



Castle View Academy

The best in everyone™

Part of United Learning



Y11 EXTENDED ANSWER EVIDENCE

Summer 2021

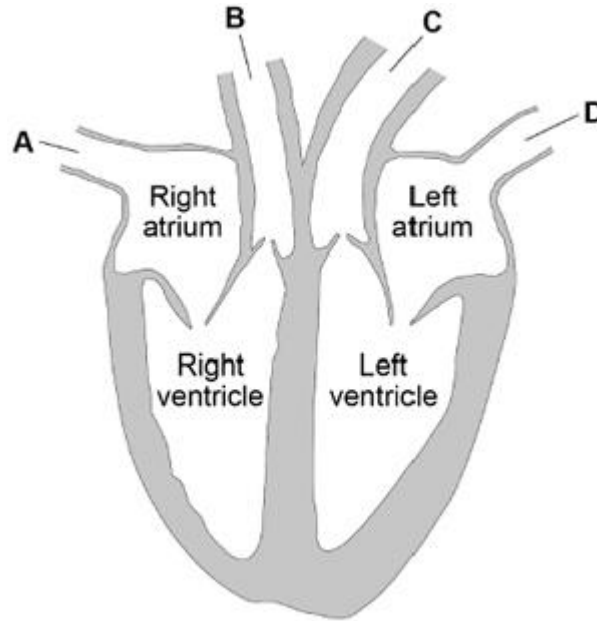
HOW TO USE THIS BOOKLET

This booklet contains a series of extended answer questions. It may be necessary to use this as additional evidence towards any grades awarded, so it is important your work is well presented and your own.

Name: _____

Q1.

The diagram shows a human heart.



(a) Which blood vessel carries deoxygenated blood away from the heart to the lungs?

Tick (✓) **one** box.

A B C D

(1)

(b) The natural resting heart rate is controlled by a group of cells that act as a pacemaker.

Where in the heart are 'pacemaker cells' found?

Tick (✓) **one** box.

Left atrium

Left ventricle

Right atrium

Right ventricle

(1)

Some people may be treated with a drug to slow their heart rate.

(c) Digitalis is a drug that slows the heart rate.

Where does the drug digitalis originate from?

Tick (✓) **one** box.

Bacteria	<input type="checkbox"/>
Foxgloves	<input type="checkbox"/>
Mould	<input type="checkbox"/>
Willow	<input type="checkbox"/>

(1)

Beta blockers are another type of drug that slows the heart rate.

The table shows information for people who do not take beta blockers and for people who do take beta blockers.

- Stroke volume is the volume of blood pumped out of the heart each time it beats.
- Cardiac output is the total volume of blood pumped out of the heart each minute.

	No beta blockers taken		Taking beta blockers	
	At rest	During exercise	At rest	During exercise
Heart rate in beats per minute	68	150	52	88
Stroke volume in cm ³	80	120	X	98
Cardiac output in cm ³ per minute	5440	18 000	2800	8624

(d) Calculate stroke volume **X** in the table above.

Use the equation:

$$\text{cardiac output} = \text{stroke volume} \times \text{heart rate}$$

Give your answer to 2 significant figures.

Stroke volume **X** = _____ cm³

Q2.

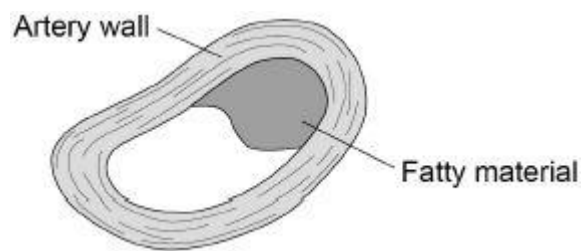
Coronary heart disease (CHD) is a non-communicable disease.

CHD is caused when fatty material builds up in the coronary arteries.

(a) Explain what a non-communicable disease is.

(2)

The diagram below shows a coronary artery of someone with CHD.



(b) Explain how CHD can cause a heart attack.

(3)

(c) Explain how lifestyle and medical risk factors increase the chance of developing CHD.

(6)

(Total 11 marks)

Q5.

This question is about salts.

Ammonium nitrate solution is produced when ammonia gas reacts with nitric acid.

- (a) Give the state symbol for ammonium nitrate solution.

(1)

- (b) What is the formula of nitric acid?

Tick (✓) **one** box.

HCl

HNO₃

H₂SO₄

NH₄OH

(1)

- (c) Ammonia gas dissolves in water to produce ammonia solution.

Ammonia solution contains hydroxide ions, OH⁻

A student adds universal indicator to solutions of nitric acid and ammonia.

What colour is observed in each solution?

Colour in nitric acid _____

Colour in ammonia solution _____

(2)

- (d) The student gradually added nitric acid to ammonia solution.

Which row, **A**, **B**, **C** or **D**, shows the change in pH as the nitric acid is added until in excess?

Tick (✓) **one** box.

	pH of ammonia solution at start	pH after addition of excess nitric acid
A	10	7

B	2	10	<input type="checkbox"/>
C	7	1	<input type="checkbox"/>
D	10	2	<input type="checkbox"/>

(1)

- (e) Calculate the percentage by mass of oxygen in ammonium nitrate (NH_4NO_3).

Relative atomic masses (A_r): H = 1 N = 14 O = 16

Relative formula mass (M_r): $\text{NH}_4\text{NO}_3 = 80$

Percentage by mass of oxygen = _____ %

(3)

- (f) Describe a method to investigate how the temperature changes when different masses of ammonium nitrate are dissolved in water.

You do **not** need to write about safety precautions.

(6)

(Total 14 marks)

Q6.

A student plans a method to prepare pure crystals of copper sulfate.

The student's method is:

1. Add one spatula of calcium carbonate to dilute hydrochloric acid in a beaker.
2. When the fizzing stops, heat the solution with a Bunsen burner until all the liquid is gone.

The method contains several errors and does not produce copper sulfate crystals.

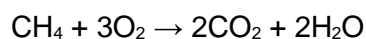
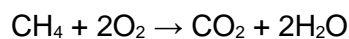
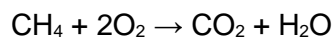
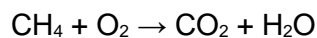
Explain the improvements the student should make to the method so that pure crystals of copper sulfate are produced.

(Total 6 marks)

Q7.

- (a) Methane is burned in a plentiful supply of oxygen.

Which is the correct balanced chemical equation?

Tick **one** box.**(1)**

- (b) Burning fuels causes atmospheric pollution.

Write **one** effect for each pollutant in **Table 1**.**Table 1**

Pollutant	Effect
Carbon monoxide	
Sulfur dioxide	
Particulates	

(3)

- (c) Methane, petrol and coal are fuels.

Table 2 shows information about these fuels.**Table 2**

Fuel	State	Energy content in kJ per g	Mass in mg of CO ₂ produced for one kJ of energy released
Methane	Gas	52	53
Petrol	Liquid	43	71
Coal	Solid	24	93

Evaluate the use of the fuels.

Use in the information in **Table 2** and your knowledge.

(6)

(Total 10 marks)

Q8.

A scientist cooled the air inside a container.

- (a) The temperature of the air changed from 20 °C to 0 °C

The volume of the container of air stayed the same.

Explain how the motion of the air molecules caused the pressure in the container to change as the temperature decreased.

(3)

- (b) The air contained water that froze at 0 °C

The change in internal energy of the water as it froze was 0.70 kJ

The specific latent heat of fusion of water is 330 kJ/kg

Calculate the mass of ice produced.

Use the Physics Equations Sheet.

Mass of ice = _____ kg

(3)

(c) The air also contained oxygen, nitrogen and carbon dioxide.

Oxygen boils at $-183\text{ }^{\circ}\text{C}$ and freezes at $-218\text{ }^{\circ}\text{C}$
Nitrogen boils at $-195\text{ }^{\circ}\text{C}$ and freezes at $-210\text{ }^{\circ}\text{C}$
Carbon dioxide sublimates at $-78\text{ }^{\circ}\text{C}$

The scientist continued to cool the air to a temperature of $-190\text{ }^{\circ}\text{C}$

What is the state of each substance at $-190\text{ }^{\circ}\text{C}$?

Tick (\checkmark) **one** box for **each** row of the table.

Substance	Solid	Liquid	Gas
Oxygen			
Nitrogen			
Carbon dioxide			

(2)

(d) The air also contained a small amount of argon.

As the temperature of the air decreased from $20\text{ }^{\circ}\text{C}$ to $-190\text{ }^{\circ}\text{C}$ the argon changed from a gas to a liquid to a solid.

Explain the changes in the arrangement and movement of the particles of the argon as the temperature of the air decreased.

(6)

(Total 14 marks)

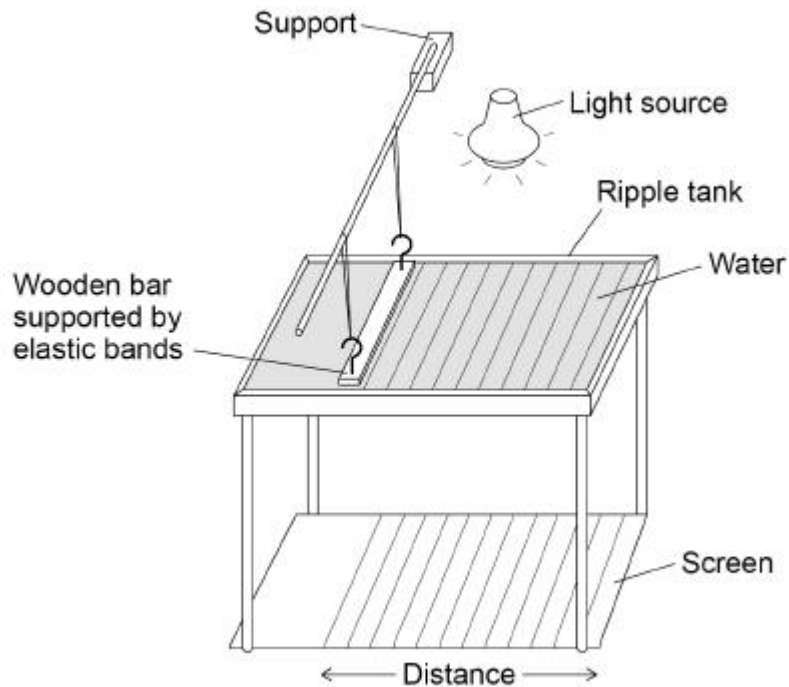
Q9.

Figure 1 below shows the equipment a teacher used to determine the speed of a water wave.

The equipment includes:

- a ripple tank filled with water
- a wooden bar that creates ripples on the surface of the water
- a light source which causes a shadow of the ripples on the screen.

Figure 1

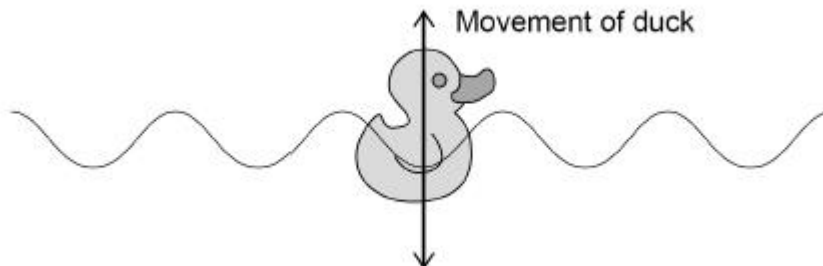


(a) Describe how equipment in **Figure 1** can be used to measure the wavelength, frequency and speed of a water wave.

The teacher put a plastic duck in the ripple tank as shown in **Figure 2**.

The plastic duck moved up and down as the waves in the water passed.

Figure 2



- (b) How does the movement of the plastic duck in **Figure 2** demonstrate that water waves are transverse?

(1)

- (c) The teacher measured the maximum height and the minimum height of the plastic duck above the screen as the wave passed.

The teacher repeated his measurements.

The table shows the teacher's measurements.

Maximum height in mm	509	513	511
Minimum height in mm	503	498	499

Calculate the mean amplitude of the water wave.

Mean amplitude = _____ mm

(3)

(Total 10 marks)

Q10.

A student wanted to determine the density of the irregular shaped object shown in **Figure 1**

Figure 1



(a) Plan an experiment that would allow the student to determine the density of the object.

(6)

(b) Another student did a similar experiment.

He determined the density of five common plastic materials.

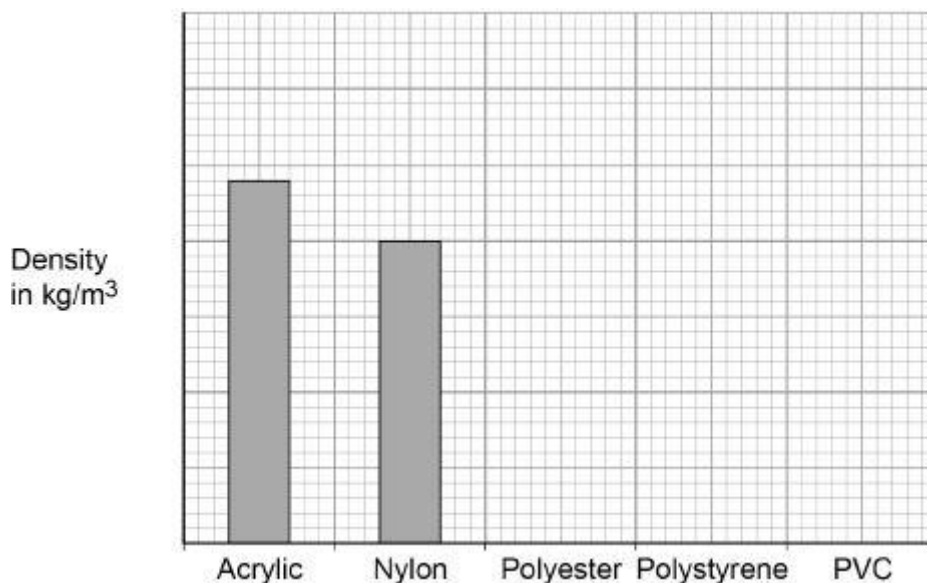
Table 1 shows the results.

Table 1

Plastic material	Density in kg/m³
Acrylic	1200
Nylon	1000
Polyester	1380
Polystyrene	1040
PVC	1100

Figure 2 shows the results plotted in a bar chart.

Figure 2



Complete Figure 2

You should:

- Write the correct scale on the y-axis.
- Draw the bars for polyester, polystyrene and PVC.

(4)

(c) The student is given a piece of a different plastic material.

The student determined the density of the material three times.

Table 2 shows the results.

Table 2

	Density in kg/m ³
1	960
2	1120
3	1040

Determine the uncertainty in the student's results.

Uncertainty = _____ kg/m³

(2)

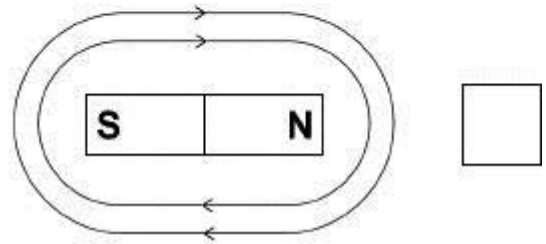
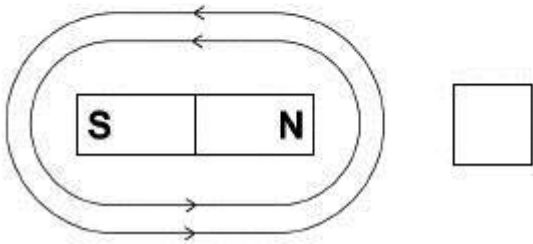
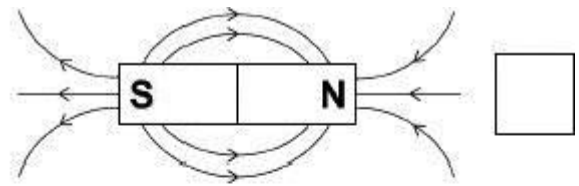
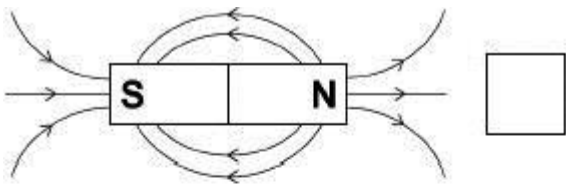
(Total 12 marks)

Q11.

A magnet produces a magnetic field.

(a) Which diagram shows the magnetic field pattern around a bar magnet?

Tick **one** box.



(1)

(b) **Figure 1** shows three metal blocks.

The blocks are not labelled.

One block is a permanent magnet, one is iron and one is aluminium.

Figure 1

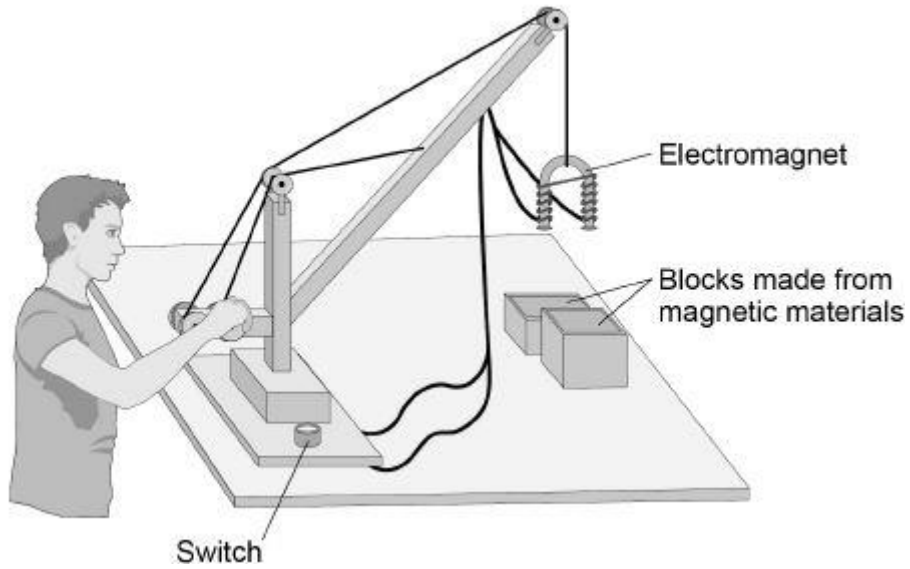


Describe how another permanent magnet can be used to identify the blocks.

(3)

(c) **Figure 2** shows a toy crane.

Figure 2



The toy crane uses an electromagnet to pick up and move the blocks.

Explain how this electromagnet is able to pick up and move the blocks.

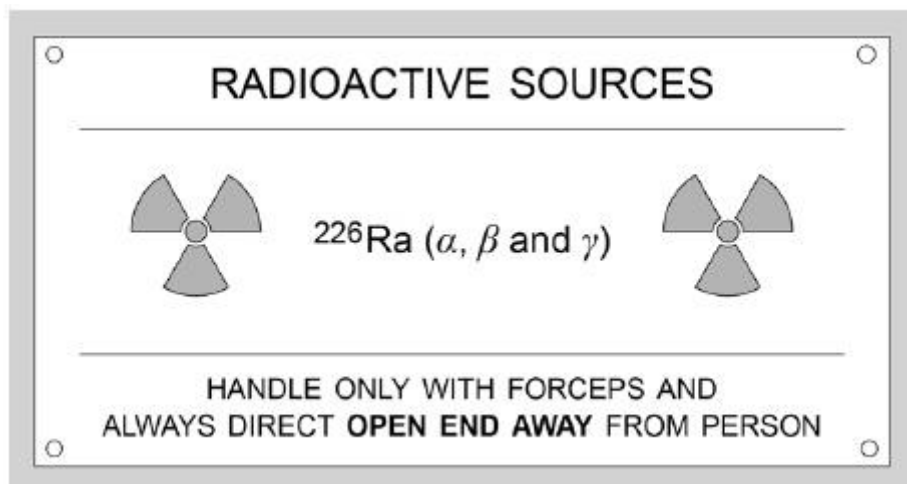
(6)
(Total 10 marks)

Q12.

Figure 1 shows the label from a box containing radium-226

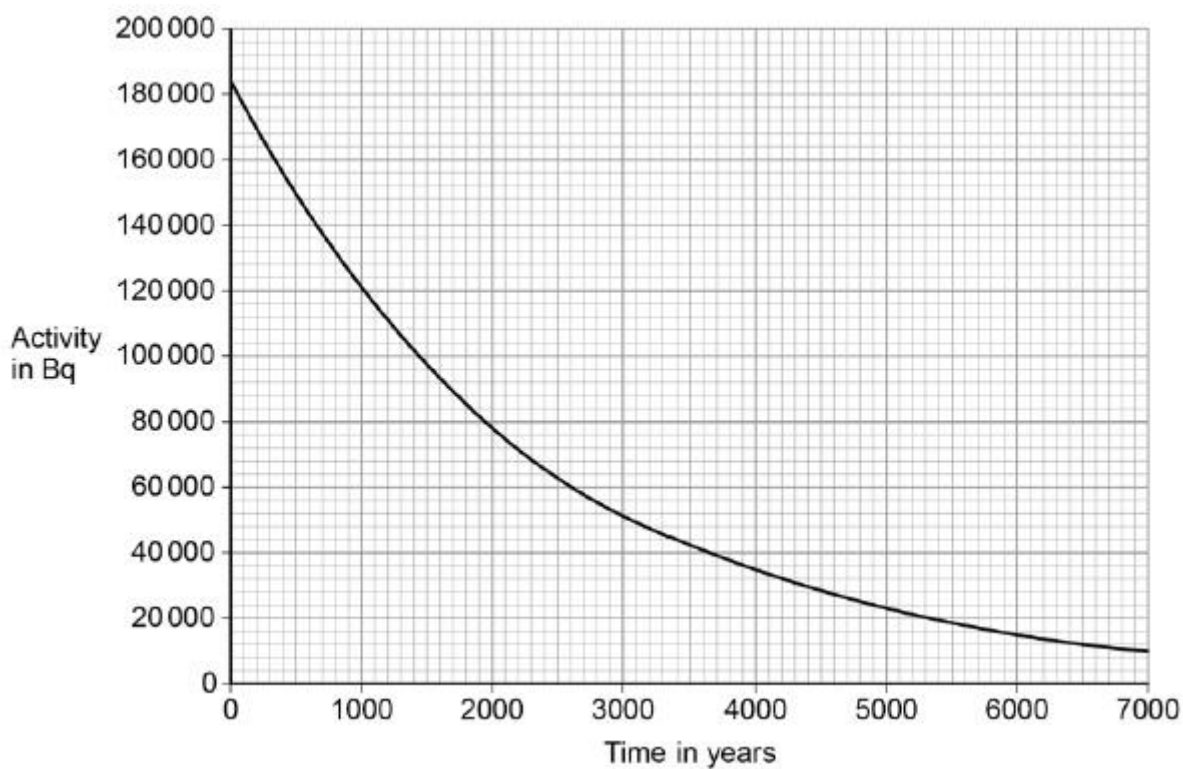
Radium-226 emits α , β and γ radiation.

Figure 1



(a) **Figure 2** shows how the activity of the radium-226 will change.

Figure 2



Determine the half-life of radium-226.

Show your working on **Figure 2**.

Half-life = _____ years

(2)

- (b) Radium-226 was discovered by Marie Curie in 1898.

The notebooks she used were contaminated with radium-226 and are still hazardous.

Explain why the notebooks are still hazardous.

(2)

- (c) Explain how the properties of α , β and γ radiation affect the level of the hazard at different distances.

(6)

(Total 10 marks)