Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel Level 1/Level 2 GCSE (9–1)

Time 1 hour 10 minutes

Paper reference **1SC0/1BF**

Combined Science

PAPER 1

Foundation Tier

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- 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 questions 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.

Turn over ▶

E:1/1/1/

P 6 6 6 2 0 R A 0 1 2 4

Pearson

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 Figure 1 shows a cell from an onion root tip.

This cell is dividing by mitosis.

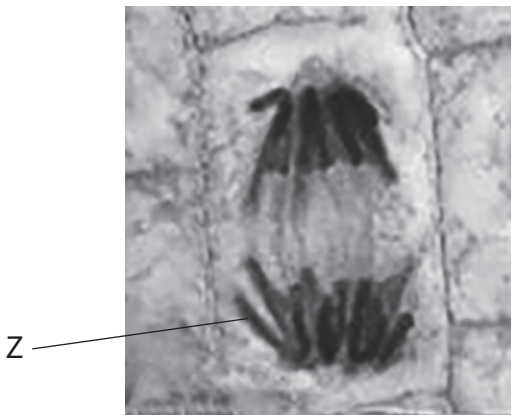


Figure 1

(a) (i) Which structure is labelled Z?

(1)

☒ **A** allele

☒ **B** chromosome

☒ **C** spindle

☒ **D** nuclear membrane

(ii) Mitosis produces new cells.

Give **two** reasons why mitosis is important in living things.

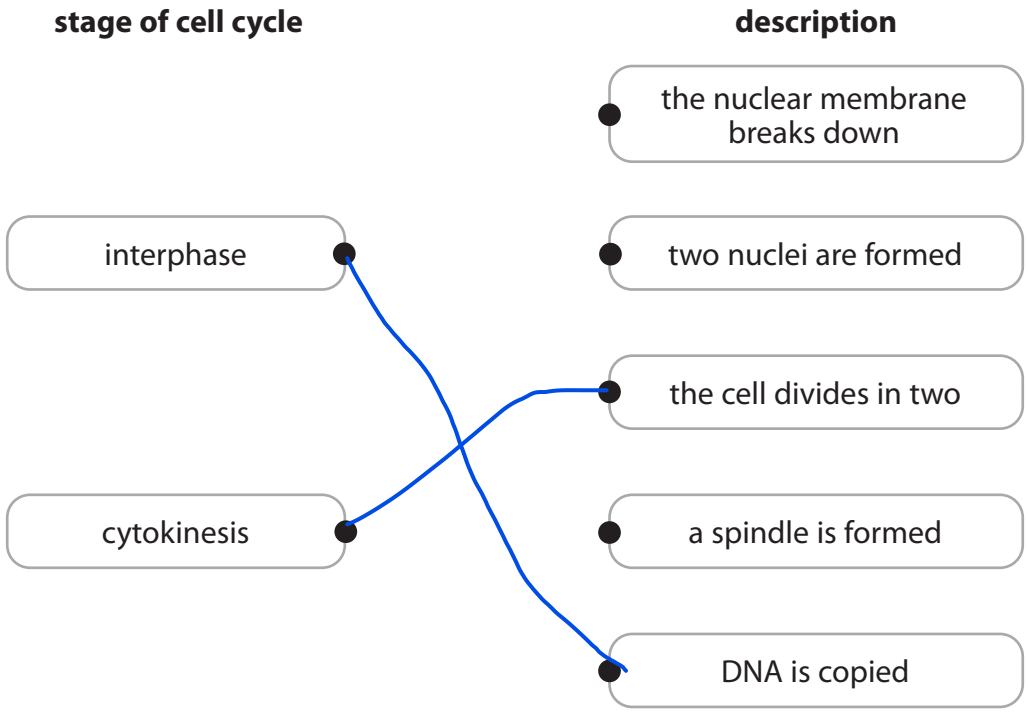
(2)

1 for growth (1)

2 • for repair (of tissues / organs) (1)

(iii) Draw **one** straight line from each stage of the cell cycle to its description.

(2)



(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)

use a stain / named stain

(ii) The microscope has two lenses:

- an eyepiece lens with ×10 magnification
- an objective lens with ×40 magnification

Which is the **total** magnification of this microscope?

(1)

- ☒ **A** ×4
- ☒ **B** ×30
- ☒ **C** ×50
- ☒ **D** ×400

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

(1)

focusing wheel

(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)

	D	**d**
D	DD	Dd
d	Dd	dd

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

(1)

percentage probability = 25 %

(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)

all the children will have the genotype Dd / will be heterozygous (1)

but to have sickle cell disease the children must have {the genotype dd / two recessive alleles} (1)

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(b) Figure 2 shows some information about two types of cattle.

type of cattle	survival in high temperatures	meat quality
Brahman	good	poor
Shorthorn	poor	good

Figure 2

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

(2)

{cross / breed} Brahman cattle with Shorthorn cattle (1)

• select the offspring with the desired characteristics and {cross / breed} them (1)

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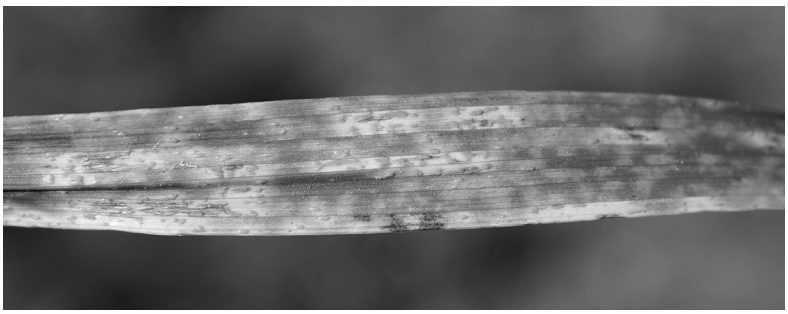
(c) Figure 3 shows the leaf of a wheat plant with a fungal disease.



(Source: © Kazakov Maksim/Shutterstock)

Figure 3

Give **two** benefits of breeding wheat plants that are resistant to fungal disease.

(2)

(wheat) plants not damaged (1)

1 .....

• the spread of the fungus would be reduced

.....

2 • greater yield / profit (1) .....

.....

(Total for Question 2 = 8 marks)

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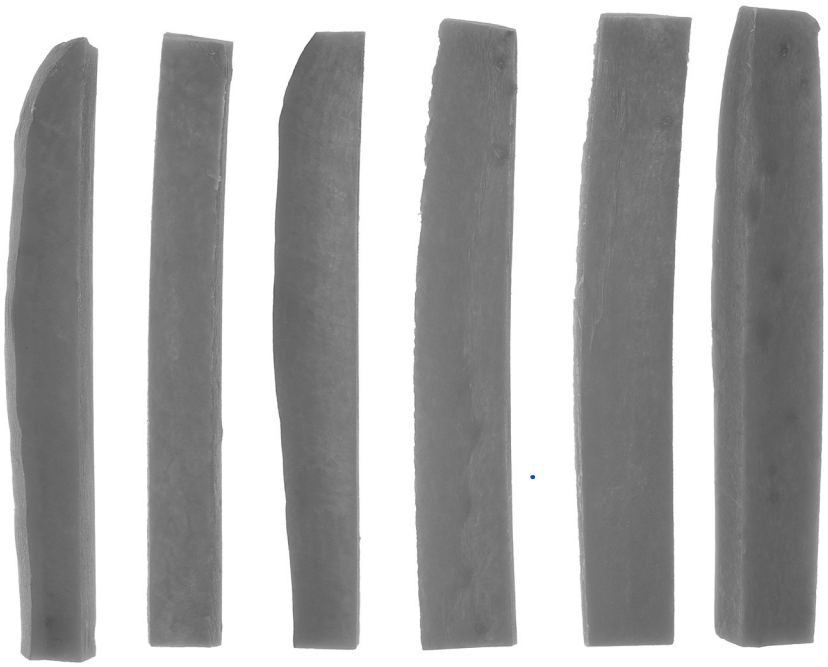
3 (a) Carrots have different physical characteristics such as colour.

Which genetic term describes the physical characteristics of a carrot?

(1)

- ☒ **A** genotype
- ☒ **B** monohybrid
- ☒ **C** phenotype
- ☒ **D** heterozygous

(b) Figure 4 shows some carrot sticks.



(Source: © rukxstockphoto/Shutterstock)

Figure 4

A student chose three carrot sticks and weighed each one.

The carrot sticks were placed in 50 cm^3 of distilled water.

After two hours the student weighed each carrot stick again.

Figure 5 shows the results for these carrot sticks P, Q and R.

carrot stick	mass at the start in grams	mass after two hours in grams	change in mass in grams
P	4.0	4.9	0.9
Q	4.2	5.0	0.8
R	4.1	5.0	0.9

Figure 5

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

(1)

a single result could be anomalous (1)

(ii) Give **two** ways that this method could be improved.

(2)

1 measure the length / width of the carrot sticks (1)

2 • cut sticks from the same carrot / same part of carrot (1)

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

(3)

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.

substitution
(0.8 ÷ 4.2) x 100 (1)
evaluation
19.048 (1)
2 significant figures
19 (%)

percentage change = ... %

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(iv) Explain the change in mass of the carrot sticks.

(2)

the carrot sticks gained mass (1)

• because water moved into the carrot (cells) (1)

(Total for Question 3 = 9 marks)

4 (a) Why are enzymes called biological catalysts?

(1)

- ☒ **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

(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.

Figure 6 shows the equipment used.

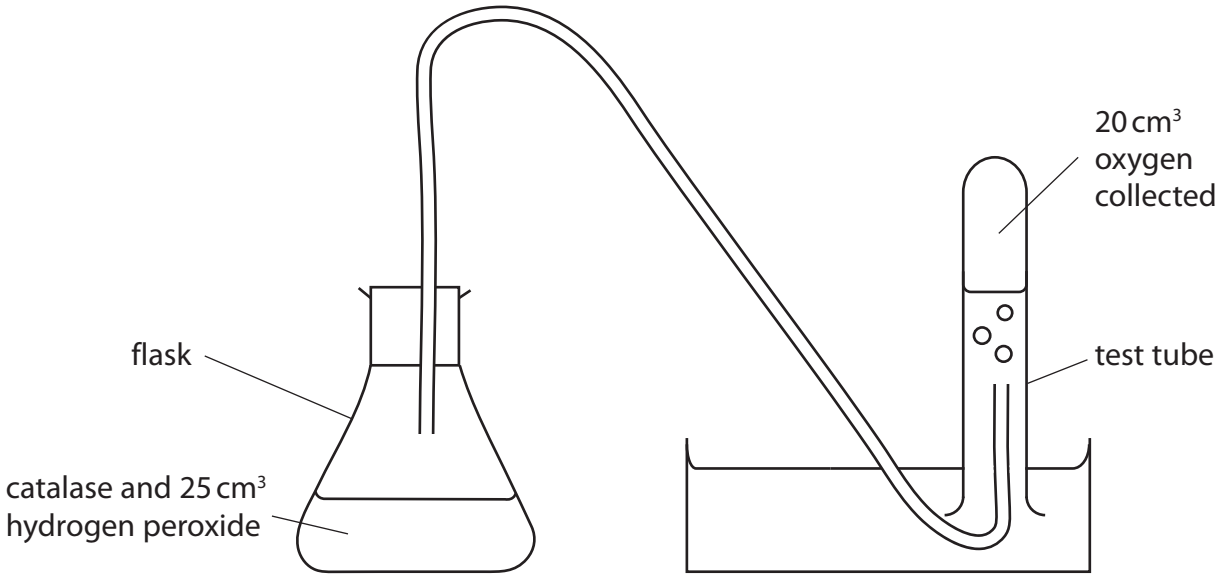


Figure 6

(i) State how the scientist could control the temperature of the flask.

(1)

use a water bath / description of a water bath

(ii) Explain why the temperature should be controlled in this investigation.

(3)

enzymes have an optimum temperature (1)

• so temperature will affect the rate of enzyme activity / the time taken to produce 20cm3 of oxygen (1)

• enzyme activity increases as temperature increases (up to the enzyme's optimum temperature) (1)

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

Figure 7 shows the results of this investigation.

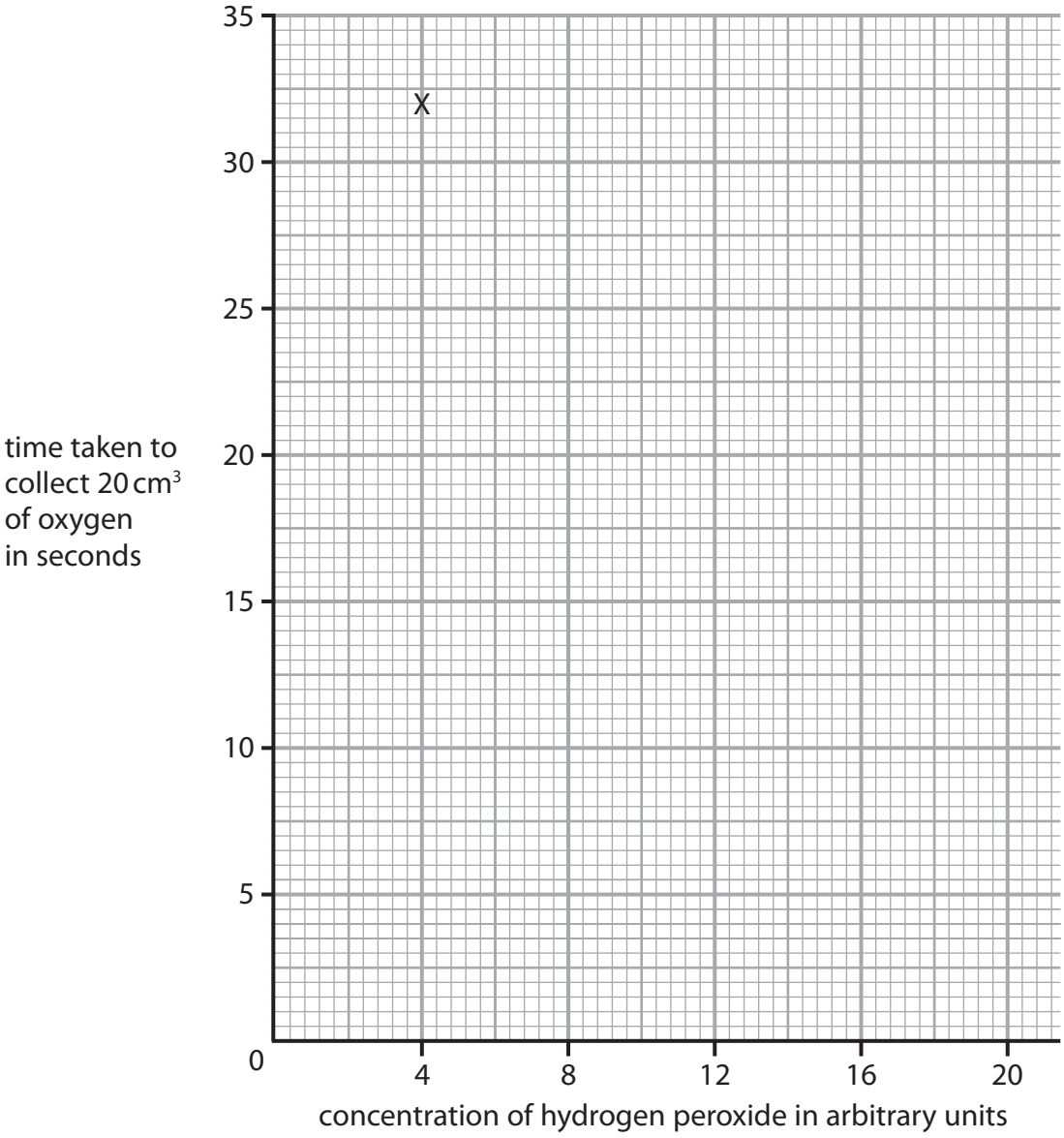
concentration of hydrogen peroxide in arbitrary units	time taken to collect 20 cm^3 of oxygen in seconds
4	32
8	14
12	9
16	7
20	6

Figure 7

Complete the graph by plotting the points and drawing a line to show the trend in the data.

The first point has been plotted for you.

(2)



all 4 points plotted accurately (± half a small square) (1)

• smooth curve / dot-to-dot line drawn

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(iv) Describe the trend shown in the graph.

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

(3)

the time taken to collect 20 cm3 oxygen decreases as hydrogen peroxide concentration increases (1)

• the curve flattens (1)

• the correct use of data from the table (1)

(Total for Question 4 = 10 marks)

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

Figure 8 shows a motor neurone.

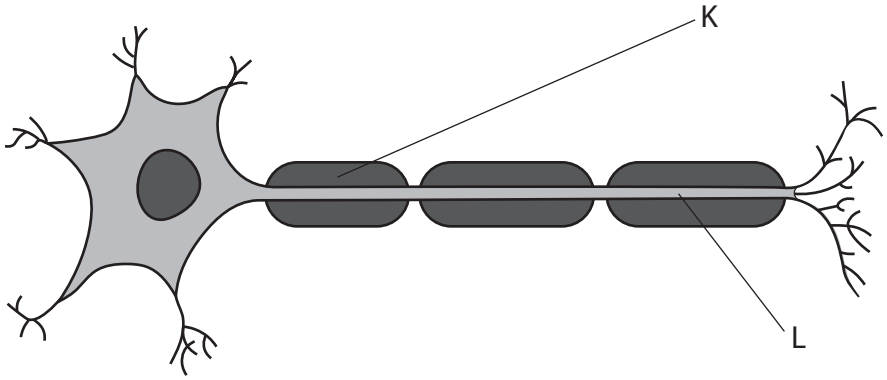

Figure 8

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

(1)

arrow showing direction of travel is from left to right

(ii) Name both structure **K** and structure **L**.

(2)

K – myelin (sheath) (1)

L – axon (1)

(b) Figure 9 shows part of a reflex arc in the spinal cord.

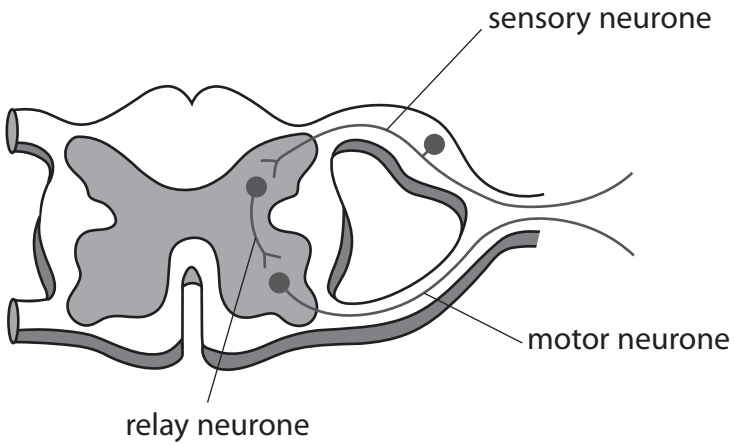

Figure 9

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

(3)

the impulse (in the relay neurone) triggers the release of a chemical (1)

• neurotransmitter (1)

• (neurotransmitter) diffuses (1)

(ii) Explain the function of a reflex arc.

(2)

a process that occurs in response to danger (1)

• which bypasses the {brain / parts of the brain} / is an {involuntary process / subconscious process} (1)

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(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.

Figure 10 shows the results for the five students.

student	reaction time in milliseconds
1	245
2	200
3	210
4	215
5	225

Figure 10

(i) Which is the median result for these students?

(1)

☒ **A** 200 milliseconds

☒ **B** 210 milliseconds

☒ **C** 215 milliseconds

☒ **D** 225 milliseconds

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(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)

measure their reaction time using red squares (1)

• keep everything else the same (as using blue squares) (1)

• repeat measurements (for each student) (1)

(Total for Question 5 = 12 marks)

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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)

World Health Organization / WHO

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

(i) State **two** ways that communicable diseases are different from non-communicable diseases.

(2)

1 (communicable) is passed from person to person (1)

2 • (communicable) caused by {pathogens / example of pathogen} (1)

(ii) Explain **one** way that the spread of tuberculosis (TB) can be reduced or prevented.

(2)

{cough / sneeze} into a tissue / avoid close contact with infected people / avoid cramped living conditions(1)

• because spread of TB is airborne droplets / TB is spread through the air (1)

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

Figure 11 shows the student's data.

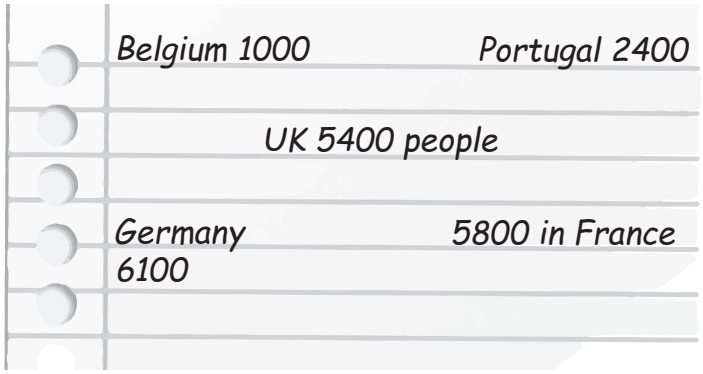

Figure 11

Complete the table to show the student's data.

(2)

suitable heading for each column, with country in left column (1)

• all data entered accurately (1)

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

(6)

Physical barriers

- mucus is produced by cells that line some surfaces of the body
- mucus traps pathogens

- cilia are found on epithelial / lining cells
- ciliated cells line the inside of the respiratory system
- cilia move mucus across the surface of cells
- cilia move pathogens out of the body / into the throat

- skin is a thick covering over the body
- skin has dead cells on its surface
- skin is waterproof
- pathogens are unable to enter the body through the skin

- tears wash pathogens away
- ear wax traps pathogens
- nasal hairs trap pathogens
- blood clots / scabs cover wounds to prevent the entry of pathogens

(Total for Question 6 = 13 marks)

TOTAL FOR PAPER = 60 MARKS

Chemical defences

- skin has glands that secrete lysozymes
- lysozymes are enzymes found in tears, saliva and mucus
- lysozymes kill some bacteria

- hydrochloric acid is in the stomach
- hydrochloric acid has a low pH which kills many pathogens

- antibodies are present on mucus linings

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