Ark Elvin Academy

Year 7 Science Study Pack

Spring assessment 2018

Name _____

What I am going to be assessed on?

You will be assessed on everything that you have been taught so far in Year 7 in both the Autumn (before Christmas) and Spring term (January and February).

To help you revise the key contents, use your own exercise book, this revision pack as well as BBC Bitesize online resources. https://www.bbc.co.uk/education/subjects/zng4d2p

Cumulative content from September- Makes up 40% of the exam	
Biology	**Topic- Cells** **Key concepts: Animals and plant cells, specialised cells, unicellular organisms**
Chemistry	**Topics- Particles** **Key concepts: Particle model, states of matter, diffusion, gas pressure**
Physics	**Topics- Forces** **Key concepts: Contact and non-contact forces, balanced and unbalanced forces,**

New content taught in January and February- Makes up 60% of the exam	
Biology	**Topic- Body systems** **Key concepts: Breathing and gas exchange, skeletal system, muscular system**
Chemistry	**Topic- Atoms, elements and compounds, chemical reactions** **Key concepts: Atoms, elements, compounds, chemical formula, chemical reactions and word equations, word equations, burning fuels, thermal decomposition, conservation of mass, exothermic and endothermic reactions**
Physics	**Topic- Sound** **Key concepts: Sound waves, loudness and pitch, the structure and function of the ear, echoes and ultrasound**

How many exams will I have?

3 x 30 minutes papers

1 Biology exam, 1 Chemistry exam and 1 Physics exam

Biology Key knowledge:

- Cells are the building blocks of life – they are the smallest units in an organism.
- Scientists use microscopes to observe small objects in detail.
- Animal cells contain a nucleus, cytoplasm, cell membrane, and mitochondria.
- Plant cells also contain chloroplasts, a vacuole, and a cell wall.
- Cytoplasm is where the chemical reactions in a cell take place.
- The cell membrane is a barrier that controls what moves in and out of the cell.
- The nucleus controls the cell, and contains genetic material needed to make new cells.
- Respiration occurs in the mitochondria – this chemical reaction transfers energy.
- The cell wall strengthens the cell and provides support.
- The vacuole contains a watery liquid called cell sap. It keeps the cell firm.
- Photosynthesis takes place inside the chloroplasts.
- Specialised cells have changed their shape and structure so that they are suited to carry out a particular job.
- Nerve cells, red blood cells, sperm cells, leaf cells, and root hair cells are specialised cells.
- Diffusion is the movement of particles from a high-concentration area to a low-concentration area. For example, water and oxygen diffuse into cells.
- A unicellular organism contains only one cell.
- An amoeba is a unicellular organism consisting of a cell membrane, cytoplasm, and a nucleus.
- Euglenas appear green as they contain chloroplasts for photosynthesis. Their eye spot locates light, and they use their flagellum to swim towards it. In low light levels they can engulf food.

- Multicellular organisms are made of many cells. They are organised into layers: cells → tissues → organs → organ systems → organisms
- Gas exchange takes place inside the lungs – oxygen is taken in and carbon dioxide is given out.
- Oxygen enters the body through the mouth and nose. It then travels down the windpipe, through a bronchus, then a bronchiole, into an alveolus, and diffuses into the blood.
- Exhaled air is warmer and contains more carbon dioxide and water vapour than inhaled air, but less oxygen.
- When you inhale, muscles between your ribs and the diaphragm contract. This increases the volume inside your chest. The pressure decreases and air is drawn into the lungs.
- When you exhale, muscles between your ribs and the diaphragm relax. This decreases the volume inside your chest. The pressure increases and air is forced out of your lungs.
- The skeleton is made up of bones. It has four important functions – support the body, protect the organs, allow movement, and make blood.
- Red and white blood cells are produced in bone marrow found in the centre of some bones.
- Joints occur where two or more bones join together.
- Cartilage in joints stop bones rubbing together.
- Bones are held together by ligaments. Muscles are attached to bones by tendons.
- Antagonistic muscles are pairs of muscles that work together at a joint. When one muscle contracts, the other muscle relaxes.

Chemistry key knowledge:

- Materials are made up of tiny particles.
- A substance is made up of just one type of material.
- The properties of a substance describe what it looks like and how it behaves.
- The properties of a substance depend on what its particles are like, and how they are arranged.
- There are three states of matter – solid, liquid, and gas. For a certain substance, the particles never change. But in different states, the particles move differently, and have different arrangements.
- In the solid state, you cannot compress a substance, or make it flow.
- In the liquid state, you cannot compress a substance, but you can make it flow.
- In the gas state, you can compress a substance, and make it flow.
- The change of state from solid to liquid is melting. A substance melts at its melting point. Pure substances have sharp melting points.
- A substance changes from the liquid to the gas state by evaporating or boiling. A substance boils at its boiling point.
- The change of state from gas to liquid is condensing.
- The change of state from liquid to solid is freezing.
- Some substances change directly from the solid state to the gas state. This is subliming.
- Diffusion is the random moving and mixing of particles.
- Gas particles collide with the walls of their container. The collisions cause gas pressure.

- All materials are made up of one or more elements.
- Elements are substances that cannot be broken down.
- There are 92 elements that exist naturally.
- The Periodic Table lists all the elements.
- Every element has its own chemical symbol.
- An atom is the smallest part of an element that can exist.
- Every element is made up of one type of atom. All the atoms of an element are the same.
- The atoms of one element are different to the atoms of all other elements.
- The properties of a substance are the properties of many atoms, not just a single atom.
- A compound is a substance made up of atoms of two or more elements, strongly joined together.
- The properties of a compound are different to the properties of the elements that it is made from.
- A molecule is a group of two or more atoms that are strongly joined together.
- A chemical formula shows the relative number of atoms of each element in a compound.

- Physical changes are reversible. They include changes of state and dissolving.
- Chemical reactions are not reversible.
- In a chemical reaction, atoms are re-arranged to make new substances.
- In a chemical reaction, the total mass of reactants is equal to the total mass of products. This is conservation of mass.
- In a chemical reaction, the starting substances are called reactants. The substances that are made in the reaction are called products.
- Word equations represent reactions simply. They show reactants on the left and products on the right. The arrow means *reacts to make*.
- In a balanced symbol equation, chemical formulae represent the reactants and products. The equation shows how atoms are re-arranged. It gives the relative amounts of reactants and products.
- Chemical reactions can make useful products and transfer energy.
- In oxidation reactions, substances join with oxygen to form oxides.
- Oxidation reactions include burning and rusting. Burning is also called combustion.
- In a thermal decomposition reaction, a compound breaks down when it is heated. The products are simpler compounds, and elements.
- Exothermic changes transfer energy to the surroundings.
- Endothermic changes transfer energy from the surroundings.
- A hazard is a possible source of danger.
- A risk is the chance of damage or injury from a hazard.

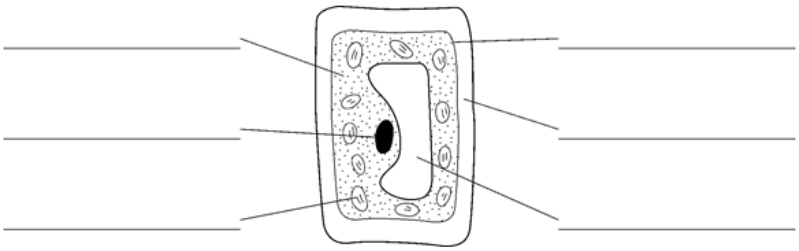
Physics key knowledge:

- Forces are pushes or pulls, measured in newtons (N) using a newtonmeter.
- Forces exist when objects interact – this produces an interaction pair.
- Forces can deform objects, change their speed, or the direction of motion.
- Contact forces occur when objects are touching.
- Friction, air resistance, and water resistance are contact forces.
- Friction can be reduced by lubrication. Air resistance and water resistance can be reduced by streamlining.
- Non-contact forces occur when objects are not touching.
- Gravitational, electrostatic, and magnetic forces are non-contact forces.
- Solid surfaces provide a support force when they are compressed.
- Springs or ropes extend when you apply a force.
- For some objects if you double the force the extension doubles. This is Hooke's Law.
- A field is a region where something feels a force, for example, a mass in a gravitational field.
- Mass is the amount of stuff an object is made up of, measured in kilograms.
- Weight is the force of the Earth on an object, measured in newtons.
  Weight (N) = mass (kg) x g (N/kg)
- When the forces acting on an object are equal in size and acting in opposite directions they are balanced. The object is in equilibrium.
- If the forces are not balanced the object will speed up, slow down, or change direction.

- Waves are oscillations or vibrations that have an amplitude, wavelength, and frequency. The top of a wave is a crest and the bottom is a trough.
- In a transverse wave the oscillation is at 90° to the wave direction, and in a longitudinal wave it is parallel to the wave direction.
- Waves can reflect from barriers and add up or cancel out.
- A sound wave is produced by vibrating objects and is longitudinal.
- Sound travels at 340 m/s. Sound travels fastest in solids and slowest in gases and cannot travel through a vacuum.
- The loudness of a sound depends on its amplitude, and the pitch depends on its frequency. Frequency is measured in hertz (Hz).
- A human's audible range is from 20–20 000 Hz.
- Your outer ear consists of the pinna, auditory canal, and eardrum. Your middle ear contains your ossicles. Your inner ear contains your cochlea and semi-circular canals.
- Vibrations travel from your eardrum to the hairs in your cochlea. This produces a signal that is sent to your brain.
- Loudness is measured in decibels (dB).
- An echo is a reflection of sound that you can use to work out distance. Soft materials absorb sound and don't produce echoes.
- Ultrasound is sound with a frequency of more than 20 000 Hz. Humans use ultrasound to produce images of inside the body, and to find the depths of water.

Cells

1. Label the parts of this plant cell.



[1]

2. State one similarity and one difference between an animal cell and a plant cell.

Similarity: _____

Difference: _____ [1]

3. Which part of a cell:

a) controls the movement of substances into and out of the cell? _____ [1]

b) contains cell sap to keep the cell firm? _____ [1]

c) controls the activities of the cell? _____ [1]

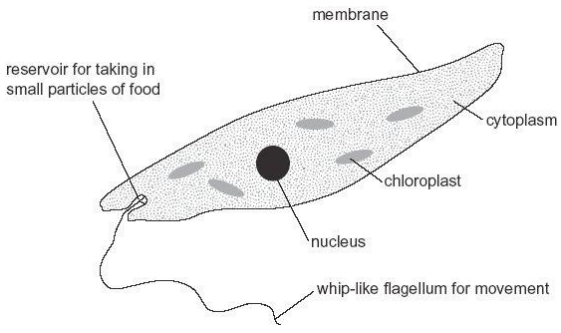
4. The diagram shows a sperm cell. Sperm cells carry male genetic material.

State and explain ***one*** adaptation that helps a sperm to carry out its function.

_____ [1]

5. Look at the diagram of *Euglena*.

a) Give ***two*** pieces of evidence which suggest that it is an animal cell rather than a plant cell.



1) _____ [1]

2) _____ [1]

b) How can you tell from the diagram that *Euglena* makes its own food?

_____

_____ [2]

Total: _____ /10

Particle model

1. What is the difference between a material and a substance?

_____

_____ [2]

2. A solid, like rock, has a:

A shape which is easy to change but its volume is fixed.

B shape which is fixed but it can change its volume.

C shape and a volume which are both easy to change.

D shape and volume which are both fixed. [1]

3. Describe the particles in a gas in terms of their movement and arrangement.

_____ [1]

4. Complete the sentence: 'Liquids flow and have no fixed shape because' …

_____ [1]

5. Explain what happens to ice when it melts? Use the terms 'energy' and 'particles' in your answer.

_____

_____ [1]

6. A student makes some observations about three solids and summarises the results in the table below.

	Mass	Melting Point	Colour
Solid 1	3.0 g	776°C	white
Solid 2	3.0 g	445°C	white
Solid 3	9.8 g	445°C	white

Which of the solids could be the same substance?

A Solids 1 and 2 could be the same substance.

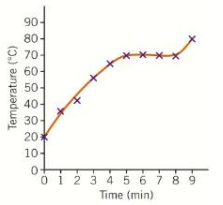
B Solids 2 and 3 could be the same substance.

C All of the solids could be the same substance.

D None of the solids could be the same substance

[1]

7. The graph shows the temperature of stearic acid when it is heated.



a) Use the graph to identify the melting point of stearic acid.

_____ °C [1]

b) Explain how the graph shows that stearic acid is a pure substance.

_____ [1]

8. Use the data below to predict the physical state of chlorine at 0°C

(Data: melting point: -101°C, boiling point -34°C)

Answer: _____ [1]

Total: ___ /10

Forces 1

1. Which answer shows four contact forces?

A Gravity, friction, upthrust, water resistance

B Friction, air resistance, upthrust, gravity

C Water resistance, gravity, friction, upthrust

D Friction, water resistance, upthrust, air resistance

[1]

2. The unit of force is the:

A kilogram

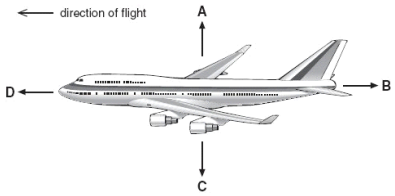
B newton

C centimeter

D gram

[1]

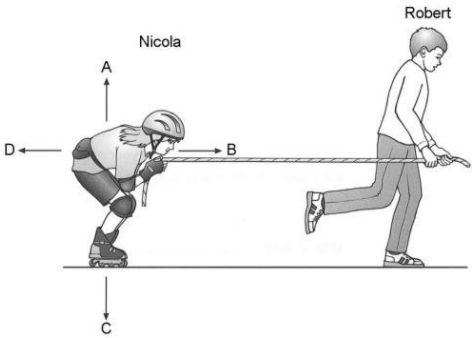
3. The diagram shows four forces acting on a plane in flight.



Which arrow shows air resistance? Give the letter. _____

[1]

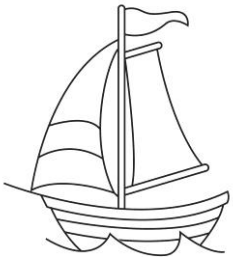
4. Nicola is trying out her new roller blades. Robert is pulling her along with a rope. Arrows A, B, C and D show the directions of four forces acting on Nicola.



Which arrow shows the direction of the force of the rope on Nicola? Give the letter.

_____ [1]

5. This boat is not moving. There are no horizontal forces on it. Draw and label two forces acting on the boat.



[2]

6. A parachutist falls towards the Earth, pulled by her weight. Which of these forces makes the interaction pair force for her weight?

A Her parachute pulls her upwards.

B She experiences a drag force upwards from the air.

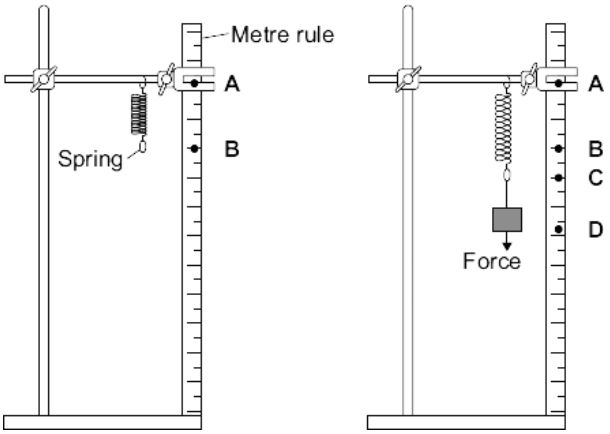
C She exerts a force downwards on the air molecules in her way.

D She exerts a gravitational pull upwards on the Earth.

[1]

7. A student investigated how the extension of a spring depends on the force applied to the spring.

The diagram shows the spring before and after a force had been applied.



a) Complete the following sentence using letters, **A**, **B**, **C** or **D**, from the diagram.
The extension of the spring is the distance between the positions labelled .....and ..... on the metre rule. [1]

The table below shows the results of her investigation.

Force in newtons	0.0	1.0	2.0	3.0	4.0	5.0	6.0
Extension in cm	0.0	4.0		12.0	16.0	22.0	30.0

b) Add the missing value to the table. [1]

c) Explain why you chose this value.

_____

_____ [1]

Total: ___ /10

Forces 2

1. A student carried out an experiment by putting weights on the end of a spring. After each weight was added, the length of the spring was carefully measured. The results are summarised below.

Weight added to spring (N)	2	4	6	8	10
Extension of spring (cm)	21	25	29	33	37

Use the data to suggest the value for the extension of the spring with a weight of 15 N.

Answer: _____ [1]

2. Which example shows **unhelpful** friction?

A Friction between the chain and axles of a bike

B Friction between paper and the point of a pencil

C Friction between a tyre and the road

D Friction between your shoes and the floor [1]

3. State of the following would **not** help to reduce the drag and frictional forces on a track cyclist?

A Crouching down low on the bicycle

B Wearing a streamlined helmet

C Using smooth, narrow tyres

D Wearing baggy clothes [1]

4. A student investigated how the type of surface affects the force needed to move it down a ramp.

What was the **independent** variable in this investigation?

_____ [1]

5. What happens to the air resistance on a car as the car goes faster?

A It decreases

B It stays the same

C It increases [1]

6. What is the weight of a 20 kg box on the Earth?

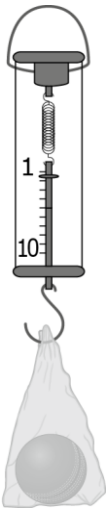
A 2 N

B 20 N

C 200 N

D 20 kg [1]

7. A cricket ball is weighed using a newton meter. On Earth the cricket ball has a weight of 1.5 N.



The force of gravity on the Moon is much less than it is on Earth. An astronaut on the Moon decides to weigh the cricket ball.

Describe what would happen to the weight and the mass of the cricket ball on the Moon.

_____

_____ [2]

8. The picture shows a bird flying at a **constant** speed. What can you say about the forces acting on it?

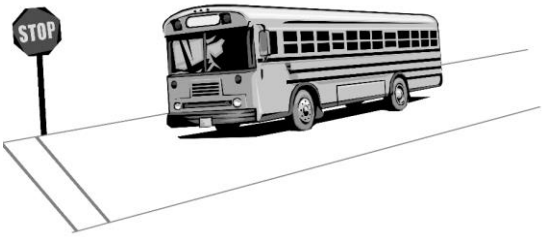
A there must only be one force acting on it

B the forces must be balanced

C the forward force is greater than the backward force

D there are no forces acting on it [1]

9. A school bus is slowing down as it comes to a stop sign.



Which of the following statements is TRUE about the forces acting on the school bus while it is slowing down but still moving forward?

A As long as the school bus is still moving forward, the forward force of the school bus has not run out

B As long as the school bus is still moving forward, any forces moving it forward would have to be stronger than any forces slowing it down

C If the school bus is slowing down, any forces moving it forward would have to be weaker than any forces slowing it down

D If the school bus is slowing down, any forces moving it forward would have to be the same strength as any forces slowing it down [1]

Total: ___ /10

Body systems

1. Which statement describes the correct order of levels of organisation, from the smallest structure to the largest?

A cell, organ, organ system, tissue, multicellular organism **B** multicellular organism, organ system, organ, tissue, cell
C cell, tissue, organ, organ system, multicellular organism **D** tissue, cell, organ, organ system, multicellular organism

[1]

2. Define the term 'tissue'

_____

[1]

3. Name one **animal** tissue and one **plant** tissue:

Animal tissue: _____ Plant tissue: _____

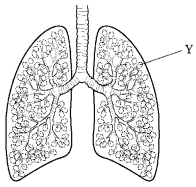
[2]

4. State the names of 3 organs of the digestive system.

_____

[1]

5. What part of the lung is labelled Y in the diagram?



A diaphragm B windpipe
C alveolus D bronchus

[1]

6. Air entering the lungs would pass through the following structures in the order:

A trachea → bronchus → bronchiole → alveoli B trachea → bronchus → alveoli → bronchiole
C alveoli → trachea → bronchus → bronchiole D bronchus → trachea → bronchiole → alveoli

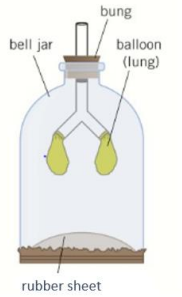
[1]

7. The air we breathe in contains:

A more oxygen, less carbon dioxide and more water vapour than the air we breathe out.
B more oxygen, less carbon dioxide and less water vapour than the air we breathe out.
C less oxygen, more carbon dioxide and less water vapour than the air we breathe out.
D less oxygen, more carbon dioxide and more water vapour than the air we breathe out.

[1]

8. Circle the correct words in the table to show how the bell jar model can help to explain what happens inside the lungs when we inhale.



	Inhaling
Rubber sheet is	Pulled down OR pushed up.
Volume inside jar	Decreases OR increases.
Pressure inside jar	Decreases OR increases.
Balloons	Inflate OR deflate.

[1]

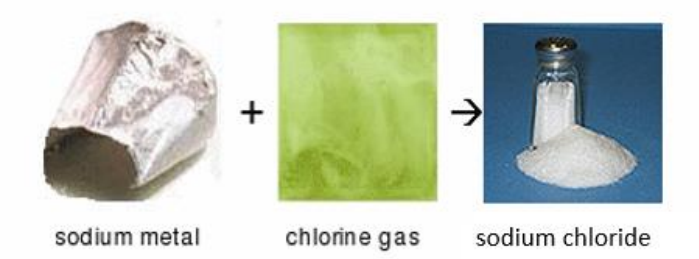
9. The rubber sheet represents the diaphragm. What happens to the muscles of the diaphragm to cause the movements described?

_____

[1]

Atoms, elements and compounds

1. The diagram below shows the reaction between the elements sodium and chlorine to form a compound sodium chloride.



Match the substance with its properties:

Sodium □	□ White, solid crystals
Chlorine □	□ Shiny, silver, soft metal
Sodium chloride □	□ Pale green, smelly, poisonous gas

[1]

2. Which statement explains why sodium chloride has different properties from the elements in it?

A The sodium and chlorine atoms are mixed together.

B The sodium and chlorine atoms are chemically joined together to make one substance.

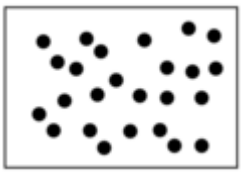
C The sodium and chlorine atoms fit in the spaces of the sodium chloride. [1]

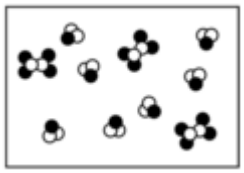
3. What is the difference between an element and a compound?

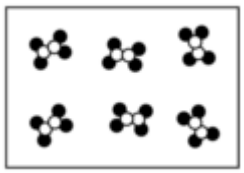
_____

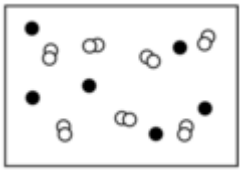
_____ [2]

4. Which particle diagrams show the ***molecules*** of a pure substance?

A 

B 

C 

D 

[1]

5. Write a word equation to show the reaction of iron and sulphur.

_____ [1]

6. Which statement describes a molecule of carbon dioxide?

A Made up of one carbon atom and one oxygen atom

B Made up of carbon atoms only

C Made up of one carbon atom and two oxygen atoms

D Made up of two carbon atoms and one oxygen atom [1]

7. The chemical formula for water is:

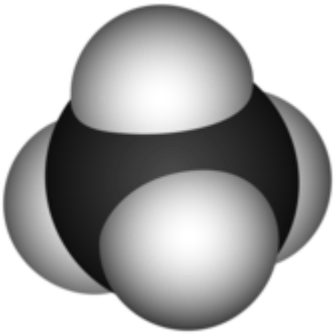
A HO

B H_2

C H_2O

D HO_2 [1]

8. The diagram below shows a molecule of methane.



a) State the total number of atoms in the molecule.

_____ [1]

b) State the number of different types of atom in the molecule.

_____ [1]

Total: ___ /10

Reactions – 1

1. Which of the following is **not** an example of a chemical reaction?

A Dissolving sugar in a cup of tea **B** Gas burning on a stove

C Frying an egg **D** A metal fizzing in acid

[1]

2. Tick the **two** correct statements about *all* chemical reactions:

□ New substances are made

□ Chemical reactions happen very quickly

□ Energy is transferred to or from the surroundings

□ Are always reversible

[1]

3. State three signs of a chemical reaction

a. _____

b. _____

c. _____

[1]

4. Magnesium burns in air. It reacts with oxygen to produce magnesium oxide.

a. Complete the word equation for this chemical reaction.

b. Draw particle diagrams to show the reactants and products. Use a different colour for each reactant.

_____ _____ _____

[2]

5. Methane is a compound of carbon and hydrogen. Its chemical formula is CH_4. When it burns it that reacts with oxygen in the air.

Write a word equation for the reaction of methane with oxygen.

_____

[1]

6. Burning is an example of an oxidation reaction.

a. What is meant by the term ‘oxidation’?

_____

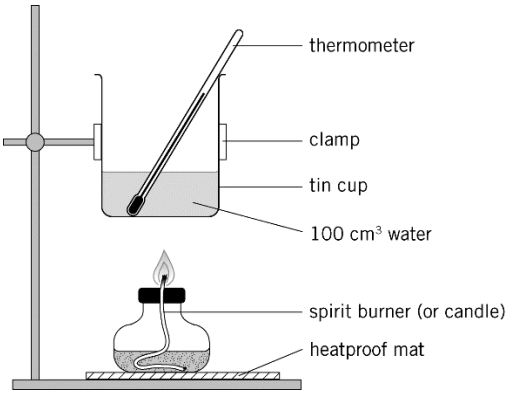
[1]

b. Give one other example of an oxidation reaction.

_____

[1]

7. An experiment was carried out to find out which fuel releases the most energy.



- Cold water was measured into a copper calorimeter - a small metal can.
- The starting temperature of the water was recorded.
- The water is heated using the flame from the burning fuel.
- The final temperature of the water was recorded.

Identify one source of error in this experiment and suggest how you improve this method to reduce the error.

Error:

_____

[1]

Improvement to method to reduce the error.

_____

[1]

Total: ___ /10

Reactions - 2

1. When hydrogen peroxide is heated it thermally decomposes to form oxygen and water. The word equation for the reaction is shown below.

Hydrogen peroxide → oxygen and water

Use the word equation to explain why this is a decomposition reaction.

_____

[1]

2. a. Complete the word equation for the thermal decomposition of copper carbonate.

Copper carbonate → copper oxide + _____

[1]

b. Describe how you would test for the presence of the product you have stated above.

_____

[1]

3. What is meant by the term 'conservation of mass'?

_____

[1]

4. A student heats 12.5 g zinc carbonate. It decomposes to make 8.1 g zinc oxide. Calculate the mass of carbon dioxide made.

_____

[1]

5. Methane gas (CH_4) reacts with oxygen (O_2) in a combustion reaction to produce carbon dioxide (CO_2) and water (H_2O). Write a balanced symbol equation for this reaction.

_____

[2]

6. The table below shows the temperature of two reaction mixtures before and after a chemical reaction.

Reaction	Initial temperature °C	Final temperature °C	Temperature difference °C
A Ammonium nitrate + water	21	10	-11
B Calcium + hydrochloric acid	21	67	46

a. Which reaction, A or B, is *exothermic*?

_____**[1]**

b. Explain your answer.

_____**[2]**

Sound – 1

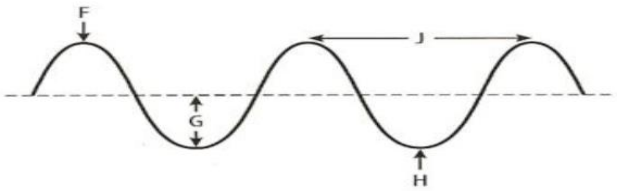
1. Which statement about waves is correct? Tick the appropriate box.

Waves transfer matter.	
Waves transfer energy.	

[1]

2. Identify parts F, G, H and J from the wave diagram, using the words below.

wavelength	***trough***	***amplitude***	***peak***



F = _____

G = _____

H = _____

J = _____

[1]

3. The two main types of wave are transverse and longitudinal

For each one, describe how the wave moves and give an example of that type of wave.

Transverse. How it moves: _____

_____

Example: _____

Longitudinal. How it moves: _____

_____

Example: _____

[2]

4. Complete the wave diagram to show what will happen when these two waves below overlap.

[2]

5. Use your knowledge of the particle model to explain why sound travels fastest in solids.

_____

[2]

6. A girl sees a flash of lighting then hears thunder 8 seconds later. How far away is the storm? Give your answer in kilometres.

(Speed of sound: 340 m/s; Speed of light: 300,000,000 m/s)

_____

[2]

Total: ___ /10

Sound – 2

1. Complete the sentences by circling the correct answer:

a. The loudness of a sound depends on the *amplitude/frequency* of the wave.

b. The pitch of a sound depends on the *amplitude/frequency* of the wave.

[1]

2. The table below shows the lowest and highest frequencies that five living things can hear.

living thing	**lowest frequency (Hz)**	**highest frequency (Hz)**
human	20	20 000
sparrow	300	20 000
dog	20	45 000
cat	20	64 000
rabbit	300	42 000

a. Which three living things from the table cannot hear a frequency of 43 000 Hz?

_____ and_____ and _____

[1]

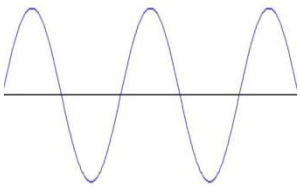
b. From the table, choose the living thing that can hear the biggest range of frequencies.

_____

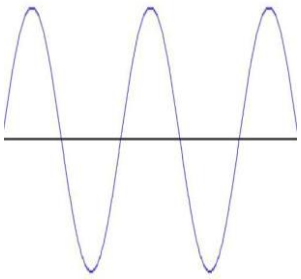
[1]

3. Three waves are shown below.

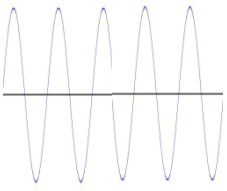
Wave A



Wave B



Wave C



a. Which wave has the highest pitch?

_____

[1]

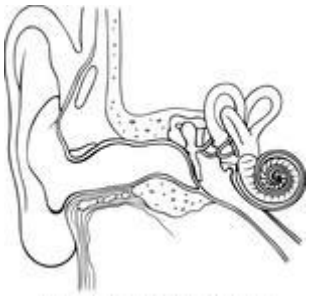
b. Which wave is the loudest?

_____

[1]

4. On the diagram below, draw an arrow and label the eardrum.

[1]



b) What is the function of the ear drum?

_____

[1]

5. Define the term ‘ultrasound’ and state one of its uses.

Definition:

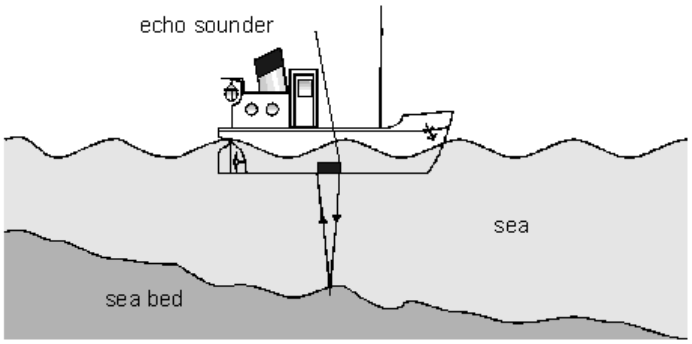
_____

Use:

_____

[1]

6. The diagram shows a boat using an echo sounder. It sends a pulse of sound waves which is reflected from the sea bottom. The reflected sound waves are detected by a sensitive microphone.



The time between sending and receiving the pulse is 0.03 s. The device calculates the depth of the sea, using the speed of sound in sea water, which is 1500 m/s.

Calculate the depth of the sea. Show your working.

Depth of sea = _____ m

[2]

Total: ___ /10