must be applied. **False**



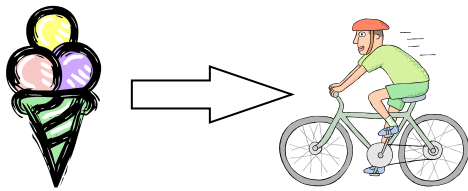
7. Define fulcrum, load, and effort force, and indicate them on the diagram of the wheelbarrow.

**Fulcrum:** the point of pivot of the lever

**Load (Resistance Force):** the weight being lifted or pushed or cut or squeeze...

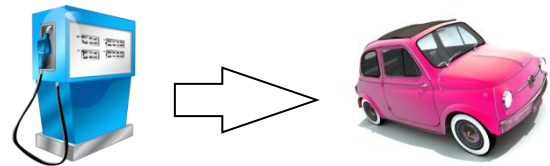
**Effort Force:** the force exerted (by the human) on the lever

8. Indicate the energy transformations happening in each example below (before and after the arrows).



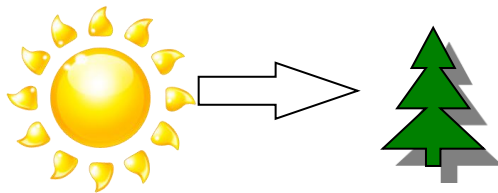
**Chemical Energy**

**Mechanical Energy**



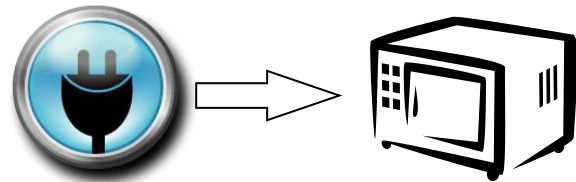
**Fossil Energy**

**Mechanical Energy**



**Solar/Luminous energy**

**Biomass/Chemical Energy**



**Electrical Energy**

**Thermal Energy**

9. What is a technological system?

**It is a group of parts, mechanisms, devices, or machines that are assembled to perform a specific task.**

10. Write the characteristics of a system for a dishwasher. Include the overall function, the controls, the inputs, the processes and the outputs.

**Refer to corrections on p. 202 of your textbook.**

11. What is a manufacturing process sheet? What information is found on it?

**It is a sheet that describes all the steps to be followed to mass-produce a part of a technical object. Information found on the sheet includes: the name of the part, materials needed, the number of steps, their required time, a written description of the step, a diagram/sketch for the step, and equipment needed.**

12. What is the difference between motion transmission and motion transformation?

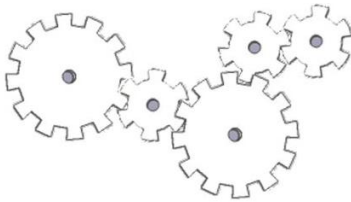
A motion transmission system transfers motion from one part to another without changing the type of motion (for example rotation to rotation).

On the other hand, a motion transformation system transfers motion from one part to another while changing the type of motion (for example translation to rotation).

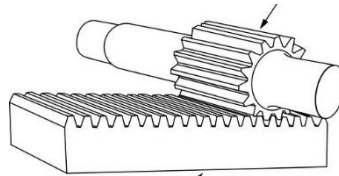
13. Look at the pictures below. Do they transmit motion or do they transform motion?

Name the systems.

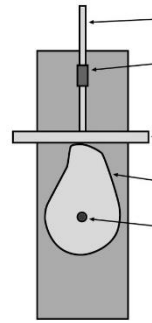
TRANSMIT



TRANSFORM



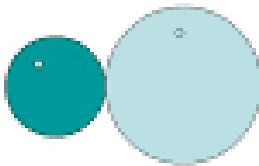
TRANSFORM



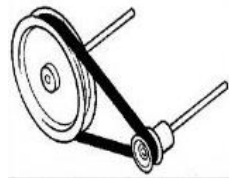
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TRANSMIT



TRANSMIT



TRANSFORM

