SEVENOAKS SCHOOL

YEAR 9 (13+) SCHOLARSHIP

for entry in September 2020

SCIENCE 1

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:

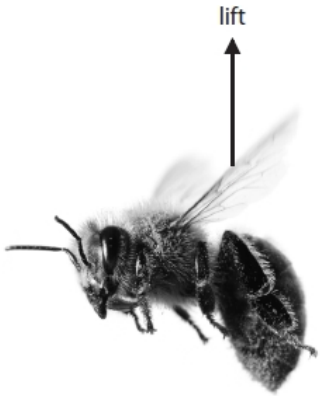
1. Write your name and school on this page.
2. Write all of your answers on the question papers in the space provided. If you need additional paper then please ask the invigilator. Please put your name on the sheets of paper you use.
3. The marks for each question or part question are shown in square brackets [ ] after the question.
4. Answer **ALL QUESTIONS**.
5. The total mark for this paper is 60.

PHYSICS

Question 1

This question is about a small flying insect called a bee.

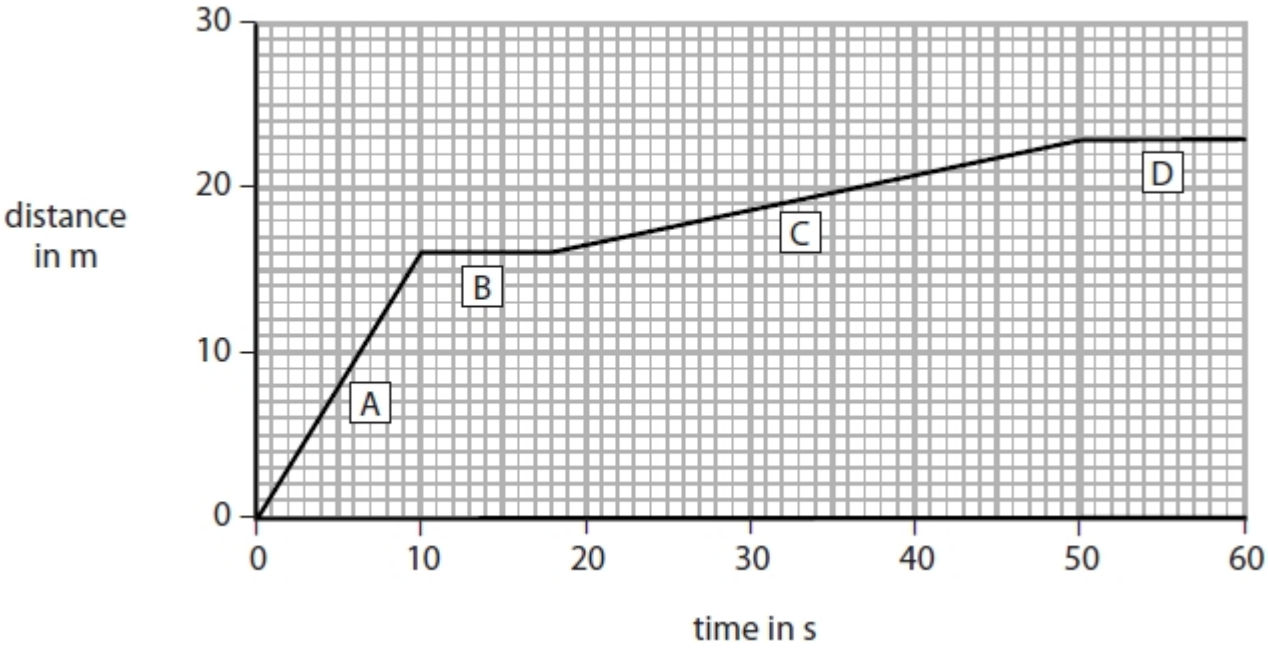
a. The photograph shows a bee accelerating vertically upwards.



© Friends of the Honey Bee

Complete the diagram by adding another labelled force arrow. [2]

b. The graph shows a 60-second journey made by the bee.
During this time, the bee stops at some flowers to feed.



i. Which stage of the graph shows the bee stopping at a flower for the shortest period of time? [1]

☐ A ☐ B ☐ C ☐ D

ii. Which stage of the graph shows the bee moving at the fastest speed? [1]

☐ A ☐ B ☐ C ☐ D

iii. State the equation linking average speed, distance moved and time taken. [1]

iv. Calculate the average speed of the bee during the first 35 seconds of its journey. [2]

Average speed = _____ m/s

c. Ultraviolet waves are used by bees to identify markings on flowers.

i. State another use of ultraviolet waves. [1]

_____

_____

ii. State a similarity and a difference between ultraviolet waves and visible light waves. [2]

Similarity

_____

_____

Difference

_____

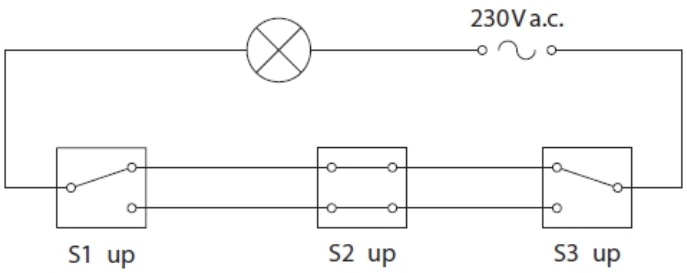
_____

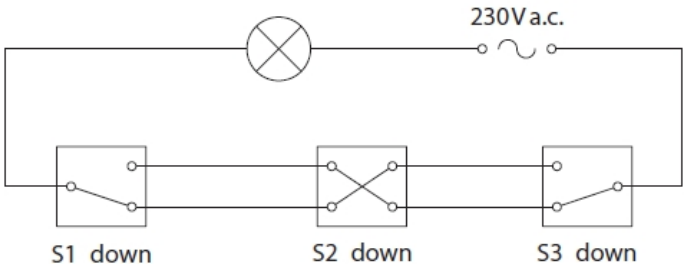
Question 2

a. A lamp with a power of 6.5 W is connected to a 230 V supply.
Calculate the current in the lamp. Power is equal to Voltage multiplied by Current. [3]

Current = _____ A

b. Three switches, S1, S2 and S3, are used to control a lamp in a large room.
Each switch can be up or down, and each switch can turn the lamp on or off.





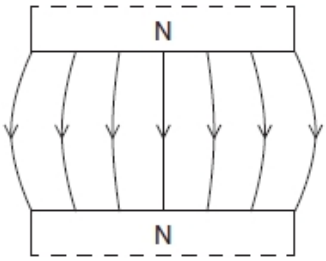
When all three switches are up, the lamp is on.
When all three switches are down, the lamp is off.
Complete the table by giving the missing information. [3]

S1	S2	S3	Lamp
up	up	up	on
down	down	down	off
up	up	down	
down	up		off
up		down	on

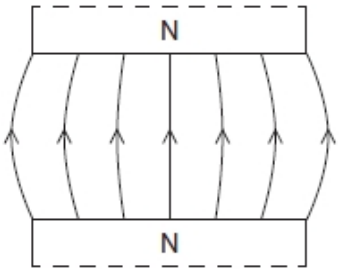
Question 3

a. Which diagram shows the correct magnetic field pattern between the north poles of two bar magnets? [1]

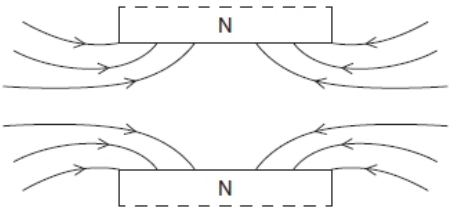
☒ **A**



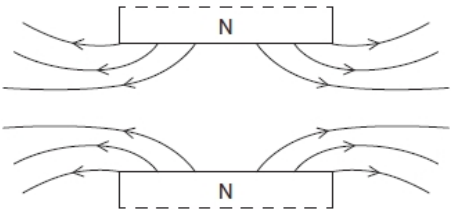
☒ **B**



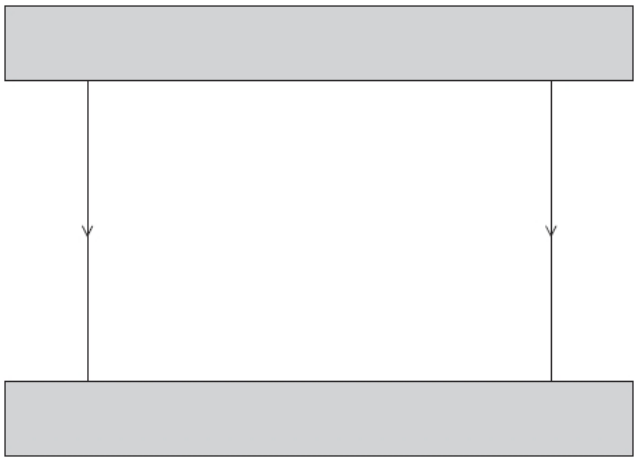
☒ **C**



☒ **D**



b. The diagram shows part of a magnetic field.



i. Two magnetic field lines have already been drawn.
Draw more magnetic field lines on the diagram to show a uniform magnetic field. [2]

ii. Describe how you would change your diagram to show a stronger magnetic field. [1]

_____

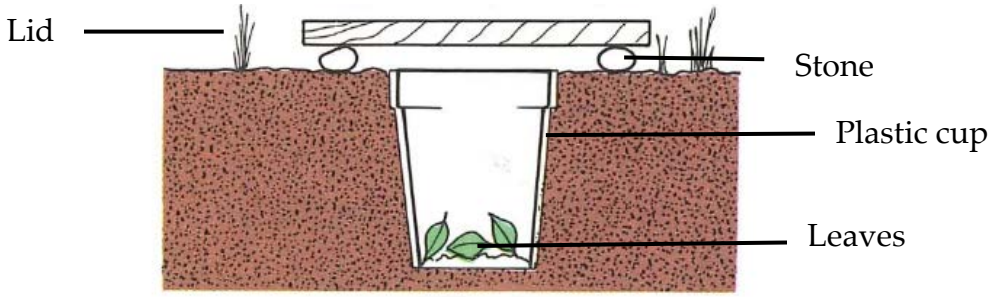
_____

Total for PHYSICS: 20 marks

BIOLOGY

Question 1

Jenny wanted to investigate the invertebrates (such as insects and spiders) living in two different fields near her home.
She used the following equipment to catch the invertebrates and she checked the traps every two hours.



a. Why is it important to put the lid on the trap? [1]

_____

_____

b. Give one reason why it was important to check the trap every two hours. [1]

_____

_____

She also collected samples of soil from the two fields.

c. Describe how she could measure the water content of each soil sample. [2]

_____

_____

_____

_____

_____

Question 2

A biologist wished to show that strawberry flowers cannot make fruit unless they have been pollinated. An unopened flower on the plant was sealed with a polythene bag. A week later the biologist was surprised to find that a fruit had formed.

a. Suggest how the flower may have been pollinated. [1]

_____

_____

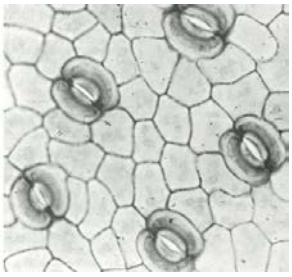
b. What could the biologist have done to prevent pollination of this flower? [2]

_____

_____

Question 3

The microscopic image below shows the lower surface of an oak leaf.



The small holes are known as stomata and allow gases to enter and leave the leaf. They can open and close according to the needs of the plant.

a. During the day the stomata are usually open. Explain why this is important for the plant to survive. [3]

_____

_____

_____

_____

_____

b. Suggest why it is important that the stomata can close on very hot days. [1]

_____

_____

Question 4

A sport scientist wanted to investigate how exercise intensity affects the amount of sweat produced by athletes. She measured the mass of some cotton wool and then taped it to the armpits of the athlete. After a period of exercise on a treadmill, she removed the cotton wool and measured the mass again. The mass of sweat produced was calculated by subtracting the original mass of cotton wool from the final mass. She did this experiment at 5 different speeds on the treadmill.

a. What are the independent and dependent variables in this investigation? [2]

i. Independent variable

_____

ii. Dependent variable

_____

b. The same athlete was used for all five treadmill speeds. Give two other variables that would need to be kept constant for each trial. [2]

_____

_____

c. How could the scientist have made this investigation more reliable? [1]

_____

_____

d. Describe one possible source of error in the experimental method which could have caused inaccuracies in the result. [1]

_____

_____

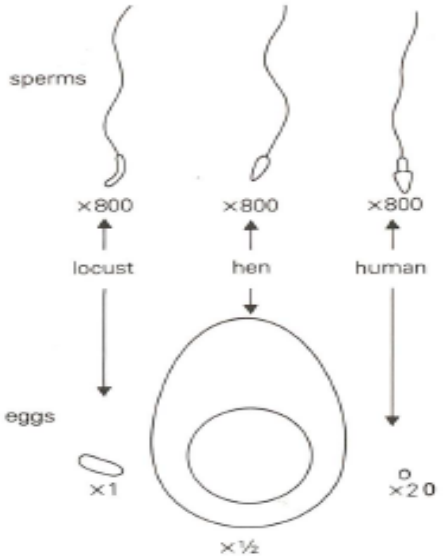
_____

_____

_____

Question 5

This diagram shows the relative sizes of eggs and sperm from three different animals.



a. Suggest a reason why the sperm are so much smaller than the eggs. [1]

_____

_____

b. Suggest why the hen's eggs is so much larger than the human egg. [2]

_____

_____

_____

Total for BIOLOGY: 20 marks

CHEMISTRY

Question 1

Molly wishes to carry out an investigation into how quickly salt (sodium chloride) dissolves in water at different temperatures.

a. Molly uses the following pieces of laboratory apparatus. State the name of each piece of apparatus in the space provided. [3]

_____ _____ _____

_____ _____ _____

b. Molly uses a Bunsen burner, tripod and gauze to heat up the water. State the names of three other pieces of apparatus that would be required to carry out this investigation. [3]

_____

_____

_____

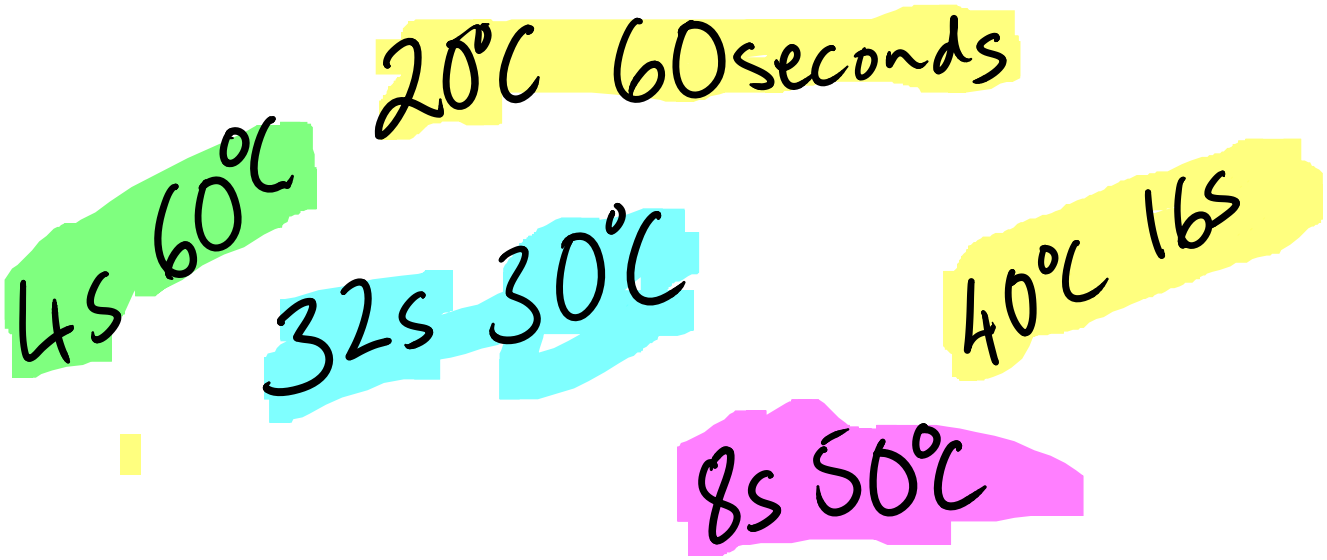
c. State three things that must be kept the same in order to make this a fair test. [3]

_____

_____

_____

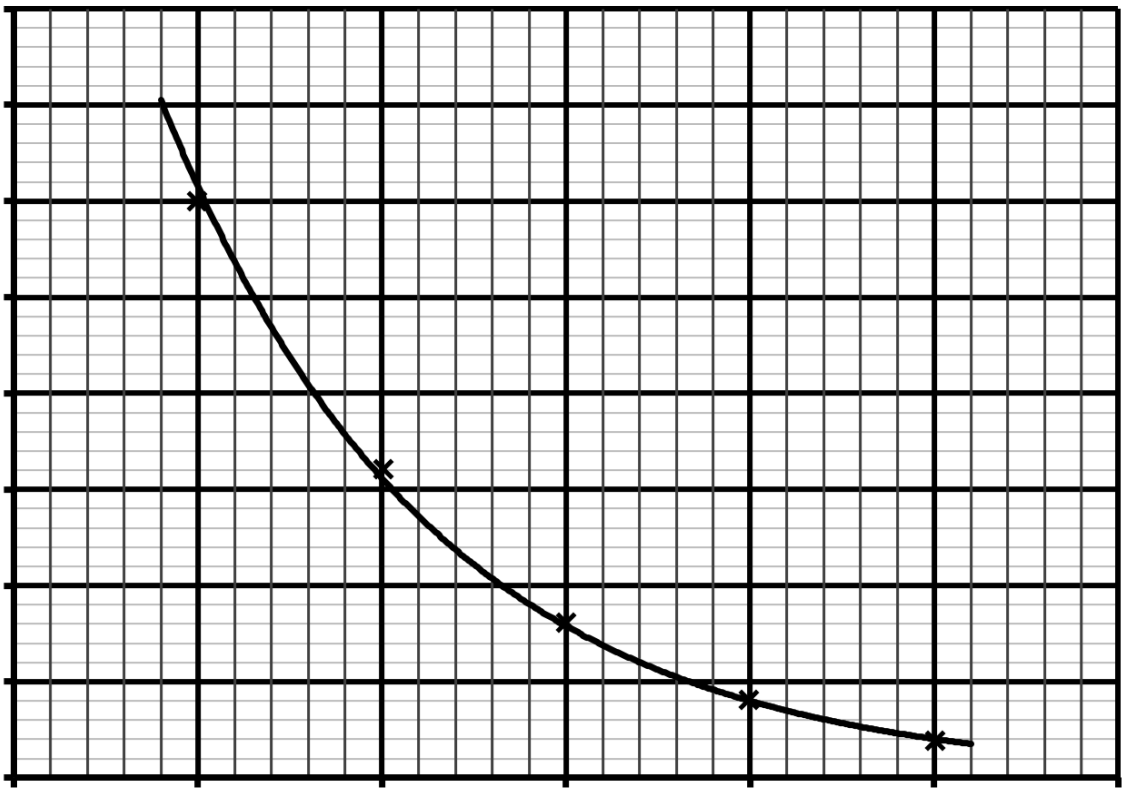
d. Molly recorded the following results on a scrap of paper.



Re-write the results in a more appropriate format. [2]

Continued…….

e. Molly drew a graph of these results:



i. Label the axes and insert scales on the axes. [2]

ii. Explain as fully as possible what this graph tells you about how changing the temperature affects how quickly the salt dissolves in water. [2]

_____

_____

_____

f. Explain how you could convince someone (without tasting it!) that, when salt dissolves in the water, it does not just disappear and is still there. [2]

_____

_____

_____

_____

g. When salt dissolves in water, is this an example of a physical or chemical change? [1]

_____

h. Outline a method you could adopt in order to determine the maximum mass of sodium chloride that could dissolve in 100 cm^3 of distilled water. [2]

_____

_____

_____

_____

Total for CHEMISTRY: 20 marks

END OF PAPER