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

Time 1 hour 10 minutes

| Paper reference | **1SC0/1BH** |

Combined Science
PAPER 1
Higher 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 ▶

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 ⊠.

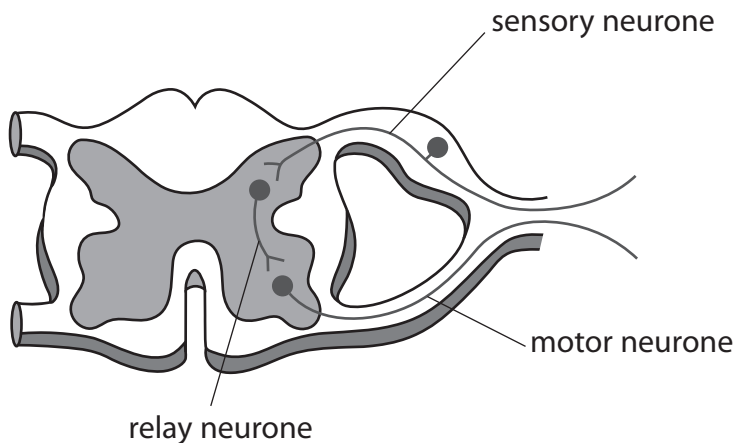**1** (a) Figure 1 shows part of a reflex arc in the spinal cord.

sensory neurone

motor neurone

relay neurone

Figure 1

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

(3)

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(ii) Explain the function of a reflex arc.

(2)

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(b) 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 2 shows the results for the five students.

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

Figure 2

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

(1)

☒ **A** 200 milliseconds

☒ **B** 210 milliseconds

☒ **C** 215 milliseconds

☒ **D** 225 milliseconds

(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)

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(Total for Question 1 = 9 marks)

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2 (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)

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

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

(2)

1 ....

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2 ....

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

(2)

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

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

Figure 3 shows the student's data.

Belgium 1000   *Portugal 2400*

UK 5400 people

Germany   *5800 in France*
6100

Figure 3

Complete the table to show the student's data.

(2)

(c) Explain why people with AIDS are more susceptible to TB.

(2)

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(Total for Question 2 = 9 marks)

3 (a) Figure 4 shows cells from an onion root tip as seen using a light microscope.

cell R

cell Q

(Source: © Rattiya Thongdumhyu/Shutterstock)

Figure 4

(i) Identify the stages of mitosis shown in cell Q and cell R.

(1)

		cell Q	cell R
☒	**A**	metaphase	anaphase
☒	**B**	telophase	anaphase
☒	**C**	metaphase	interphase
☒	**D**	telophase	interphase

(ii) Describe **two** processes that occur in cells during prophase.

(2)

1 ....

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2 ....

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(iii) State the term used to describe the process which occurs after mitosis, when the cell divides into two.

(1)

....

(iv) The diameter of one cell in Figure 4 is 0.075 mm.

Which is this diameter in μm?

(1)

☒ **A** 0.75 μm

☒ **B** 75 μm

☒ **C** 750 μm

☒ **D** 75 000 μm

(b) A student placed a prepared slide on the stage of a light microscope.

Describe how to adjust the microscope to view the slide at a magnification of ×400.

(2)

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Turn over ▶

(c) Arthritis is a condition that occurs when cells in joints get damaged or destroyed.

Stem cell therapy can be used to treat arthritis.

Discuss the benefits and risks of using stem cell therapy to treat arthritis.

(4)

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(Total for Question 3 = 11 marks)

4 (a) Figure 5 shows how alcohol consumption increases the risk of developing liver cancer.

Someone who does not drink alcohol has a 1.0 risk of developing liver cancer.
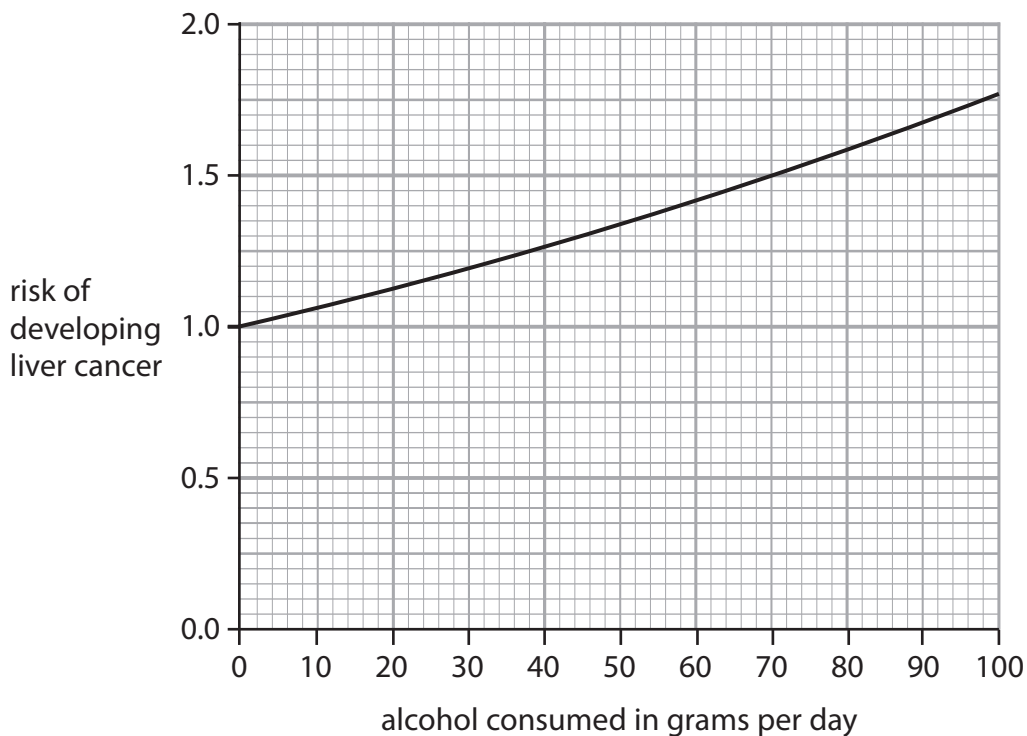

Figure 5

(i) One unit of alcohol contains 8 grams of alcohol.

Calculate the risk of developing liver cancer for someone who consumes 4 units of alcohol a day.

(2)

.... risk of developing liver cancer

(ii) Describe how cancer develops in the liver.

(2)

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(b) Haemochromatosis is a disease that occurs when iron accumulates in the liver.

A person with haemochromatosis is treated by having 0.5 dm^3 of their blood removed each week.

This lowers the level of iron in their blood.

(i) Give **two** safety precautions needed when blood is removed from this person.

(2)

1 ....

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2 ....

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(ii) Haemochromatosis can be inherited.

Haemochromatosis occurs when a person inherits two copies of a recessive allele.

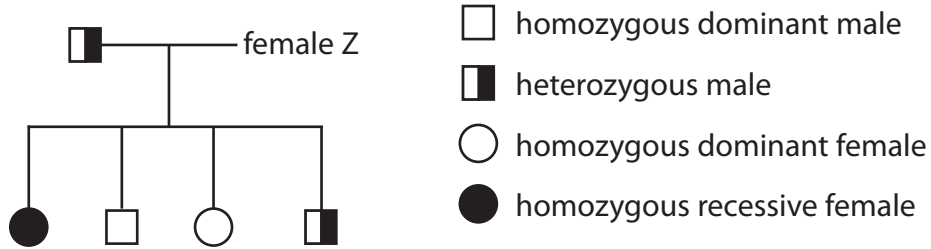Figure 6 shows the inheritance of haemochromatosis in a family.

Figure 6

State and explain the genotype of female Z.

(3)

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(Total for Question 4 = 9 marks)

5 Chymosin is an enzyme that causes milk to curdle.

When milk curdles the proteins in the milk clump together and become solid.

(a) As part of an investigation, milk was heated in test tubes to different temperatures using a Bunsen burner.

Two drops of chymosin solution were added to each test tube and the time taken for the milk to curdle was recorded.

Figure 7 shows the results.

temperature of the milk in °C	time taken for milk to curdle in seconds
25	125
30	105
35	90
40	70
45	75

Figure 7

(i) Which variables need to be kept constant in this investigation?

(1)

☒ **A** the volume of milk and the time

☒ **B** the temperature and the time

☒ **C** the volume of milk and the concentration of chymosin

☒ **D** the temperature and the concentration of chymosin

(ii) Explain why the time taken for the milk to curdle decreases from 30 °C to 40 °C.

(2)

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(iii) Explain what the expected result would be if two drops of chymosin were added to the milk at 70 °C in the test tube.

(2)

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(iv) As part of this investigation, test tubes containing only milk were heated to each temperature and no chymosin solution was added.

State why these test tubes containing only milk were used.

(1)

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(v) Describe **two** improvements that could be made to the method of this investigation so that the optimum temperature for chymosin can be found.

(2)

1 ....

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2 ....

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(b) Chymosin can be produced by genetically modified bacteria.

Figure 8 shows a bacterial cell.

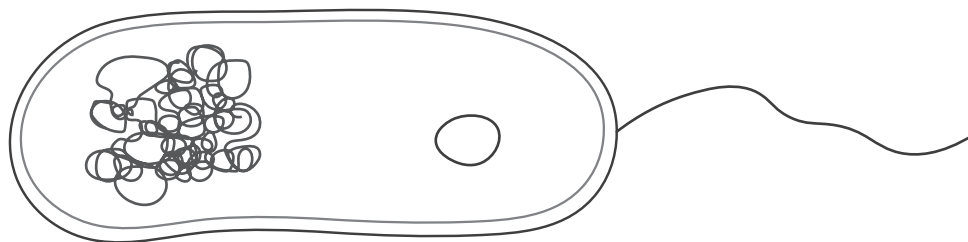**Figure 8**

Explain how to genetically modify a bacterial cell to produce chymosin.

(3)

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(Total for Question 5 = 11 marks)

6 (a) Figure 9 shows a sperm cell.

structure A   structure B
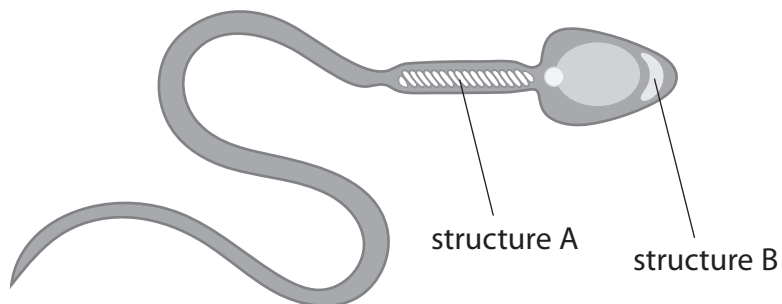
Figure 9

Describe how structure A and structure B enable fertilisation.

(2)

structure A

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structure B

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(b) Figure 10 shows a human egg cell, magnified ×700.
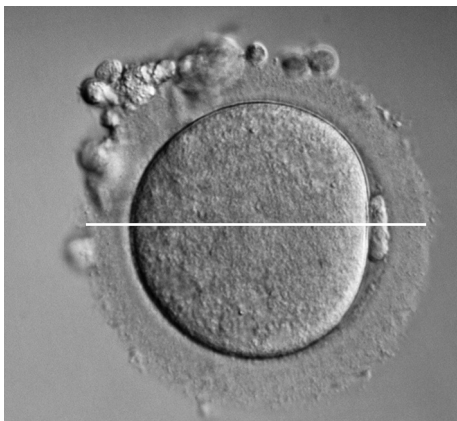
(Source: © Pascal Goetgheluck / Science Photo Library)

Figure 10

Calculate the actual width of the region indicated by the line on Figure 10.

Give your answer in millimetres, in standard form.

(3)

.... mm

*(c) A student investigated the movement of water.

Hens' eggs were placed in vinegar for two days to dissolve the shell.

This makes the eggs permeable to water.

The eggs were then weighed and placed in different solutions.

After 24 hours the eggs were weighed again.

Figure 11 shows the results.

solution	mass of the egg at the start in grams	mass of the egg after 24 hours in grams
tap water	77	84
5% salt	77	77
10% salt	77	75

Figure 11

Evaluate the results of this investigation.

You should include calculations using the data in Figure 11.

(6)

P 6 6 6 2 1 R A 0 1 9 2 0

(Total for Question 6 = 11 marks)

TOTAL FOR PAPER = 60 MARKS