SEVENOAKS SCHOOL

YEAR 9 (13+) SCHOLARSHIP

May 2022
for entry in September 2022

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**.
5. The total mark for this paper is 45.

BIOLOGY

Question 1

A biologist studied a grassy field with a footpath running through it. Five areas were sampled on the path and on the field on either side of the path. The table below shows, with a tick, the species in each sample area.

Species	Grassy field					Path					Grassy field				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
grass type A	✓	✓	✓	✓	✓							✓	✓	✓	✓
grass type B		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
grass type C						✓	✓	✓	✓	✓					
daisy					✓	✓	✓	✓	✓	✓		✓			
plantain					✓	✓	✓	✓	✓	✓		✓			
rock rose		✓	✓	✓										✓	✓
hawkweed			✓		✓	✓		✓	✓	✓	✓				
ribwort	✓	✓		✓	✓		✓					✓		✓	✓
salad burnet	✓	✓	✓	✓		✓			✓		✓	✓		✓	✓

a. Which species of plant is not found on the path? [1]

_____

b. Suggest a reason why it is not found on the path. [1]

_____

_____

c. Which of the following two species of grass is most likely to be grass type C? [1]

Species	Height of leaves	Leaf type
Poa annua	10cm	Blunt, broad, fibrous
Brachypodium pinnatum	30cm	Narrow, stiff

_____

d. Give a reason for your answer. [1]

_____

_____

e. Suggest a reason why grass C does not grow on the field on either side of the path. [1]

_____

_____

f. Describe one way in which the experiment could be designed to prevent experimenter bias. [1]

_____

g. Give two factors that would need to be kept the same in this experiment to ensure a valid comparison between the three different areas. [2]

_____

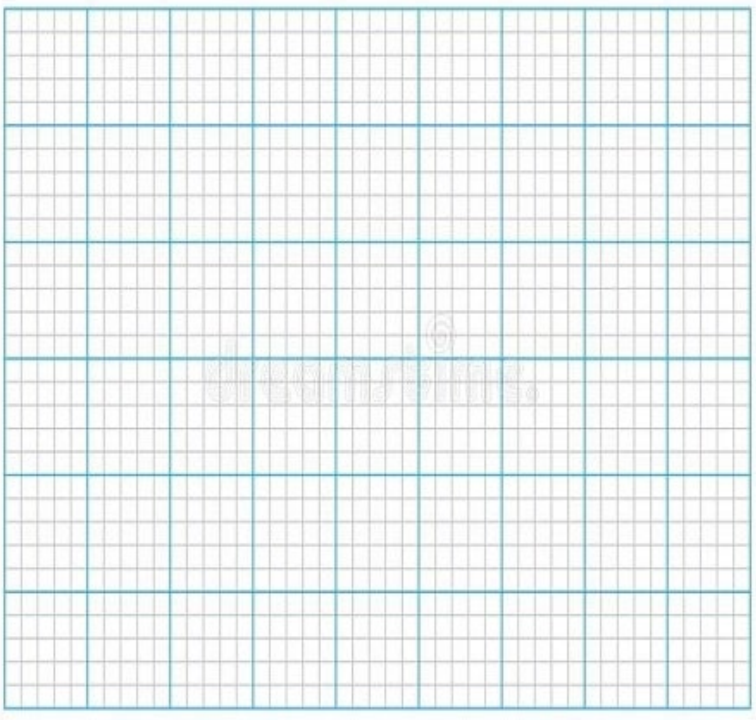
_____

Question 2

A student collected data by measuring the height of every student in the class. He then completed the table below by putting a tick in the correct row for each student. If a student was exactly on the boundary between two groups (e.g. 130 cm) they were placed in the higher group (130-135cm).

Height class (cm)	People in each height class	Total in height class
120–125	✓	1
125–130	✓ ✓	2
130–135	✓ ✓ ✓	3
135–140	✓ ✓ ✓ ✓ ✓ ✓	6
140–145	✓ ✓ ✓	3
145–150	✓ ✓	2
150–155	✓	1
	Total number of pupils	18

a. On the graph grid below, draw a **histogram** (bar chart with touching bars) to display the data from the table. [4]



Question 3

The image below shows a house plant growing towards a window.

a. Explain why the plant is growing in this way. [1]

_____

_____

The image below shows a field of young sunflower plants. The sunflower heads move throughout the day so that they always face the sun.

b. Suggest how this movement helps the process of reproduction in sunflowers. [2]

_____

_____

Total for BIOLOGY: 15 marks

CHEMISTRY

An investigation was carried out into the properties of 5 different metals. Conductivity is a measure of how well the metal conducts electricity. Knowledge of the units for conductivity is not required.

Element	**Melting Point (^oC)**	**Boiling Point (^oC)**	**Conductivity (S/m)**	**Density (g/cm^3)**
Germanium	938	2830	2.17	5.32
Mercury	-38.8	357	1.02×10^6	13.5
Copper	1080	2560	5.96×10^7	8.98
Iron	1538	2860	10^7	7.87
Zinc	419	907	1.69×10^7	7.14

a. All but two of the values in the table were recorded to 3 significant figures. Identify these values and write them to three significant figures. [2]

_____ and _____

b. Germanium and mercury are both metals. Explain why their properties might be considered unusual with reference to a typical metal such as copper, iron, or zinc. [4]

_____

_____

_____

_____

_____

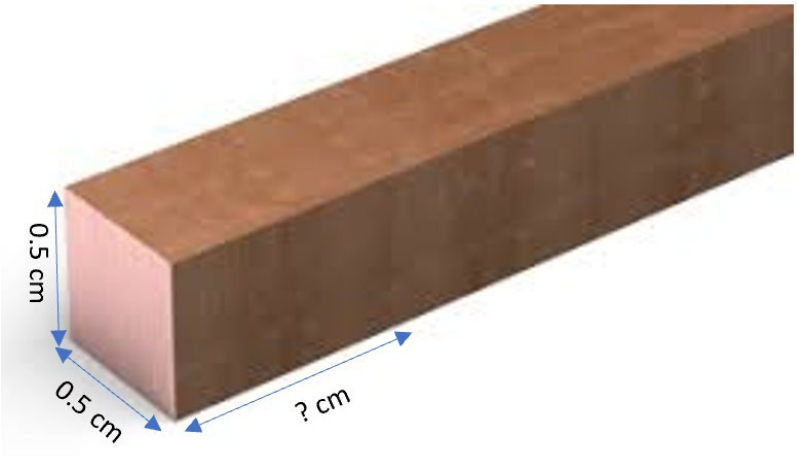
_____

_____

_____

Samples of zinc, iron and copper were tested with solutions of zinc, iron and copper salts to examine their reactivity.

c. For this experiment, a 1.0 gram piece of copper was cut from a 0.5 cm x 0.5 cm bar. What length, in cm, was cut from the copper bar? [2]



Samples of three metals were added to solutions of metal sulfates.
The results for the experiment are shown below. Where a reaction was observed, the box was marked with a ✓. Where no reaction was observed, the box was marked with a ×.

	Copper sulfate solution	Iron sulfate solution	Zinc sulfate solution
Copper	×	×	×
Iron	✓	×	×
Zinc	✓	✓	×

d. Where reactions were observed, what type of reaction took place? [1]

e. Rank the three metals in order of reactivity, giving reasons for your ranking. [3]

f. Use your answer to question e and your own knowledge to suggest why copper is used instead of iron in water pipes. [1]

_____

_____

g. Complete the word equation for the reaction between zinc and copper sulphate. [2]

zinc + copper sulphate → _____ + _____

Total for CHEMISTRY: 15 marks

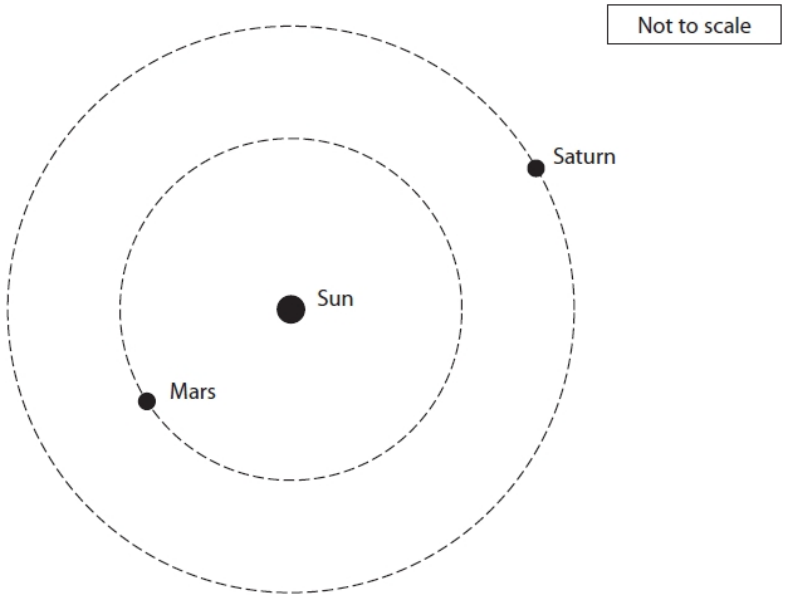
Continued…

PHYSICS

Question 1

The planets Mars and Saturn orbit around the same star, the Sun.

a. The diagram shows the orbital paths of Mars and Saturn.



Draw an orbital path of the Earth on the diagram. [2]

b. The table gives some information about the orbits of Mars and Saturn.

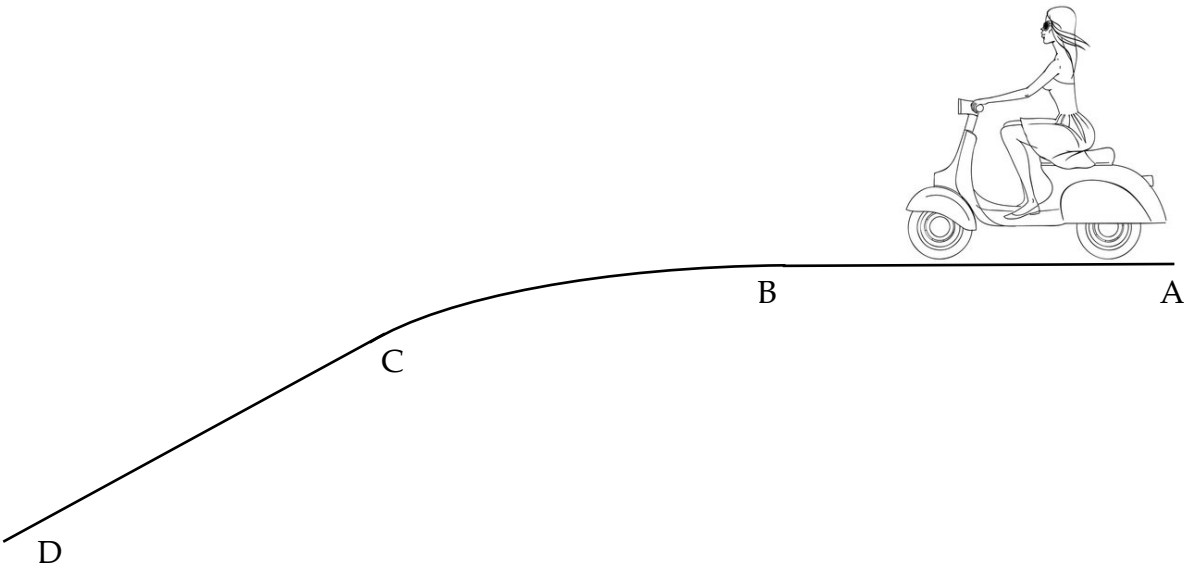
	Mars	Saturn
Orbital radius in km	2.28×10^8	1.43×10^9
Orbital speed in km/s	24.1	9.70

Calculate the number of complete orbits that Mars completes in the time it takes Saturn to complete just one orbit. [5]

number of orbits = _____

Question 2

Annabel is travelling at a constant speed on her electric scooter. She is about to go downhill but remain at the same constant speed. Describe the energy changes and transfers taking place during whole journey. You can use the labels A, B,C, D to help you identify specific points on her journey. [8]



Total for PHYSICS: 15 marks