Write your name here

Surname	Other names

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

Centre Number	Candidate Number

Combined Science

Paper 1: Biology 1

Higher Tier

Sample Assessment Materials for first teaching September 2016

Time: 1 hour 10 minutes

Paper Reference

1SC0/1BH

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.*
- Calculators may be used.
- 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.

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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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 the times when *Homo sapiens* and some of their ancestral species are thought to have lived.

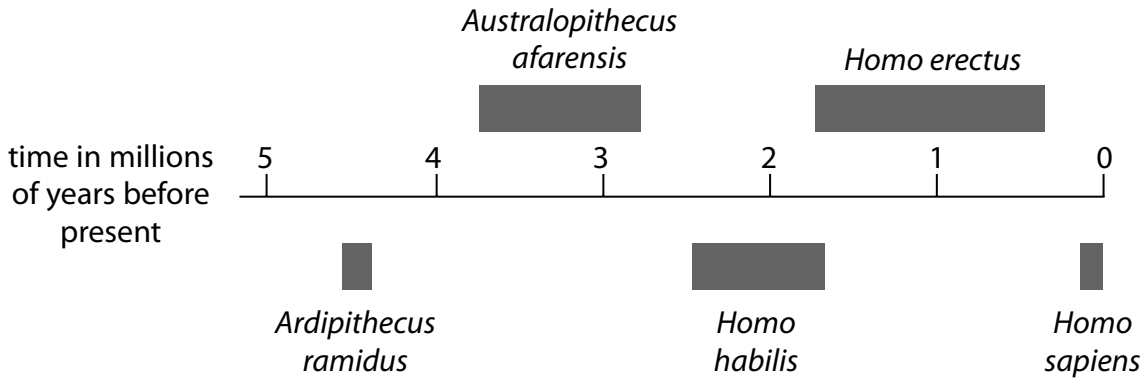

Figure 1

(a) Fossil remains of *Ardipithecus ramidus* were discovered in Ethiopia.

(i) Describe the evidence that scientists might have used to show that *Ardipithecus ramidus* inhabited the Earth earlier than *Homo habilis.*

(2)

(ii) Suggest an explanation for the extinction of *Homo habilis*.

(2)

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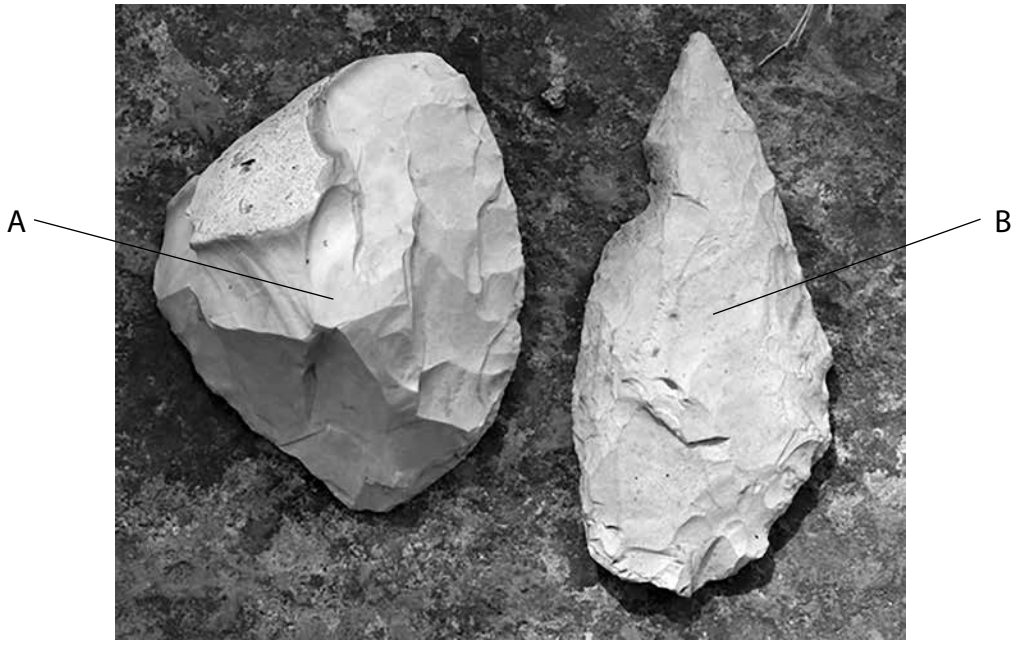
(iii) Figure 2 shows two stone tools, one used by *Homo habilis* and one used by *Homo erectus*.



(Source: Frederic Surmely/look at sciences/Science Photo Library)

Figure 2

Explain which stone tool was most likely to be used by *Homo erectus*.

Use the information from Figure 1 and Figure 2.

(2)

(b) The population of humans on Earth has increased significantly leading to food shortages.

The growth of drought-resistant crop plants could lead to an increase in food supply.

Describe how drought-resistant crop plants can be produced.

(3)

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(Total for Question 1 = 9 marks)

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2 The ratio of waist-to-hip measurements can be used to determine the risk of a person developing cardiovascular disease.

(a) Calculate the waist-to-hip ratio for a person with a waist measurement of 830 mm and a hip measurement of 0.99 m.

Give your answer to two decimal places.

(2)

Answer = ...

(b) Dieting can reduce the effects of cardiovascular disease.

(i) Which statement gives a reason why dieting can be used to reduce weight in obese people?

(1)

☒ **A** Dieting increases metabolism and growth rate

☒ **B** Dieting reduces energy consumption

☒ **C** Dieting decreases metabolism

☒ **D** Dieting increases energy consumption

(ii) A scientist is planning to test a new diet for weight loss.

She selects 40 obese people to take part in the test.

All the obese people are between 20 and 30 years of age.

State **two** other factors the scientist should control when selecting the people.

(2)

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(iii) Devise a plan the scientist could use to test the effectiveness of the new diet using the 40 obese people.

(3)

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(Total for Question 2 = 8 marks)

3 Diffusion, active transport and osmosis can be used to move substances into and out of cells.

(a) A student was investigating osmosis in potato cubes.

He used the following method:

- cut a potato into equal-sized cubes
- recorded the mass of each potato cube
- placed each potato cube into different concentrations of salt solution
- removed the potato cubes after 30 minutes
- dried the potato cubes and recorded the final mass of each cube.

He plots his results on a graph shown in Figure 3.

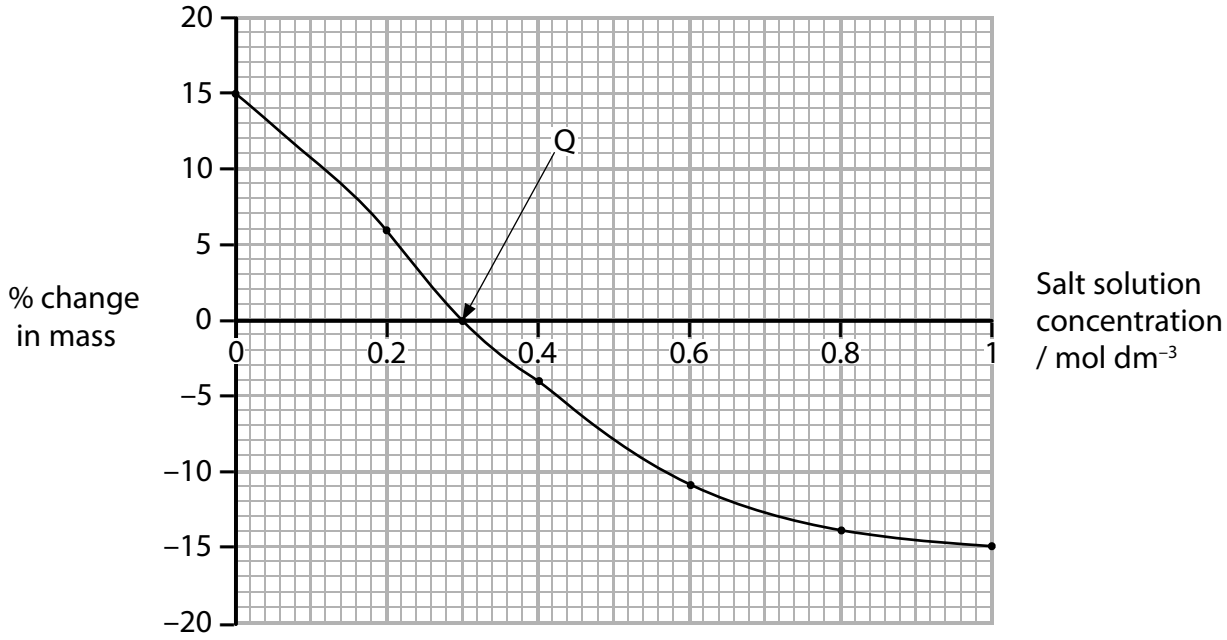

Figure 3

The method controls a number of variables.

(i) Name **one** other variable that needs to be controlled during the student's investigation.

(1)

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(ii) Give a reason why the potato cube must be dried.

(1)

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(iii) Explain the conclusion that can be made about point Q on Figure 3.

(2)

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(iv) Give one way that the student could obtain more data to increase the accuracy of point Q.

(1)

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(b) Osmosis is one method that single-celled organisms, such as bacteria, use to obtain molecules from their environment.

Which of the following is a correct description of a process involving the transport of molecules?

(1)

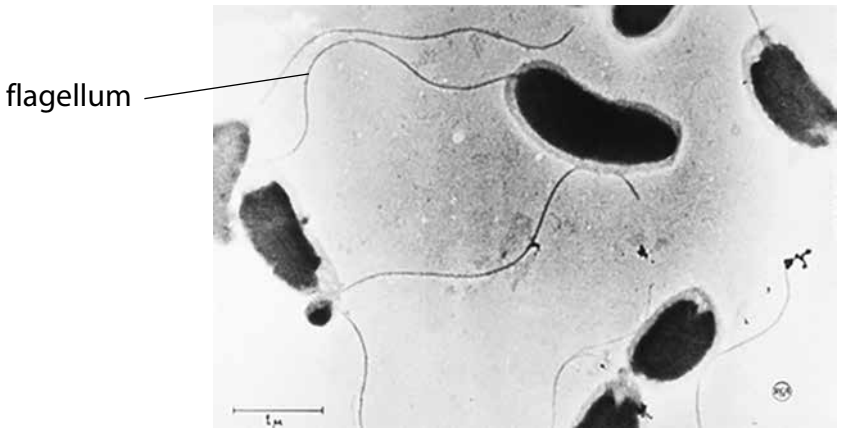
☒ **A** Diffusion is used to transport molecules against the concentration gradient

☒ **B** Active transport is used to obtain molecules in a low concentration environment

☒ **C** Active transport moves substances along the concentration gradient

☒ **D** Diffusion uses energy to transport molecules into cells

(c) Figure 4 shows some *Vibrio cholerae*, the bacteria that cause cholera.



Magnification ×8000

(Source: Corbis)

Figure 4

The length of one flagellum on Figure 4 is 68 mm.

Calculate the length of the flagellum in μm.

(3)

..... μm

(Total for Question 3 = 9 marks)

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4 (a) DNA is composed of four different DNA nucleotides.

(i) Which diagram represents the arrangement of the sugar, phosphate and the base in a DNA nucleotide?

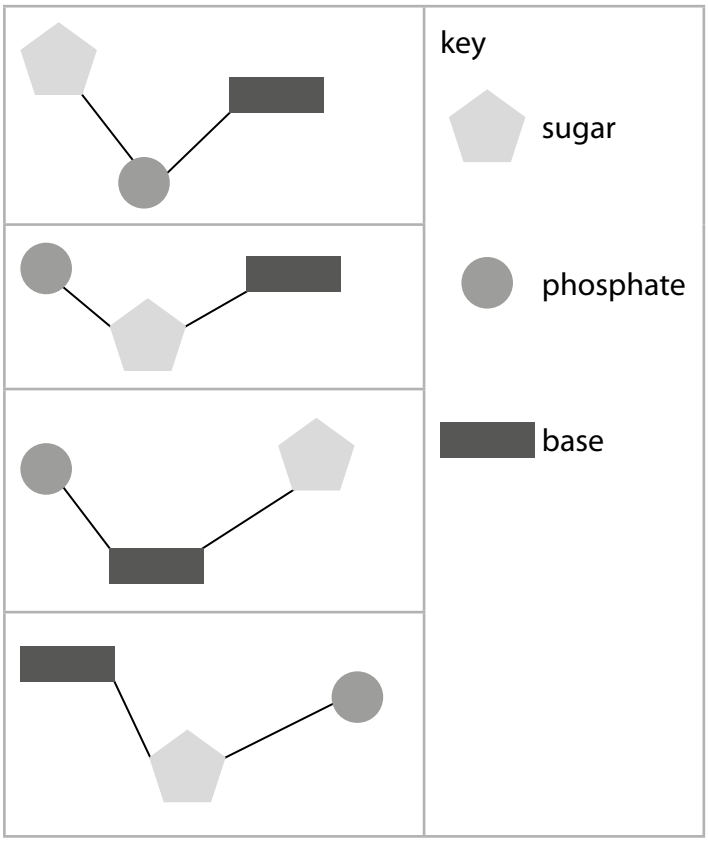
(1)

☒ **A**

☒ **B**

☒ **C**

☒ **D**



(ii) An allele starts with the DNA sequence ATGCATGTACCG.

Give the sequence of the complementary DNA sequence.

(1)

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(iii) The length of one DNA nucleotide was measured at 3.3×10^{-10} metres.

Calculate the approximate length of a gene containing 250 nucleotides in nanometres.

(2)

..... nm

(b) The DNA of an organism determines its phenotype.

White tigers are produced because of a mutation of a single allele which usually produces the normal orange and yellow fur pigmentation.

The mutated allele is recessive.

Samba, a male white tiger, was bred with Rani. They had three offspring; two offspring have white fur and one has a normal fur pigmentation.

(i) State the genotype of Rani.

(1)

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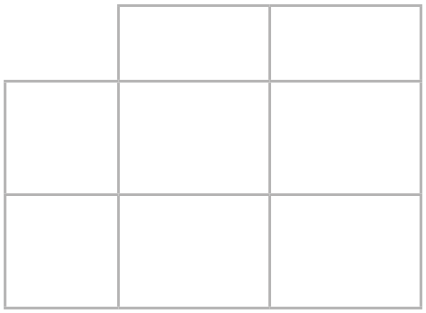
(ii) The offspring with normal fur pigmentation was bred with a tiger that was heterozygous.

Use A/a to represent the alleles for fur pigmentation.

Predict, using the Punnett square, the percentage probability of the offspring from this cross having normal fur pigmentation.

(2)



percentage probability = ... %

(c) Explain how two parents with a dominant phenotype can produce offspring expressing a recessive characteristic.

(2)

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(Total for Question 4 = 9 marks)

5 Phenolphthalein is an indicator. It is pink in alkaline solutions and turns colourless as the pH decreases.

It can be used to measure the activity of the enzyme lipase on the breakdown of lipids.

Samples of milk containing phenolphthalein were incubated with lipase at different temperatures.

The time taken for the phenolphthalein to turn colourless was recorded and used to calculate the rate of enzyme activity.

Figure 5 shows these results.

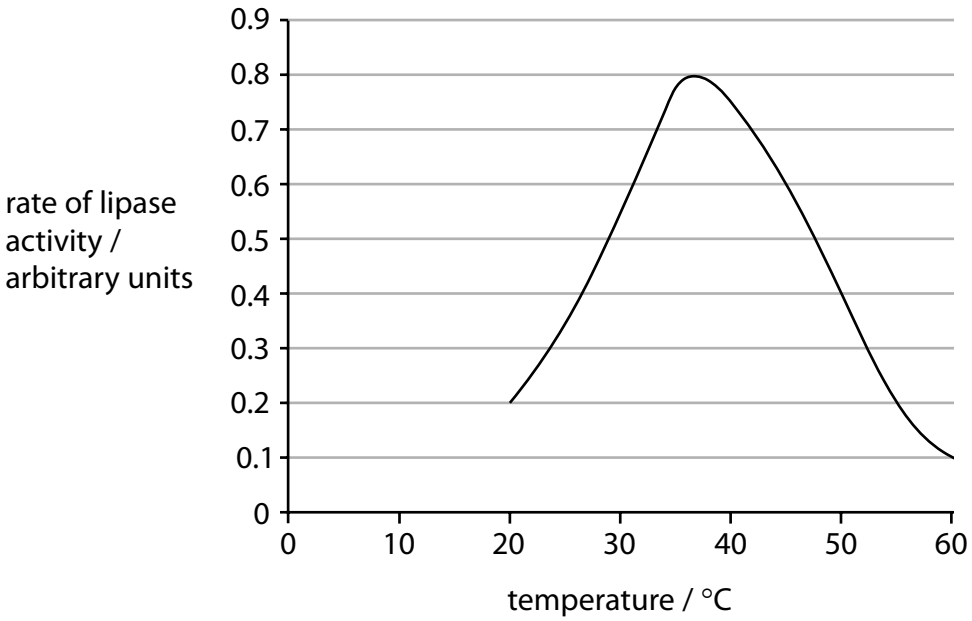

Figure 5

(a) (i) Explain why phenolphthalein turns colourless when lipase breaks down the lipids in milk.

(2)

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(ii) Describe the effect of temperature on the activity of lipase, as shown in Figure 5.

(2)

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(iii) Explain why the activity of lipase changes above a temperature of 40 °C.

(2)

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(b) A student investigated the time taken for amylase to breakdown a 10% starch solution into glucose at 37 °C. The student repeated the investigation five times.

Figure 6 shows the results.

time taken for amylase to produce glucose (s)				
test 1	**test 2**	**test 3**	**test 4**	**test 5**
120	125	110	115	118

Figure 6

(i) Calculate the rate of amylase enzyme activity for the 10% starch solution.

(3)

rate = ... s^{-1}

The investigation was done at 37 °C.

(ii) State **one** other variable that the student should have controlled during this investigation.

(1)

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(c) Different enzymes catalyse specific reactions.

Explain why enzymes can only catalyse specific reactions.

(2)

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(Total for Question 5 = 12 marks)

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6 When bacteria divide they replicate their genome and synthesise their cell wall.

Figure 7 outlines the stages of bacterial replication.

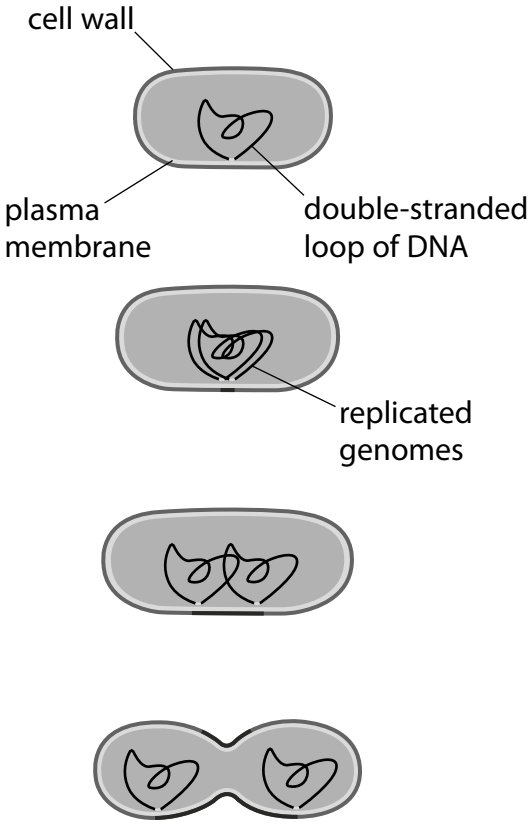

Figure 7

(a) Penicillin inhibits the synthesis of the cell wall in bacteria.

Explain the effect of penicillin on bacterial and human cells.

(3)

(b) Penicillin, isolated from a fungus, was the first antibiotic used to treat bacterial infections and is still widely used today.

Scientists have genetically engineered bacteria to produce large amounts of penicillin.

Describe how scientists would produce a genetically modified bacterium that produces penicillin.

(4)

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*(c) MRSA is a bacterium that has evolved to become resistant to antibiotics.

With reference to Darwin's theory of evolution by natural selection, explain how MRSA bacteria have evolved to become resistant to antibiotics.

(6)

(Total for Question 6 = 13 marks)

TOTAL FOR PAPER = 60 MARKS