SEVENOAKS SCHOOL

YEAR 9 (13+) SCHOLARSHIP

May 2019
for entry in September 2019

SCIENCE 2

Your Name: _____

Your School: _____

Time allowed: 1 hour

Equipment needed: Pen, pencil and ruler.
You may use an eraser and a calculator if needed.

Information for candidates:

1. Write your name and school on this page.
2. Write all of your answers on the question papers in the space provided. If you need additional paper then please ask the invigilator. Please put your name on the sheets of paper you use.
3. The marks for each question or part question are shown in square brackets [ ] after the question.
4. Answer **ALL QUESTIONS** in **SECTION A** [40 marks] and **ONE QUESTION ONLY** from **SECTION B** [10 marks].

Section A

Answer ALL questions in this section.

BIOLOGY

1. The table shows the relationship between mean birth weight of babies and the smoking habits of their mothers.

	Mean weight of babies at birth/kg	
	Mother continued to smoke after 4th month of pregnancy	Mother gave up smoking before 4th month of pregnancy
Light smoker	3.20	3.39
Heavy smoker	3.18	3.36
Non-smoker	3.39	

a) If a mother gives up smoking before the fourth month of her pregnancy, what effect would this have on the likely birth weight of her baby? In your answer, compare the likely birth weight with that of a baby born to non-smoker. [3]

_____

_____

_____

_____

b) If the mother continued to smoke after the fourth month of her pregnancy, what effect would this have on the likely birth weight of her baby? Again, in your answer compare the likely birth weight with that of a baby born to a non-smoker. [3]

_____

_____

_____

_____

2. a) A cheetah is a predator that feeds on small antelopes. When chasing its prey, the cheetah runs very fast but can only keep this up for a short time. Give two ways the cheetah's body changes to provide the necessary energy for this increased level of activity. [2]

1. _____

_____

2. _____

_____

b) To run very fast the cheetah releases energy by both aerobic and anaerobic respiration. Complete the equation below to show anaerobic respiration in the cheetah's muscles. [1]

_____ → _____ + energy

c) State **two** disadvantages of anaerobic respiration. [2]

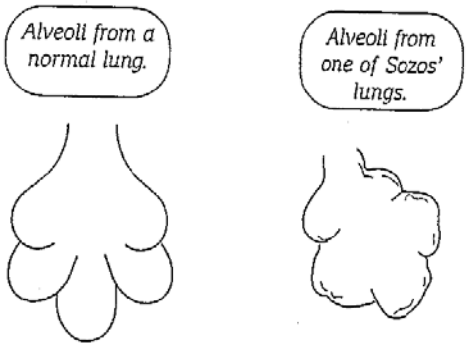
1. _____

_____

2. _____

_____

3. Emphysema is a disorder of the lungs. It can be caused by infections, chemicals or by cigarette smoking. The damage happens when you cough a lot. Sozos has emphysema.



Describe two ways that emphysema has affected the surface area of Sozos' alveoli and how this affects gas exchange. [2]

1. _____

_____

2. _____

_____

CHEMISTRY

4. A student tested four unknown metals (the names are all imaginary) with different metal salt solutions. She put a tick (✓) if there was a reaction and a cross (×) if there was no change. Some of her results are shown in the table.

	Merconium chloride solution	Supposium chloride solution	Immodium chloride solution	Brainium chloride solution
Merconium	×		×	
Supposium	✓	×	✓	✓
Immodium			×	×
Brainium				×

a) Complete the table using the symbols × and ✓. [3]

b) Arrange the metals in order of reactivity (most reactive first). [2]

_____

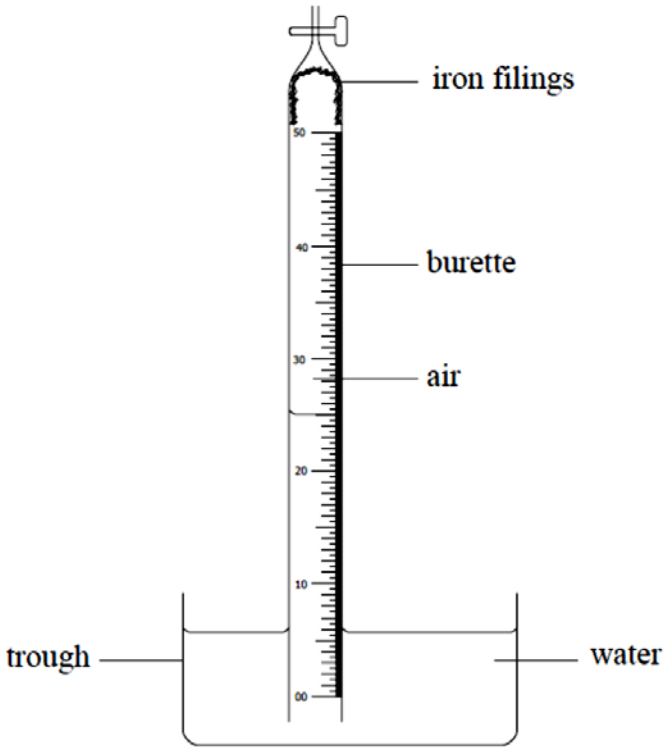
_____

c) Complete the equation for the reaction of a piece of supposium metal with a solution of merconium chloride: [2]

Supposium + Merconium chloride →

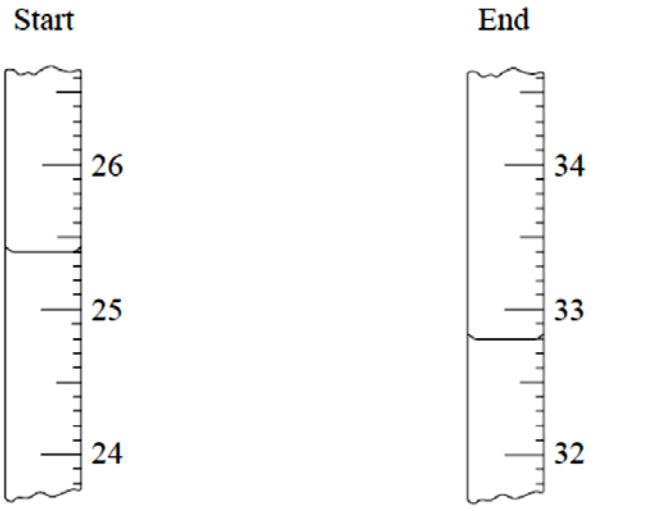
5. Iron reacts slowly with water to form hydrated iron(III) oxide, also called rust.

A student placed a known mass of wet iron filings in the end of a burette and set it up as shown in the diagram.



Over several days, the water level rose up the burette and reached a constant level. This is because the iron reacted with the oxygen in the air. Other students repeated the experiment using different starting levels of water in the burette and different masses of iron filings.

a) The diagrams below show the water level in the burette at the start and end of one of the experiments. Record the volumes shown on the burette. [2]



Burette reading at start

..... cm^3

Burette reading at end

..... cm^3

b) The students wrote down these results:

With 1.23 g of iron the water level started at 13.2 cm^3 and ended at 24.4 cm^3

The water level went from 2.5 cm^3 to 10.7 cm^3 when 0.65 g of iron filings were used

When I used 2.30 g of iron filings the water went from 0.0 cm^3 to 8.9 cm^3

Complete the table by: [3]

- putting suitable headings, including units, at the top of each of the first three columns.
- recording the data the students wrote down.
- calculating the volume of oxygen used in each experiments.

			volume of oxygen used (cm^3)

c) (i) The percentage of oxygen in the air can be calculated by using the equation:

$$\textbf{percentage of oxygen} = \frac{\textbf{volume of oxygen used}}{\textbf{volume of air at start}} \times 100$$

(ii) A student said she could use the results in this experiment to calculate the percentage of oxygen in air. Explain why this is **not** possible. [1]

_____

_____

(iii) What change could be made to the apparatus so that the percentage of oxygen in the air could be determined? [1]

_____

_____

6. An atom contains electrons, neutrons and protons.

*The photographs show some electrostatic effects.

positively charged balloon near hair

positively charged rod near some paper

positively charged balloon near a thin stream of water

Explain in terms of electric charges how one of these effects is caused. [6]
You may include diagrams to help with your answers.

7. Figure 3 shows the energy transferred by one solar panel in one second.

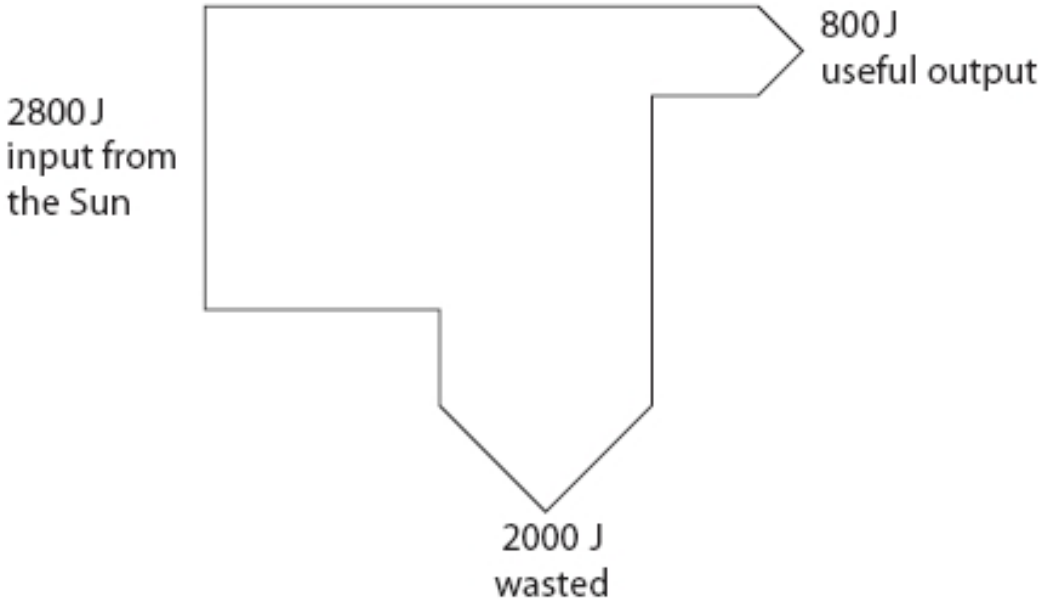


Figure 3

a) Use the information in Figure 3 to calculate the efficiency of the solar panel in generating electricity. [3]

Efficiency = _____

b) Give a reason why some of the energy reaching the panel from the Sun is not used to generate electricity. [1]

_____

_____

8. Figure 1 is a table showing the distance from the Sun of the orbit of some planets.

The distances are in AU (astronomical units). 1 AU = 150 000 000 km

planet	distance of orbit from the Sun in AU
Mercury	0.39
Earth	1
Mars	1.5
Jupiter	5.2
Neptune	30.1

Figure 1

a) State the distance of Earth from the Sun in kilometres. [1]

Distance of Earth from the Sun = _____km

b) One of the planets in the table orbits the Sun between the orbits of Earth and Jupiter.

Calculate the distance from the Sun to this planet in kilometres. [2]

Distance from the Sun = _____ km

Total for Section A: 40 marks

Section B

Answer ONE question in this section, 1, 2 or 3.

BIOLOGY

1. Explain the effects of **three** recreational drugs you have studied on the behaviour and long term physical and mental health of an individual. [10]

CHEMISTRY

2. When green copper carbonate is heated strongly a gas is produced that turns limewater cloudy. The green solid turns black. [2]

a) State the names of:

(i) the gas produced _____

(ii) the black solid _____

When copper carbonate is reacted with dilute sulfuric acid, the same gas as in part (a) is produced as well as a blue solution.

b) Write a word equation for the reaction of copper carbonate with dilute sulfuric acid. [2]

_____

c) Malachite is an ore of copper containing copper carbonate and several other unreactive substances that are insoluble in water.

You are supplied with several pieces of malachite and the chemicals and apparatus listed below.

Chemicals: **dilute sulfuric acid** **magnesium powder**

Apparatus: **beakers** **filter funnel & paper** **pestle & mortar**

Describe how you would use the chemicals and the apparatus listed above to obtain a sample of copper from the malachite. [6]

Total: 10 marks

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

3. Figure 2 shows a foam jacket around a copper cylinder.

Figure 2

The hot water is stored in the copper cylinder until it is needed. The foam jacket helps to keep the water hot.

a) Explain how the foam helps to keep the water hot. [2]

b) A company has developed a new material which they think could be used instead of foam around the cylinder.

Devise an investigation that the company could carry out to make a fair comparison of the insulating properties of their new material with those of the foam. [6]

c) Some forces act at a distance. One example is the gravitational attraction between the Moon and the Earth.

Describe an example of another type of force acting at a distance, where the force is **not** gravitational. [2]

Total: 10 marks