

## FREE SAMPLE: THE FIRST 3 QUESTIONS

### SECTION A

150 marks · 10 questions · suggested time 55 minutes

Answer all parts of all questions. Where you are asked to tick a box, put a tick (✓) in the correct box. The number of marks for each question is shown beside it.

#### Question 1 (15 marks)

Energy sources can be renewable or non-renewable. A renewable source is replaced as fast as it is used. A non-renewable source is used up much faster than it forms.

Decide if each energy source in the table is renewable or non-renewable by putting a tick (✓) in the correct column.

| Energy source | Renewable | Non-renewable |
|---------------|-----------|---------------|
| Solar         |           |               |
| Natural gas   |           |               |
| Wind          |           |               |
| Peat          |           |               |
| Tidal         |           |               |

[15 marks]

#### Question 2 (15 marks)

(a) The table gives information about three atoms. Complete the six empty boxes in the table.

| Atom     | Atomic number | Mass number | Protons | Neutrons | Electrons |
|----------|---------------|-------------|---------|----------|-----------|
| Sodium   | 11            | 23          |         |          |           |
| Chlorine | 17            |             | 17      | 18       | 17        |
| Oxygen   |               | 16          | 8       | 8        |           |

[6 marks]

(b) Write the electron arrangement of the sodium atom, showing the number of electrons in each shell (for example 2, 6).

[3 marks]

(c) Is chlorine a metal or a non-metal? Put a tick (✓) in the correct box.

| Metal | Non-metal |
|-------|-----------|
|       |           |

[3 marks]

(d) Neon has atomic number 10 and is very unreactive. Suggest a reason why neon is very unreactive.

[3 marks]

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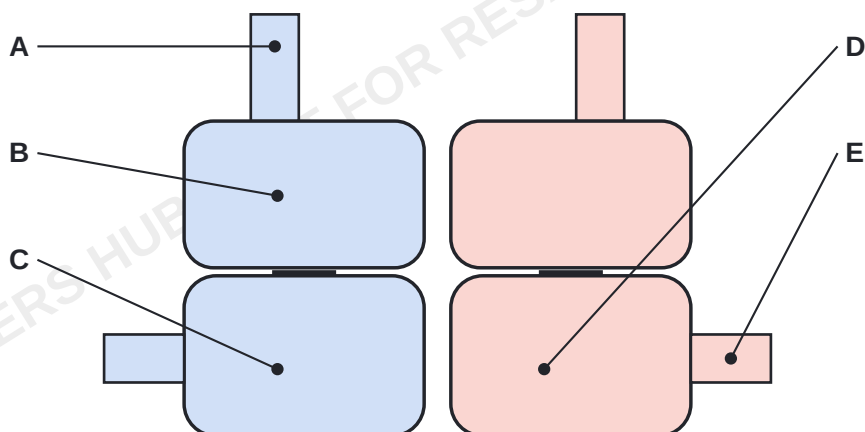
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### Question 3 (15 marks)

(a) The diagram shows the human heart. Name the parts labelled A, B, C, D and E using the words in the list.

Aorta, Left ventricle, Right atrium, Right ventricle, Vena cava

[5 marks]



Simplified diagram of the heart, as seen from the front of the body (not to scale).

(b) The blood in the right side of the heart (A, B and C) has returned from the body. Is this blood oxygenated or deoxygenated? Put a tick (✓) in the correct box.

| Oxygenated | Deoxygenated |
|------------|--------------|
|            |              |

[2 marks]

(c) Chamber D has a much thicker muscular wall than chamber C. Suggest a reason for this.

[3 marks]

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(d) Name the blood vessel that carries blood from the heart to the lungs.

[2 marks]

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(e) Oxygen passes from the blood into the body cells in very small blood vessels. Name these vessels and give one feature that makes them suited to this job.

[3 marks]

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DISTRIBUTION

## THE WORKED ANSWERS TO THOSE 3 QUESTIONS

### Question 1 (15 marks) [Energy sources]

Energy sources can be renewable or non-renewable. A renewable source is replaced as fast as it is used. A non-renewable source is used up much faster than it forms. Decide if each energy source in the table is renewable or non-renewable by putting a tick (✓) in the correct column.

**Answer: Solar: renewable. Natural gas: non-renewable. Wind: renewable. Peat: non-renewable. Tidal: renewable.**

- Approach: ask whether the source can be replaced within a human lifetime.
- Solar, wind and tidal energy come from the Sun, the wind and the Moon's pull on the oceans, which do not run out: renewable (3 marks each for these three).
- Natural gas is a fossil fuel formed over millions of years, and peat takes thousands of years to form: both non-renewable (3 marks each).

#### KEY TAKEAWAY

Renewable sources (solar, wind, tidal, hydro) are replaced as fast as they are used; fossil fuels and peat are non-renewable.

LOS: Energy sources (Junior Cycle Science, Physical World / Earth and Space)

### Question 2 (15 marks) [Atoms and the periodic table]

(a) The table gives information about three atoms. Complete the six empty boxes in the table.

**(a) Answer: Sodium: protons 11, neutrons 12, electrons 11. Chlorine: mass number 35. Oxygen: atomic number 8, electrons 8.**

- Approach: atomic number = number of protons = number of electrons (in a neutral atom); mass number = protons + neutrons.
- Sodium: protons 11, neutrons  $23 - 11 = 12$ , electrons 11. (3 marks)
- Chlorine: mass number  $17 + 18 = 35$  (1 mark). Oxygen: atomic number = protons = 8, electrons 8 (2 marks).

#### KEY TAKEAWAY

In a neutral atom protons = electrons = atomic number, and mass number = protons + neutrons.

(b) Write the electron arrangement of the sodium atom, showing the number of electrons in each shell (for example 2, 6).

**(b) Answer: 2, 8, 1**

- Approach: sodium has 11 electrons; fill shells 2, 8, 8 in order.
- The first shell holds 2 electrons, the second holds 8, leaving  $11 - 10 = 1$  electron in the third shell.
- So the arrangement is 2, 8, 1 (3 marks: 1 for each shell correct).

#### KEY TAKEAWAY

Fill electron shells in the order 2, 8, 8; the last number is the outer shell.

(c) Is chlorine a metal or a non-metal? Put a tick (✓) in the correct box.

**(c) Answer: Non-metal.**

- Approach: metals are on the left of the periodic table and non-metals on the right.
- Chlorine is a gas at room temperature and does not conduct electricity, which are properties of non-metals.
- Answer: non-metal (3 marks).

#### KEY TAKEAWAY

Non-metals are on the right of the periodic table; many are gases or brittle solids and do not conduct electricity.

(d) Neon has atomic number 10 and is very unreactive. Suggest a reason why neon is very unreactive.

**(d) Answer: Its outer shell is full (2, 8), so it does not need to gain, lose or share electrons.**

- Approach: reactions involve electrons in the outer shell.
- Neon has 10 electrons arranged 2, 8, so its outer shell is full.
- An atom with a full outer shell is stable and does not gain, lose or share electrons, so it rarely reacts (3 marks).

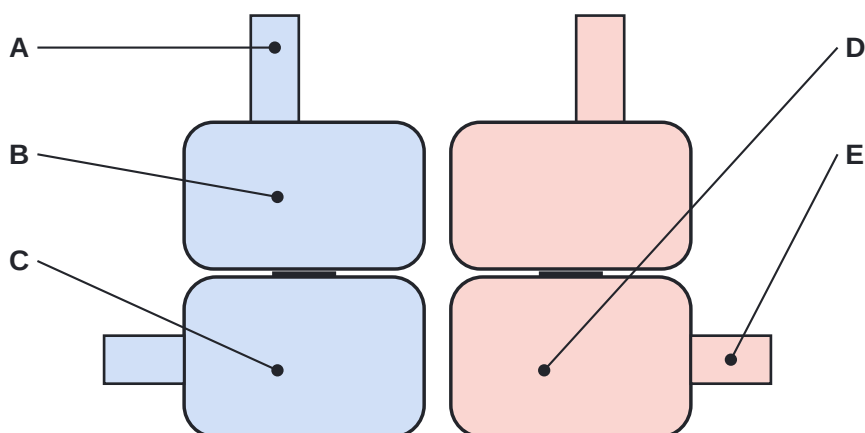
#### KEY TAKEAWAY

Atoms with a full outer shell, such as neon, are stable and unreactive.

LOS: Atoms and the periodic table (Junior Cycle Science, Chemical World)

### Question 3 (15 marks) [The heart and circulation]

(a) The diagram shows the human heart. Name the parts labelled A, B, C, D and E using the words in the list. Aorta, Left ventricle, Right atrium, Right ventricle, Vena cava



Simplified diagram of the heart, as seen from the front of the body (not to scale).

**(a) Answer: A vena cava; B right atrium; C right ventricle; D left ventricle; E aorta.**

- Approach: blood enters the heart through the vena cava, collects in the atrium and is pumped out by the ventricle.
- A is the large vein entering the top of the heart (vena cava), B is the chamber it empties into (right atrium) and C is the chamber below it (right ventricle).
- D is the lower chamber on the left side of the heart (left ventricle) and E is the large artery leaving it (aorta). 1 mark each.

**KEY TAKEAWAY**

Blood flows vena cava → right atrium → right ventricle → lungs → left atrium → left ventricle → aorta.

(b) The blood in the right side of the heart (A, B and C) has returned from the body. Is this blood oxygenated or deoxygenated? Put a tick (✓) in the correct box.

**(b) Answer: Deoxygenated.**

- Approach: blood loses oxygen to the body cells.
- The right side receives blood that has just given its oxygen to the body.
- It is deoxygenated and is sent to the lungs to collect more oxygen (2 marks).

**KEY TAKEAWAY**

The right side of the heart pumps deoxygenated blood to the lungs; the left side pumps oxygenated blood to the body.

(c) Chamber D has a much thicker muscular wall than chamber C. Suggest a reason for this.

**(c) Answer: D (left ventricle) pumps blood all around the body, which needs more force than pumping blood only to the lungs.**

- Approach: a thicker muscle wall produces a stronger pump.
- The left ventricle sends blood to the whole body, a long journey with high resistance (1 mark for body, 1 for needs more force).
- The right ventricle sends blood only to the nearby lungs, so a thinner wall is enough (1 mark for comparison).

**KEY TAKEAWAY**

The left ventricle has the thickest wall because it pumps blood around the whole body.

(d) Name the blood vessel that carries blood from the heart to the lungs.

**(d) Answer: Pulmonary artery.**

- Approach: arteries carry blood away from the heart.
- The vessel from the right ventricle to the lungs is the pulmonary artery.
- Answer: pulmonary artery (2 marks).

**KEY TAKEAWAY**

Arteries carry blood away from the heart; the pulmonary artery goes to the lungs.

(e) Oxygen passes from the blood into the body cells in very small blood vessels. Name these vessels and give one feature that makes them suited to this job.

**(e) Answer: Capillaries; their walls are only one cell thick so substances pass through quickly.**

- Approach: exchange needs a short distance for diffusion.
- The vessels are capillaries (1 mark).
- Their walls are one cell thick, so oxygen and nutrients diffuse across easily (2 marks). Accept: very narrow, so blood moves slowly past cells and there is a large surface area.

#### KEY TAKEAWAY

Capillaries have walls one cell thick, so oxygen and nutrients diffuse quickly into cells.

LOS: The heart and circulation (Junior Cycle Science, Biological World)

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