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 **1SC0/1BH**

Combined Science

PAPER 1

Higher tier

You must have:
Ruler, calculator

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.*

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.

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 ▶

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Q:1/1/

P 6 9 4 8 2 A 0 1 1 6

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 (a) DNA molecules contain base pairs.

Describe how the base pairs are bonded together in a DNA molecule.

(2)

.....

.....

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.....

(b) Figure 1 shows part of a DNA molecule.

T	T	G	A	T	T	G	C	G	T	A	A

Figure 1

(i) Write the code for the complementary DNA strand in Figure 1.

(2)

(ii) Three bases code for each amino acid.

Which is the maximum number of amino acids coded for by this strand of DNA?

(1)

☒ **A** 3

☒ **B** 4

☒ **C** 6

☒ **D** 12

(iii) What is the shape of a DNA molecule?

(1)

☒ **A** triple stranded

☒ **B** single stranded

☒ **C** single helix

☒ **D** double helix

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(c) A student wanted to extract the DNA from fresh peas.

The student crushed the peas and added washing up liquid and water.

The enzyme protease was then added to this mixture.

(i) Explain why the enzyme protease was added to the mixture.

(2)

(ii) The mixture was then heated and filtered.

Finally, the student poured the filtrate into a test tube and ice cold ethanol was poured down the side of the test tube into the filtrate.

State why ice cold ethanol was poured into the filtrate.

(1)

(Total for Question 1 = 9 marks)

2 (a) Figure 2 shows the number of people diagnosed with sexually transmitted infections (STIs) in the UK during 2017.

sexually transmitted infection (STI)	number of people diagnosed per 1000 of the population
chlamydia	3.7
gonorrhoea	0.8
genital herpes	0.6
genital warts	1.1
syphilis	0.1

Figure 2

(i) State the sexually transmitted infection that has the median number of people diagnosed.

(1)

.....

(ii) The population of the UK in 2017 was 66 million people.

Calculate the total number of people diagnosed with chlamydia in the UK in 2017.

(2)

..... people

(iii) State why chlamydia can be described as a communicable disease.

(1)

.....

.....

(iv) Give **one** way the transmission of chlamydia can be prevented.

(1)

.....

.....

(v) Explain why chlamydia can be treated with antibiotics.

(2)

(b) HIV is another sexually transmitted infection.

Explain how HIV can lead to the onset of AIDS.

(2)

(Total for Question 2 = 9 marks)

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3 (a) In 2017, a new strain of *Klebsiella pneumoniae* bacteria was discovered that was resistant to 26 different antibiotics.

(i) Explain how *Klebsiella pneumoniae* bacteria developed resistance to antibiotics.

(4)

(ii) State how the use of antibiotics could contribute to *Klebsiella pneumoniae* bacteria developing resistance to antibiotics.

(1)

(iii) *Klebsiella pneumoniae* is a prokaryotic cell.

Which is a characteristic feature of a prokaryotic cell?

(1)

☒ **A** it has chloroplasts

☒ **B** it does not have a nucleus

☒ **C** it does not have ribosomes

☒ **D** it cannot reproduce without a host

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(b) New antibiotics are being developed to treat the disease caused by *Klebsiella pneumoniae*.

Describe the stages of antibiotic development that would occur after the discovery of a new antibiotic.

(3)

(Total for Question 3 = 9 marks)

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4 A student investigated the fat content of two types of milk: milk A and milk B.

Before starting the investigation, the student added a drop of oil from a pipette into a test tube of water as shown in Figure 3.

The drop of oil rose to the surface of the water.

(Source: © Nana_studio/Shutterstock)

Figure 3

(a) The student then placed a drop of milk A into one test tube of water and a drop of milk B into a different test tube of water.

The drop of milk A sank to the bottom and the drop of milk B rose to the surface.

Give **one** reason for the drop of milk B rising to the surface.

(1)

.....

.....

(b) 5 cm^3 of milk B and 1 cm^3 of lipase were added to a different test tube.

The pH of this mixture was pH 7.

This test tube was placed in a water bath for 10 minutes.

The pH of the mixture changed from pH 7 to pH 5.

(i) Explain what caused this change in pH.

(3)

(ii) This procedure was repeated with milk A.

There was no change in the pH of this mixture after 10 minutes.

Explain why there was no change in the pH of the mixture containing milk A.

(2)

(iii) The student repeated this procedure with lipase that had been boiled and left to cool.

This was added to another sample of milk B.

Describe why the pH did not change in this mixture.

(3)

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(Total for Question 4 = 9 marks)

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5 (a) A student was investigating mitosis in the roots of a garlic plant.

Describe how the student could prepare a microscope slide to show mitosis in the growing roots of a garlic plant.

(4)

(b) Describe what is produced when a single cell divides by mitosis.

(3)

(c) The student observed 89 cells on the microscope slide.

Figure 4 shows the number of cells at each stage of the cell cycle.

stage of cell cycle	number of cells
Interphase	44
Prophase	12
Metaphase	6
Anaphase	18
Telophase	9

Figure 4

Use this equation to calculate the mitotic index for this slide.

$$\text{mitotic index} = \frac{\text{number of cells in mitosis}}{\text{total number of cells}} \times 100$$

Give your answer to three significant figures.

(3)

Mitotic index .....

(d) The mitotic index is often used in the diagnosis of cancer.

State the effect of cancer on cell division.

(1)

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.....

(Total for Question 5 = 11 marks)

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6 There is a shortage of kidneys for organ transplants.

Scientists are investigating how to grow kidneys using genetically modified pig embryos.

Figure 5 shows this process.

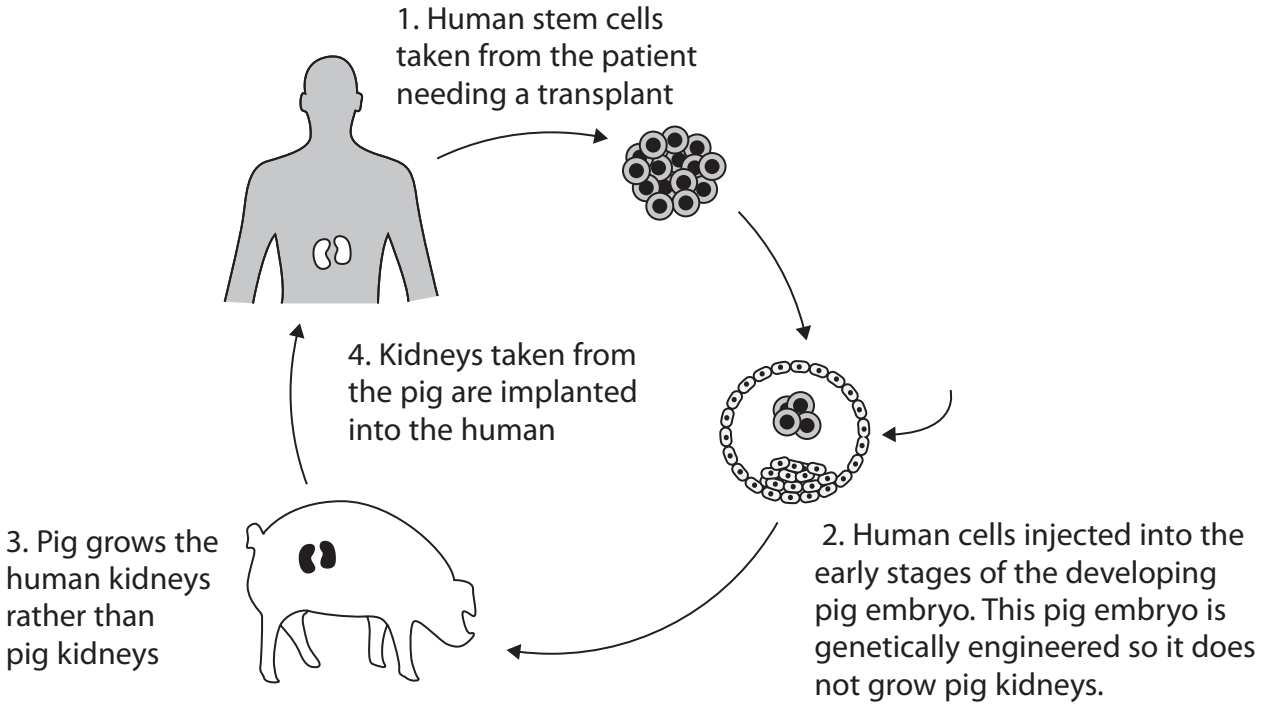

Figure 5

(a) (i) State why the embryo of the pig must be engineered so it does not grow pig kidneys.

(1)

.....

(ii) Explain why human stem cells are used for this process.

(2)

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(b) Figure 6 shows the number of organ transplants needed and the number of donors available in the USA from 1991 to 2018.

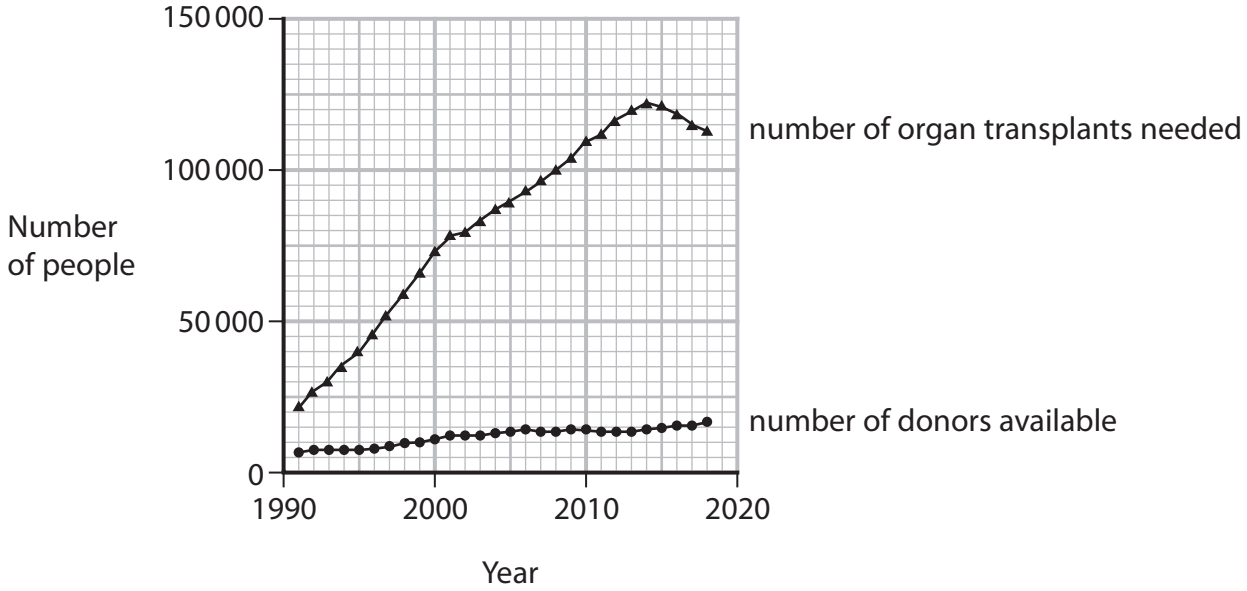

Figure 6

(i) Compare the number of donors available with the number of organ transplants needed from 1991 to 2018.

Use information from the graph to support your answer.

(3)

(ii) State why scientists are genetically engineering animals for organ transplants.

(1)

*(c) Bacteria have been genetically engineered to produce human insulin since 1978.

Explain how bacteria can be genetically engineered to produce human insulin.

(6)

(Total for Question 6 = 13 marks)

TOTAL FOR PAPER = 60 MARKS