

Combined Science
PAPER 1
Foundation Tier

Total Marks

Time: 1 hour 10 minutes plus your additional time allowance

In the boxes below, write your name, centre number and candidate number.

Surname					
Other names					
Centre Number					
Candidate Number					

YOU MUST HAVE

Calculator, ruler

YOU WILL BE GIVEN

Diagram Booklet

INSTRUCTIONS

Answer ALL questions.

Answer the questions in the spaces provided – there may be more space than you need.

Any diagrams may NOT be accurately drawn, unless otherwise indicated.

You must show all your working out with your answer clearly identified at the end of your solution.

INFORMATION

The total mark for this paper is 60.

The marks for EACH question are shown in brackets – use this as a guide as to how much time to spend on each question.

In the question marked with an ASTERISK (*), marks will be awarded for your ability to structure your answer logically showing how the points that you make are related or follow on from each other where appropriate.

Calculators may be used.

ADVICE

Read each question carefully before you start to answer it.

Try to answer every question.

Check your answers if you have time at the end.

Answer ALL questions. Write your answers in the spaces provided.

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ~~☒~~ and then mark your new answer with a cross ☒.

- 1 Look at Figure 1 for Question 1(a) in the Diagram Booklet. It shows a cell from an onion root tip.**

This cell is dividing by mitosis.

- (a) (i) Which structure is labelled Z?
(1 mark)**

- ☐ **A allele**
- ☐ **B chromosome**
- ☐ **C spindle**
- ☐ **D nuclear membrane**

(continued on the next page)

1 continued.

(ii) Mitosis produces new cells.

Give TWO reasons why mitosis is important in living things.

(2 marks)

1 _____

2 _____

(iii) Look at the diagram for Question 1(a)(iii) in the Diagram Booklet. Draw ONE straight line from each stage of the cell cycle to its description.

(2 marks)

(continued on the next page)

1 continued.

(b) A student is preparing a microscope slide of plant cells.

(i) State what can be added to the slide to make the plant cells more visible.
(1 mark)

(ii) The microscope has two lenses:

- **an eyepiece lens with $\times 10$ magnification**
- **an objective lens with $\times 40$ magnification**

Which is the TOTAL magnification of this microscope?

(1 mark)

- ☐ **A $\times 4$**
- ☐ **B $\times 30$**
- ☐ **C $\times 50$**
- ☐ **D $\times 400$**

1 continued.

- (c) Name ONE part of a light microscope that can be moved to obtain a clear image of plant cells.
(1 mark)**

(Total for Question 1 = 8 marks)

2 (a) Sickle cell disease is a recessive genetic disorder in humans.

(i) Two parents are heterozygous for sickle cell disease.

Complete the Punnett square to show the possible genotypes of their children.

(1 mark)

	D	d
D		
d		

(ii) State the percentage probability that their children could have sickle cell disease.
(1 mark)

percentage probability = _____%

(continued on the next page)

2 continued.

- (iii) A father with the genotype dd and a mother with the genotype DD plan to have several children.**

Explain why none of their children will have sickle cell disease.

(2 marks)

(continued on the next page)

2 continued.

(b) Look at Figure 2 for Question 2(b) in the Diagram Booklet. It shows some information about two types of cattle.

**Describe how these types of cattle could be selectively bred to produce cattle that can survive high temperatures and have good meat quality.
(2 marks)**

2 continued.

(c) Wheat plants can get fungal diseases that affect their leaves.

**Give TWO benefits of breeding wheat plants that are resistant to fungal disease.
(2 marks)**

1

2

(Total for Question 2 = 8 marks)

- 3 (a) Carrots have different physical characteristics such as colour.

Which genetic term describes the physical characteristics of a carrot?
(1 mark)

- ☐ A genotype
- ☐ B monohybrid
- ☐ C phenotype
- ☐ D heterozygous

(continued on the next page)

3 continued.

- (b) A student chose three carrot sticks and weighed each one.**

The carrot sticks were placed in 50 cm³ of distilled water.

After two hours the student weighed each carrot stick again.

Look at Figure 5 for Question 3(b) in the Diagram Booklet. It shows the results for these carrot sticks P, Q and R.

- (i) Give ONE reason why the student used three carrot sticks instead of just one carrot stick.
(1 mark)**

(continued on the next page)

3 continued.

- (ii) Give TWO ways that this method could be improved.
(2 marks)**

1 _____

2 _____

(continued on the next page)

3 continued.

- (iii) Calculate the percentage change in mass of carrot stick Q.
(3 marks)**

Use the equation

$$\text{percentage change} = \frac{\text{change in mass}}{\text{mass at the start}} \times 100$$

Give your answer to 2 significant figures.

percentage change = _____%

(continued on the next page)

3 continued.

- (iv) Explain the change in mass of the carrot sticks.
(2 marks)**

(Total for Question 3 = 9 marks)

**4 (a) Why are enzymes called biological catalysts?
(1 mark)**

- ☐ **A because they slow down biological processes**
- ☐ **B because they speed up biological processes**
- ☐ **C because they denature biological processes**
- ☐ **D because they stop biological processes**

(continued on the next page)

4 continued.

(b) Many cells contain an enzyme called catalase.

Catalase breaks down hydrogen peroxide into water and oxygen.

A scientist investigated the effect of hydrogen peroxide concentration on the time taken to produce 20 cm^3 of oxygen.

Look at Figure 6 for Question 4(b) in the Diagram Booklet. It shows the equipment used.

- (i) State how the scientist could control the temperature of the flask.**
(1 mark)

(continued on the next page)

4 continued.

- (ii) Explain why the temperature should be controlled in this investigation.
(3 marks)**

(continued on the next page)

4 continued.

- (iii) This investigation used five different concentrations of hydrogen peroxide.

Figure 7 shows the results of this investigation.

Figure 7

concentration of hydrogen peroxide in arbitrary units	time taken to collect 20 cm ³ of oxygen in seconds
4	30
8	15
12	10
16	7
20	5

Look at the graph for Question 4(b)(iii) in the Diagram Booklet. Complete the graph by plotting the points and drawing a line to show the trend in the data.

One of the points has been plotted for you.
(2 marks)

(continued on the next page)

Turn over

4 continued.

(iv) Describe the trend shown in the graph.

**Use data from the table in Figure 7 to support
your answer.**

(3 marks)

(Total for Question 4 = 10 marks)

- 5 (a) Motor neurones are found in the nervous system.**

Look at Figure 8 for Question 5(a) in the Diagram Booklet. It shows a motor neurone.

- (i) Draw an arrow on Figure 8 to show the direction of travel of an electrical impulse along the motor neurone.**
(1 mark)

- (ii) Name both structure **K** and structure **L**.**
(2 marks)

K _____

L _____

(continued on the next page)

5 continued.

(b) Look at Figure 9 for Question 5(b) in the Diagram Booklet. It shows part of a reflex arc in the spinal cord.

**(i) Describe how an impulse passes from the relay neurone to the motor neurone.
(3 marks)**

(continued on the next page)

5 continued.

**(ii) Explain the function of a reflex arc.
(2 marks)**

(continued on the next page)

5 continued.

- (c) A scientist investigated the reaction times of five students using a computer program.**

The computer screen showed a blue square at the start.

As soon as the blue square turned yellow, each student had to press a key on the keyboard as fast as possible.

Look at Figure 10 for Question 5(c) in the Diagram Booklet. It shows the results for the five students.

- (i) Which is the median result for these students?
(1 mark)**

☐ **A 200 milliseconds**

☐ **B 210 milliseconds**

☐ **C 215 milliseconds**

☐ **D 225 milliseconds**

(continued on the next page)

5 continued.

- (ii) The scientist wanted to investigate if the colours of the squares used on the computer program affected reaction time.**

The computer program started with blue squares that turned into yellow squares.

Describe how the scientist could compare the reaction times of these students when they respond to red squares turning into yellow squares.

(3 marks)

(continued on the next page)

Turn over

5 continued.

(Total for Question 5 = 12 marks)

- 6 (a) Name the organisation which defines health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.
(1 mark)

- (b) Tuberculosis (TB) is a communicable disease.

- (i) State TWO ways that communicable diseases are different from non-communicable diseases.
(2 marks)

1

2

(continued on the next page)

Turn over

6 continued.

- (ii) Explain ONE way that the spread of tuberculosis (TB) can be reduced or prevented.
(2 marks)**

(continued on the next page)

6 continued.

- (iii) A student researched the number of people with TB in some countries.**

The student wrote down the following notes in a notebook.

Belgium 1000

Portugal 2400

UK 5400 people

Germany 6100

5800 in France

Look at the table for Question 6(b)(iii) in the Diagram Booklet. Complete the table to show the student's data.

(2 marks)

(continued on the next page)

6 continued.

- *(c) Describe how the physical barriers and chemical defences of the human body provide protection from diseases.
(6 marks)**

(continued on the next page)

Turn over

6 continued.

(Total for Question 6 = 13 marks)

TOTAL FOR PAPER = 60 MARKS
END OF PAPER