P1 Forces, movement and energy

1. Stopping distances
   o Stopping distance = thinking distance + braking distance
   o The stopping distance is longer if the driver has been drinking or is distracted, if the road is slippery, if the car is heavy or going fast, and if the brakes or tyres are worn.

4. Distance/speed time graphs
   o The gradient of a line on a distance/time graph shows the speed
   o The gradient of a line on a speed/time graph shows the acceleration. The area under the graph shows the distance travelled

7 Energy transfers
   o Energy can be stored in chemicals, inside atoms, in stretched materials and things in high places, and in moving and hot objects
   o Energy can be transferred by heating, sound, light, forces and electricity
   o Energy cannot be created or destroyed, so the total amount stays the same
   o We can use energy transfer diagrams to show energy transfers, and Sankey diagrams to show the amounts of energy transferred

2. Balanced and unbalanced
   o Forces are balanced when an object is not moving, or is moving at a constant speed
   o unbalanced forces can change the shape, speed or direction of movement of an object

5. Calculating speed and acceleration
   o We calculate average speed using average speed = distance/time
   o We calculate acceleration using acceleration = change in speed/time taken

8. Wasted energy
   o Energy is transferred to the surroundings every time there is an energy transfer. Any energy transferred that is not useful is wasted energy.
   o the amount of energy wasted can be reduced, for example by lubrication or by using insulation
   o An efficient machine transfers most of the energy it uses to useful energy
   o Efficiency = (useful energy output) / (total energy input) x 100%

3. Measuring quantities
   o Scientists use standard units for measuring quantities, such as metres and kilograms
   o Forces are vector quantities and have a direction as well as a size. Scalar quantities only have a size.
   o Friction acts in the opposite direction to the movement of an object

6. Mass, weight and acceleration
   o Mass is the amount of matter in an object. Weight is the force of gravity pulling on the object.
   o We calculate weight using the equation weight = mass x 10N/Kg

9. Energy and using energy resources
   o Fossil fuels and nuclear fuel are called non - renewable energy resources as they will run out one day
   o Renewable energy resources will not run out
   o Bio-fuel, solar power, wind power, tidal power and hydro-electricity are all renewable energy resources
   o Gases from burning fossil fuels cause pollution and contribute to climate change.
   o renewable resources are not available all the time
   o We need to use a mixture of renewable and non-renewable resources for our energy

C3 Acids and Metals

1. Acids and metals – Acids and Alkalis
- Hazard symbols warn us that a substance my be dangerous. They remind us to use the right safety equipment.
- Indicators change colour depending on the pH
- Acid pH is below 7, alkali pH is above 7 and neutral pH is 7.

2. Neutralisation
- Neutralisation reactions involve:
  - acid + base → salt + water
  - acid + alkali → salt + water
  - acid + metal carbonate → salt + water + carbon dioxide
  - acid + metal → salt + hydrogen

3. Making salts
- Soluble salts can be made by neutralising an acid with an insoluble base
- Solubility rules can be used to identify a precipitate
- Insoluble salts can be prepared by mixing two solutions to form a precipitate

4. Recycling metals
- Different metals have different uses. These uses are related to their properties.
- Recycling has economic and environmental benefits. It also conserves valuable raw materials.
- A life cycle assessment looks at the effect of a product on the environment over the whole of its lifetime.

5. Extracting Metals
- You can place metals in a reactivity series by seeing how they react with water, dilute acid or salt solutions
- Unreactive metals are found in the Earth's crust as un combined elements. Most other metals must be extracted from ores.
- Metals that are more reactive that carbon are extracted using electrolysis. Other metals can be extracted by heating their ores with carbon.

B2 Health, Disease and Medicine

1. Health and Disease
o Communicable diseases can be passed from an infected person to other people.
o Non - communicable diseases cannot be passed from one person to another. They are caused by many factors, including diet, the way we live and our genes.
o BMI and waist: hip ratio can be used to measure obesity.

2. Lifestyle Diseases
o Cancer is caused by changes in cells leading to uncontrolled cell division.
o Tobacco smoke increases the risk of developing lung cancer and CVD
o CVD may be treated by taking medicines for life, surgery or lifestyle changes.
o Drinking too much alcohol can lead to liver disease.

3. Pathogens
o Pathogens are disease-causing organisms. They include some bacteria, fungi, viruses and protists.
o Cholera and tuberculosis are bacterial infections. Cholera causes diarrhoea. TB damages the lungs.
o Tinea (athlete's food) and chalara dieback in ash trees are caused by fungal infections.
o Viruses are non-living particles that can only reproduce inside living cells. Examples include influenza and HIV.
o Malaria is caused by a protist that damages liver and blood cells.

4. Spread and Control of Pathogens
o Pathogens may be spread; in water(cholera), by air (influenza and TB), by direct contact (tinea), by animal vector (malaria)
o An animal vector is an animal that spreads pathogens.
o The spread of pathogens cam be reduced or prevented by hygiene, such as washing hands and surfaces, by treating water and by killing animal vectors.

5. STI's
o STIs are sexually transmitted infections. Pathogens that cause STIs include the bacterium Chlamydia and the HIV virus.
o STIs can be spread during sexual activity and contact with sexual fluid
o The spread of STIs can be reduced or prevented by using a condom during sexual activity.
o STIs can be screened for by simple tests to show if a person is infected

6. Protection Against Infection
o Physical barriers stop pathogens getting into the body. These barriers include the skin, mucus and cilia
o Chemical defences are substances produced by the body to destroy pathogens. They include hydrochloric acid and lysozymes.
o The immune system destroys pathogens inside the body. Some white blood cells ingest pathogens. Others, called lymphocytes, produce antibodies to destroy pathogens.
o Memory lymphocytes cause a fast secondary response if you are infected by the same pathogen again. This makes you immune to the pathogen.

7. Medicines
o Variation is the differences in characteristics of individuals of the same species.
o Genetic variation is due to differences in alleles inherited from parents. Different alleles are produced by mutations (small changes to DNA)
o Environmental variation is differences in characteristics due to the environment.
o Most mutations have no effect on the phenotype. Only a very few have a significant effect on a characteristic.