SEVENOAKS SCHOOL

YEAR 9 (13+) SCHOLARSHIP

May 2018
for entry September 2018

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 in the spaces provided. If you need additional paper then please ask the invigilator.
3. The marks for each question are indicated at the end of the question.
4. Answer **all** questions in Section A and **one** question only in Section B.
5. The total mark for this paper is 50.

Paper 2

Section A

ANSWER ALL QUESTIONS

Biology

1 The polar bear is adapted to living in a cold and icy environment.
The frozen lands are its hunting grounds and it is well adapted to its environment.
Look at the picture below and use it to fill in the table.

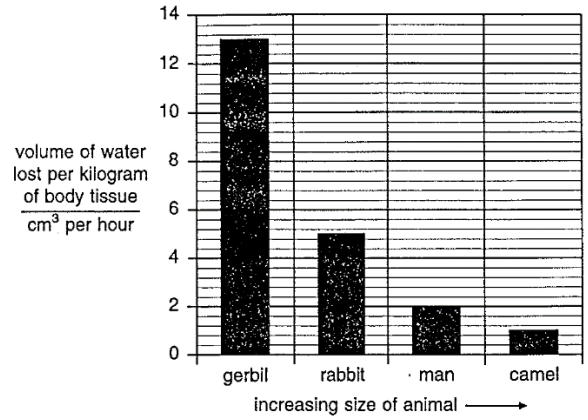
(a) Give 3 adaptations that help it survive in this landscape and detail how each of these is vital to its survival.

Adaptation	How it helps the polar bear survive

(3)

(b) Different mammals would have to lose different amounts of water to keep their body temperature constant in a hot, dry desert.

This is shown in the graph below.



(i) Describe the effect of increasing body size on the amount of water lost per kilogram of tissue.

.....

.....

(1)

(ii) A camel weighs 500kg. Use the bar chart to calculate the volume of water this camel would have to lose in one hour to keep its body temperature constant.
Show how you work out your answer.

Answer ..... **(4)**

(iii) Humans must maintain a constant body temperature. A camel's body temperature can rise by about 7°C without it coming to any harm.

Explain how this may be an advantage to the camel in the desert.

.....

.....

.....

.....

(2)

2 Most babies born in Britain weigh about 3kg at birth. A few babies weigh more than 5kg at birth. Some babies can weigh as little as 1kg at birth.

One reason for small babies is that they are born early or prematurely.

(a) Suggest **two** more reasons why the birth weights of babies can be so variable.

(i) .....

.....

(ii) .....

..... **(2)**

(b) Aarya and Mitesh are twin brother and sister. At birth, Mitesh weighed 2.7kg and his sister weighed 2.6kg.

(i) Can you suggest **one** reason why the twins were nearly the same weight?

.....

..... **(1)**

(ii) Can you suggest **one** reason why the twins weights were slightly different.

.....

..... **(1)**

3 A student half-filled a beaker of water from the tap and then heated it to 50 °C. He noted that bubbles appeared on the inside of the beaker.

(a) State the name of the substance contained within these bubbles.

.....

.....

(1)

(b) The student continued to heat the water from 50 °C to 100 °C. State and explain how you would expect the rate of bubbles appearing to change over this temperature range.

.....

.....

.....

(2)

(c) Water boils at 100 °C. State the name of the substance contained in the bubbles which form at 100 °C.

.....

.....

(1)

(d) The student then took some tap water and completely filled a bottle into which some iron wool had previously been pushed. They put a lid on and left it for a week.

State what you would expect to see in the bottle after this time?

.....

.....

(1)

(e) The student repeated the experiment in part (f) but used water that had first been heated to 100 °C for several minutes. State and explain what changes, if any, the student would expect to observe?

.....

.....

.....

(2)

4 (a) State **two** environmental problems associated with the burning of fossil fuels.

Problem 1 .....

.....

Problem 2 .....

..... **(2)**

(b) When the octane in car fuel undergoes **incomplete** combustion it can produce **two additional** products, other than carbon dioxide and water.

State the name of **one** of these additional products and suggest a problem associated with its production.

Name of product .....

.....

Problem .....

..... **(2)**

(c) Describe how the presence of carbon dioxide in a sample of gas could be tested.

Test .....

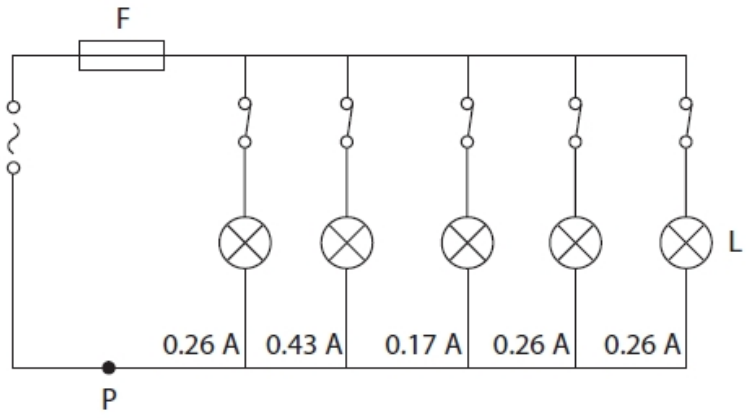
.....

Result .....

..... **(2)**

5 The diagram shows part of a lighting circuit in a house.

The circuit is protected by fuse (labelled: F).



(a) Give two reasons why the lamps are wired in parallel.

(i) .....

.....

.....

(ii) .....

.....

..... **(2)**

(b) What is the current at P?

- ☒ **A** 0.17 A
- ☒ **B** 0.26 A
- ☒ **C** 0.43 A
- ☒ **D** 1.38 A **(1)**

(c) Explain how the fuse protects the circuit.

.....

.....

.....

.....

.....

..... **(3)**

(d) The equation linking Power, Current and Voltage is:

$$Voltage = \frac{Power}{Current}$$

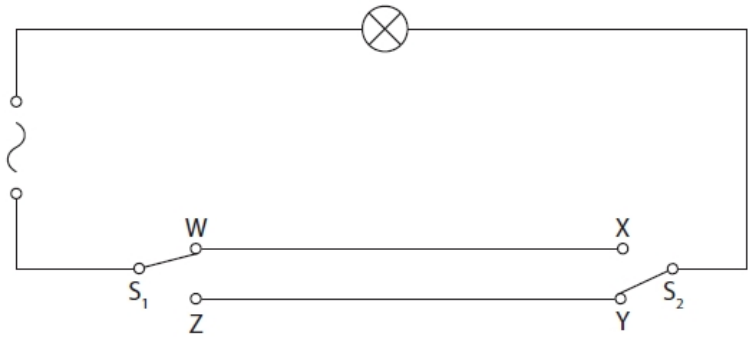
(i) Calculate the power of lamp L.
[assume the mains voltage is 230 V]

Power = …… W **(2)**

(ii) If an electrical item had a power rating of "200 Watts", it would transform 200 Joules of energy every second. Calculate the amount of energy transferred by lamp "L" in 3 minutes and give the unit.

Energy transferred = …… Unit …… **(3)**

(e) This diagram shows another lighting circuit.



(i) Complete the table by putting a tick (✓) in the box if the lamp is lit and a cross (✗) in the box if the lamp is not lit.

S_1 position	S_2 position	lamp lit (✓ or ×)
W	X	
W	Y	
Z	X	
Z	Y	

(2)

SECTION B

ANSWER ONE QUESTION ONLY

Biology

6 What are the harmful consequences to the human body of smoking cigarettes? Make sure you include any chemicals found in the cigarettes and ensure that you are specific about the harmful consequences on the human body.

(10)

7 In Chemistry, a salt is a compound comprising a metallic element and a non-metallic element that is formed via the neutralisation of a base and an acid.

Nickel sulfate is water-soluble salt that can be formed via the reaction of insoluble nickel oxide with sulfuric acid.

(a) Write a word equation for the reaction of nickel oxide with sulfuric acid.

(1)

(b) Identify the base in the reaction in (a).

(1)

(c) Describe how a sample of pure, dry, hydrated nickel sulfate crystals could be obtained via the reaction in (a).

(6)

(d) Below is a section of the reactivity series

Name of element	**Relative reactivity**
Aluminium	Most reactive
Carbon	
Nickel	
Lead	Least reactive

(i) Using information in the table above, describe how nickel metal could be obtained from nickel oxide.

.....

..... **(1)**

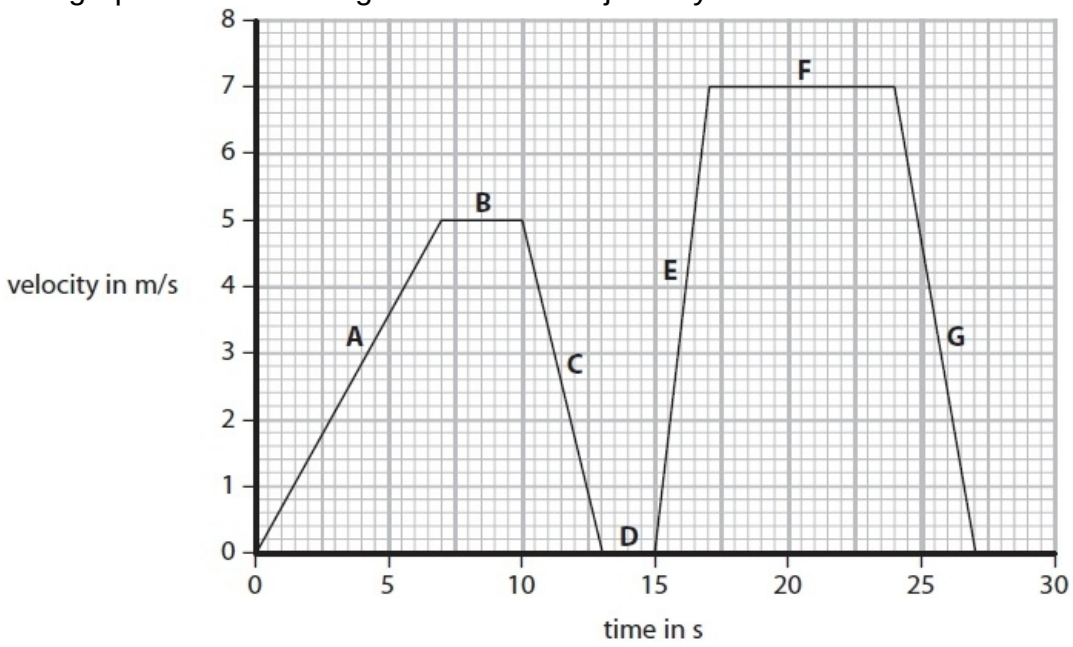
(ii) State the name of the type of reaction described in (d)(i).

.....

..... **(1)**

8 A student cycles to school.

The graph shows the stages A to G of the journey.



(a) Describe the motion of the student during stages B and D.

Stage	Description
B	
D	

(2)

(b) State how the graph shows that the acceleration for stage E is greater than the acceleration for stage A.

.....

.....

.....

(1)

(c) Calculate the distance that the student travels in the last 10 s of the journey.

Distance = …….. m **(4)**

(d) The total distance travelled is 106.5 m.
Find the average speed for the journey.

Average Speed = …… **(3)**