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 45 minutes

Paper reference **1BI0/1F**

Biology
PAPER 1

Foundation 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 100.
- 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 ▶

P69318A

Q:1/1/1/1/1/

P 6 9 3 1 8 A 0 1 3 2

Pearson

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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 Some bacteria cause disease.

(a) Which word describes an organism that causes disease?

(1)

☒ **A** pathogen

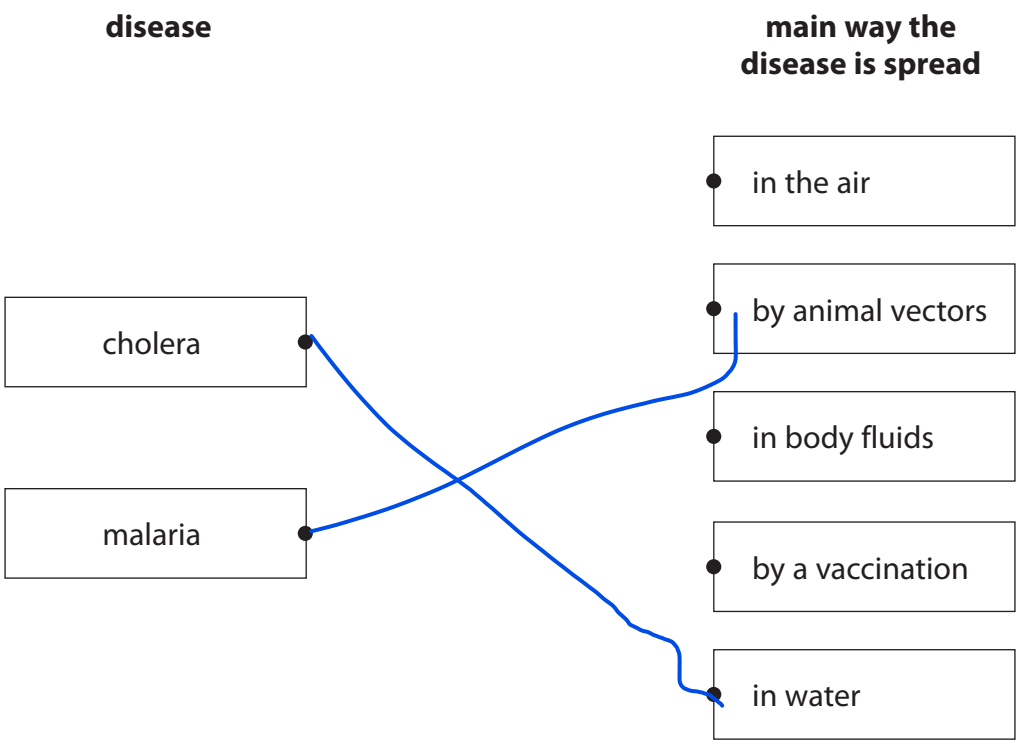
☐ **B** culture

☐ **C** antibiotic

☐ **D** platelet

(b) Draw **one** straight line from each disease to the main way that the disease is spread.

(2)



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(c) A scientist investigated the effect of temperature on the growth of bacteria.

The bacteria were grown at 10 °C and 20 °C.

The number of bacteria grown at each temperature were counted every two hours.

Figure 1 shows the result.

time in hours	number of bacteria at 10 °C in thousands	number of bacteria at 20 °C in thousands
0	10	10
2	20	47
4	30	74
6	40	80
8	50	80

Figure 1

Figure 2 shows a graph of the results at 20 °C.

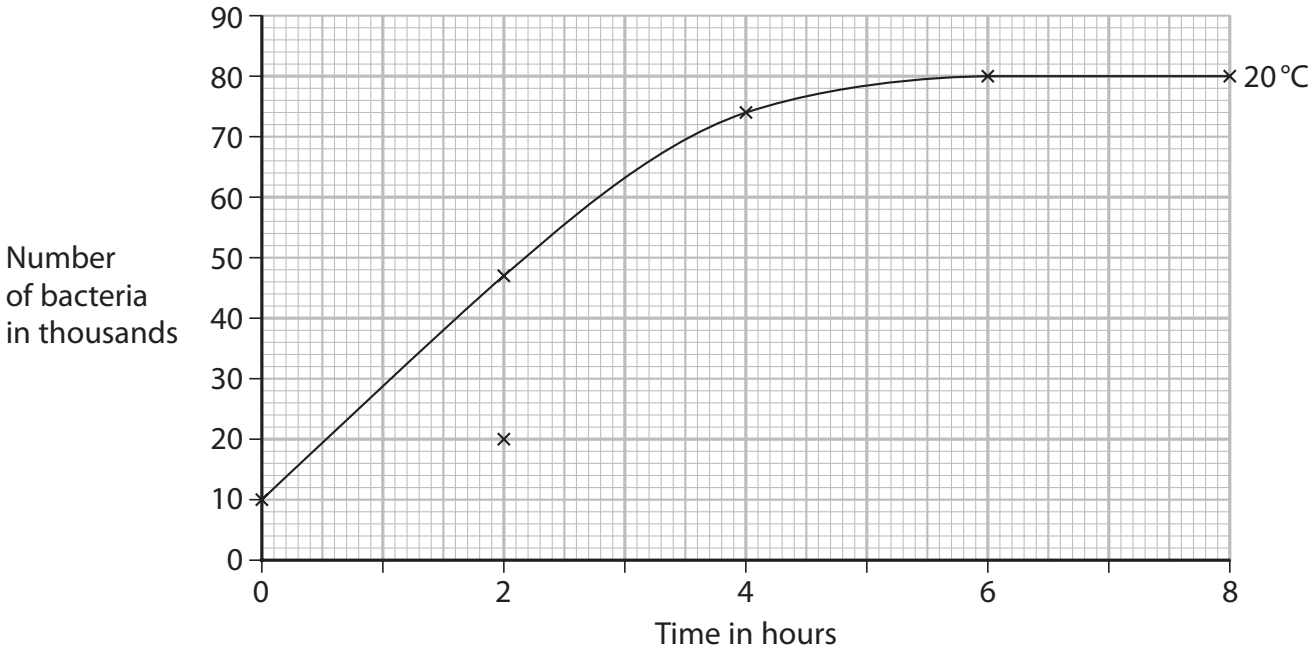

Figure 2

(i) Plot the points on the graph for the number of bacteria at 10 °C.

The first two points have been plotted for you.

all points plotted correctly ± one small square

(1)

(ii) Draw a line of best fit on the graph for 10 °C.

straight line of best fit going through all the plotted points ± two small squares.

(1)

(iii) Describe how the growth of bacteria at 10 °C was different from the growth of bacteria at 20 °C.

(2)

10 oC is slower (than growth at 20 oC) (1)

• 10 oC is linear /straight (1)

(Total for Question 1 = 7 marks)

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2 Stone tools can be found at sites used by our human ancestors.

(a) Figure 3 shows tool P.

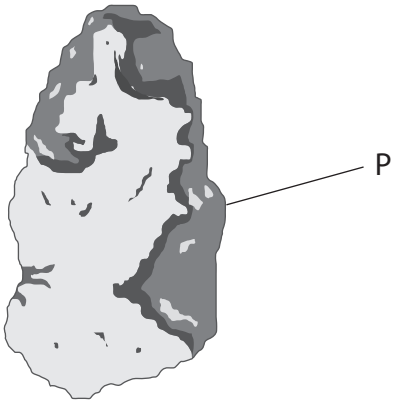

Figure 3

(i) Describe how tool P was made.

(2)

by hitting it (1)

• with another stone / rock / flint / something hard (1)

(ii) Figure 4 shows tool Q which was found at the same site as tool P.

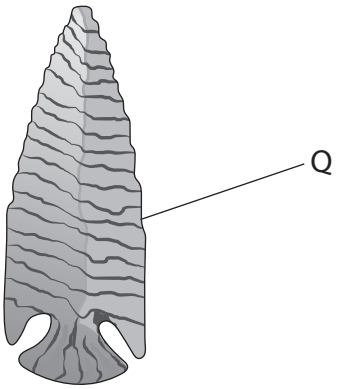

Figure 4

A scientist stated that tool Q was made by a more evolved human ancestor than tool P.

Which observation supports this statement?

(1)

☒ **A** tool Q is a darker colour than tool P

☒ **B** tool Q is more pointed than tool P

☒ **C** tool Q is a lighter colour than tool P

☒ **D** tool Q is less pointed than tool P

(iii) Tools provide evidence for human evolution.

Use words from the box to complete the sentences.

(2)

enlarge	human	migrate
mutate	natural	negative

Evolution is the change of inherited characteristics through

natural (1) selection.

These changes occur because genes • mutate .

(b) Fossils were also found in the soil around tool Q.

Describe **two** ways that stone tools and fossils can be dated to find out how old they are.

(2)

1 compare with other tools / fossils (that have already been dated) (1)

2 • from the (layer of) rock in which they are found / how deep down each was found (1)

(Total for Question 2 = 7 marks)

3 The book 'On the Origin of Species' was published in 1859.

This book describes the theory of evolution.

(a) (i) Which scientist wrote this book explaining his theory of evolution?

(1)

☒ **A** Charles Darwin

☒ **B** Robert Hooke

☒ **C** Richard Leakey

☒ **D** Gregor Mendel

(ii) Which statement is supported by this theory of evolution?

(1)

☒ **A** humans are not related to any other group of animals

☒ **B** all species have the same genes

☒ **C** a meteor caused the dinosaurs to evolve

☒ **D** new species evolve over many generations

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(b) One chapter of this book discusses pentadactyl limbs.

Figure 5 shows the bones of the pentadactyl limbs of three mammals.

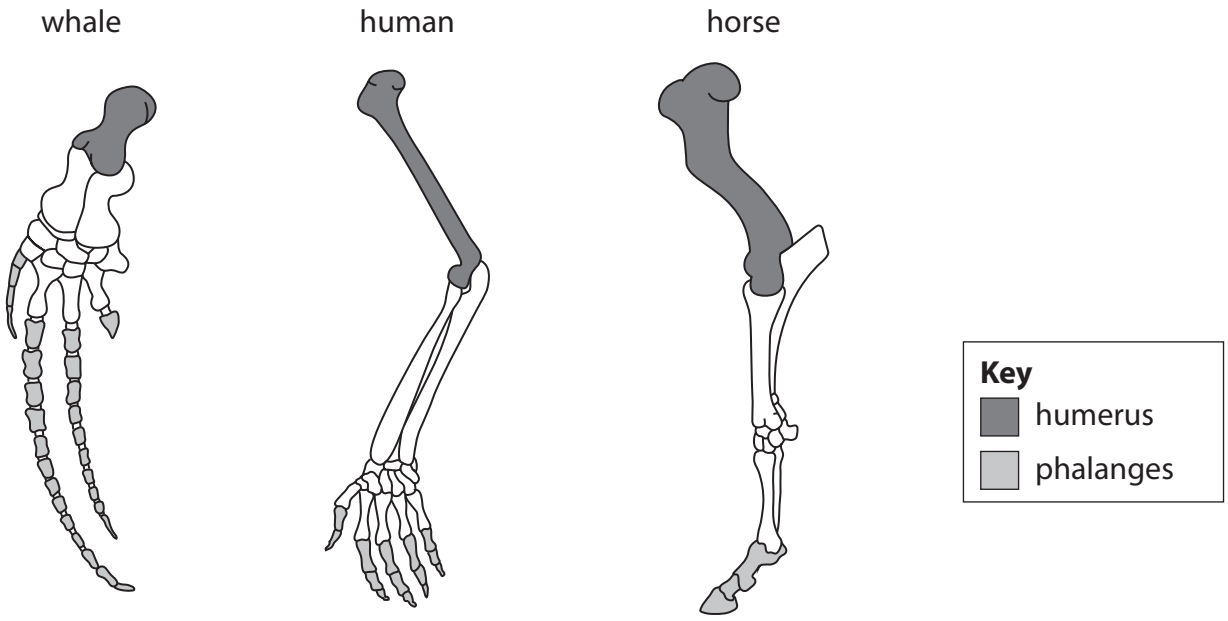

Figure 5

(i) Describe **one** difference between the humerus of the whale and the humerus of the human.

(1)

the whale humerus is shorter / wider / stubbier

(ii) Describe **one** difference between the phalanges of the horse and the phalanges of the human.

(1)

the horse has fewer phalanges

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(c) Another chapter of the book discusses how the shape of bird beaks has evolved on different islands.

Figure 6 shows two species of finch from two different islands.

(Source: © Kristel Segeren/Shutterstock)

Species A

(Source: © Maurizio De Mattei/Shutterstock)

Species B

Figure 6

These two species of finch evolved from a common ancestor that had a similar shaped beak to species B.

Beak shape is related to the food that the finches eat.

Describe how the thinner beak of species A is a result of evolution.

(4)

there was variation in beak shape / mutations occurred that changed the shape of the beak (in some finches) (1)

• thinner beaks are more suited to catching / extracting {the food available for finch A /insects / finch A's environment} (1)

• the birds with thinner beaks {outcompeted / were more successful than / more likely to survive / obtained more food } (those with thicker beaks) (1)

• (more) birds with thinner beaks reproduced and passed on alleles for thinner beaks (1)

(Total for Question 3 = 8 marks)

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4 Alcohol is broken down by liver cells.

(a) Which process moves alcohol from the blood into the liver cells?

(1)

- ☒ **A** diffusion
- ☒ **B** respiration
- ☒ **C** osmosis
- ☒ **D** transpiration

(b) If a person drinks too much alcohol, liver cells die and the person can develop cirrhosis of the liver.

The relative risk of developing cirrhosis of the liver is affected by two factors.

1. The volume of alcohol a person drinks in one week.
2. Whether the person drinks the alcohol on its own or with a meal.

Figure 7 shows how these two factors affect the relative risk of people developing cirrhosis of the liver.

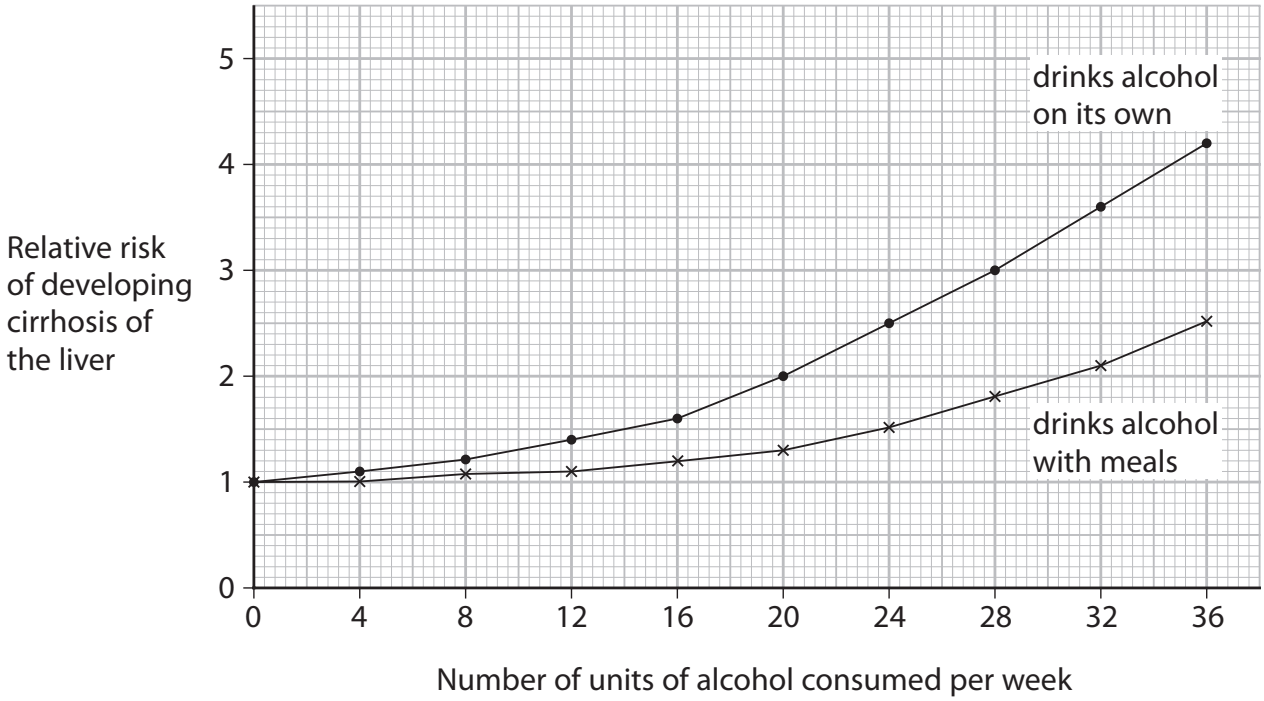

Figure 7

(i) Person A drinks alcohol on its own.

Person B drinks alcohol with their meals.

Calculate the difference in risk for these two people when each one drinks 28 units of alcohol per week.

(3)

readings from graph
3.0 / 3 (1)

1.8 (1)

Evaluation

3.0 – 1.8 = 1.2 (units higher of developing cirrhosis of the liver) (1)

(ii) Using evidence from Figure 7, state **two** pieces of health advice for people about drinking alcohol.

(2)

1 reduce alcohol intake / do not drink alcohol (1)

2 • drink alcohol with meals / do not drink it on its own (1)

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(c) Cystic fibrosis is a genetic condition that can also cause liver disease.

(i) State where genes are found in cells.

(1)

in the nucleus / on a chromosome

(ii) Figure 8 shows the inheritance of cystic fibrosis in a family.

F represents the dominant allele that does not cause cystic fibrosis.

f represents the recessive allele that causes cystic fibrosis.

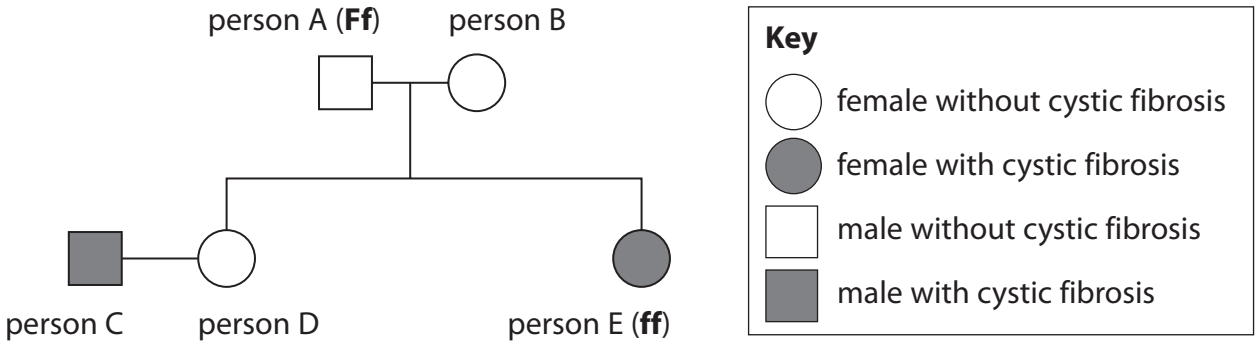

Figure 8

A scientist states that the genotype of person B is **Ff**.

Explain why the scientist is correct.

(2)

person B must have an F allele because she does not have cystic fibrosis (1)

• person B must have an f allele because person E must have inherited an f allele from her (1)

(iii) State the genotype of person C.

(1)

ff
both letters must be lower case

(Total for Question 4 = 10 marks)

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5 Figure 9 shows a plant with plantlets growing from it.

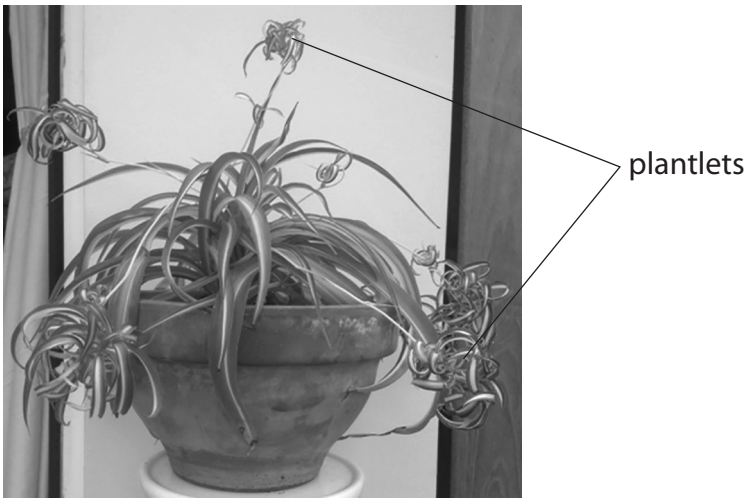

Figure 9

If a plantlet touches soil, it will grow roots and become a new plant.

This is an example of asexual reproduction.

(a) State **one** advantage of asexual reproduction for this plant.

(1)

lack of need to find a {mate / partner} / rapid reproductive cycle / plantlet has the same characteristics as the parent plant (so should be able to survive in that environment) / can quickly colonise an area.

(b) Scientists investigated how temperature affected the number of plantlets produced by this type of plant in 10 weeks.

The scientists grew one of these plants in each of six temperatures.

Figure 10 shows the results.

Temperature in °C	Number of plantlets produced
5	0
10	0
15	2
20	12
25	8
30	0

Figure 10

(i) Describe the effect of temperature on the number of plantlets produced by these plants.

(2)

plantlets are not produced at 50C / 10 0C / 30 oC (1)

• the number of plantlets then increases up to 20 0C (1

(ii) Which of these would improve the results of this investigation?

(1)

☒ **A** grow a plant at 0 °C

☒ **B** grow each plant in a different type of soil

☒ **C** grow a different species of plant at each temperature

☒ **D** grow five of these plants at each temperature

(c) The plant in Figure 9 also produces flowers for sexual reproduction.

Explain **one** advantage of sexual reproduction.

(2)

inherit different alleles (1)

• (which gives greater) variation in (species) / structures / characteristics / example of a characteristic (1)

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(d) Figure 11 shows the characteristics of three different varieties of this plant.

characteristic	plant K	plant L	plant M
size of leaves	small	large	small
striped leaves	none	none	green and white
flowers	small white	large white	large pink

Figure 11

A gardener wants to use selective breeding to produce a plant with large green and white striped leaves and large white flowers.

Explain which plants the gardener should use.

(3)

select plants L and M (1)

• because these have the desired alleles / the offspring will inherit the desired alleles (1)

• L because of large white flowers and large leaves (1)

(Total for Question 5 = 9 marks)

6 (a) Figure 12 shows a height percentile chart for boys.

The numbers on the right-hand side of the graph show the percentiles of the population for each growth curve.

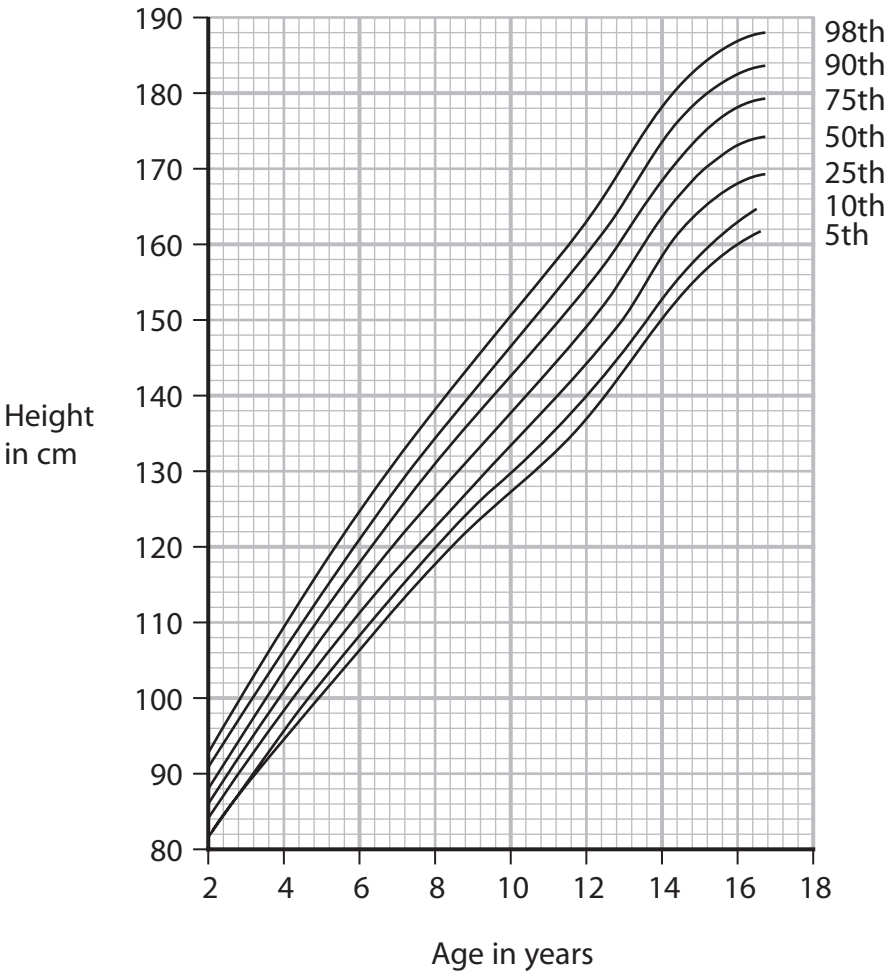

Figure 12

(i) A 10-year-old boy has a height of 140 cm.

Which is the percentile range for height for this boy?

(1)

☒ **A** 10th to 25th

☒ **B** 25th to 50th

☒ **C** 50th to 75th

☒ **D** 75th to 90th

(ii) State how percentile charts are used.

(1)

to monitor height / growth (over time) (1)

(b) As we grow, we make new cells by mitosis and meiosis.

(i) The cells that are made can become specialised.

Figure 13 shows a diagram of a sperm cell.

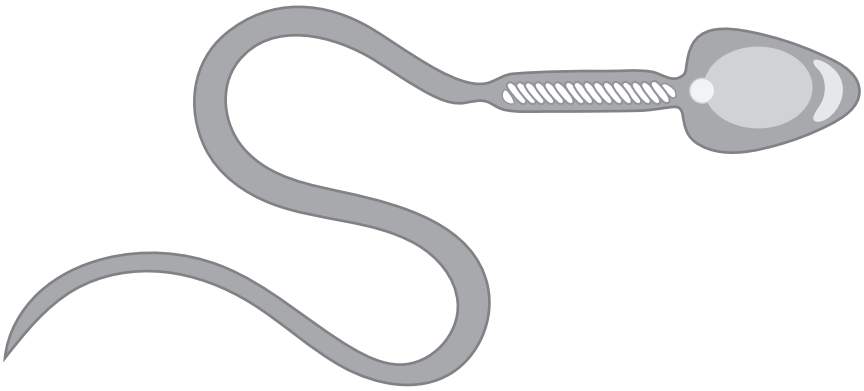

Figure 13

Describe **two** ways that the sperm cell is specialised.

(2)

1 tail / flagellum (1)

2 • acrosome / sac with enzymes (1)

(ii) Complete the table to show the results when a cell divides by mitosis or meiosis in humans.

Human body cells, except gametes, have 23 pairs of chromosomes.

(4)

	mitosis	**meiosis**
number of daughter cells produced	2	4
number of chromosomes in each daughter cell	46	23

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(c) The tips of plant roots are where many cells are dividing by mitosis.

(i) Which term describes the area of a root where many cells are dividing by mitosis?

(1)

☒ **A** meristem

☒ **B** root hair cell

☒ **C** xylem

☒ **D** phloem

(ii) Plant root cells contain an enzyme that joins glucose molecules together to make starch.

Devise a plan to investigate the effect of pH on the activity of this enzyme.

(3)

add {enzyme (solution) / plant root cells} to glucose (solution) (1)
• test for presence of starch (1)
• test {each minute / at set time intervals} / time until a positive result for starch (1)

(Total for Question 6 = 12 marks)

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7 Figure 14 shows a cross-section of a human eye.

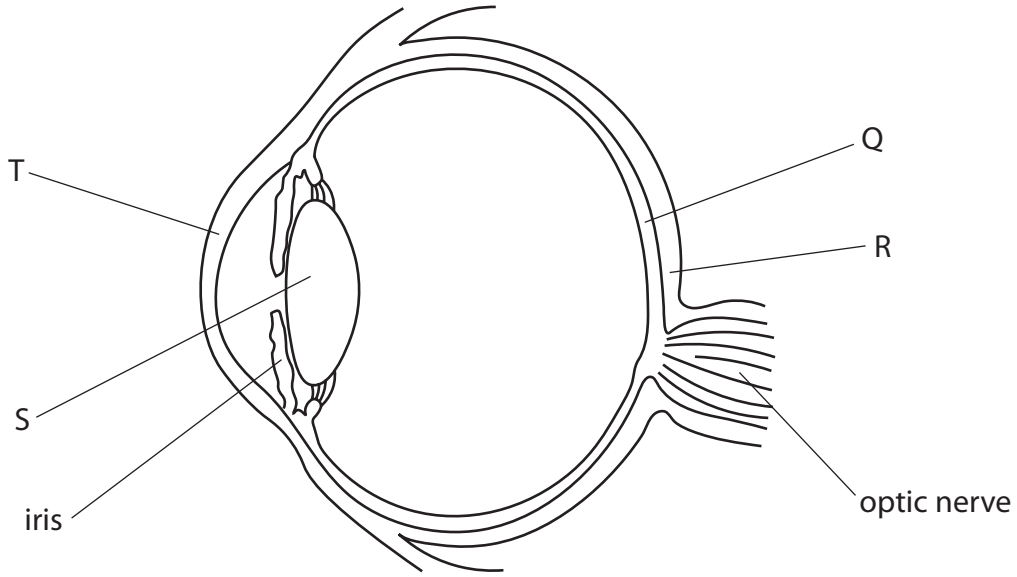

Figure 14

` (a) Cataracts can develop in the eye causing people to have blurred vision.

(i) Which structure of the eye can develop cataracts?

(1)

☒ **A** structure Q

☒ **B** structure R

☒ **C** structure S

☒ **D** structure T

(ii) Describe how cataracts are corrected by surgery.

(2)

cut into the eye / use a laser (to open the eye) (1)

• replace (old / opaque) lens (1)

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(b) (i) Explain how the size of the pupil of the eye changes when a torch is shone into the eye of a person.

(3)

the pupil gets smaller (1)

• (the) iris (1)

• gets bigger (1)

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*(ii) Figure 15 shows a diagram of light entering an eye of someone who cannot see distant objects clearly.

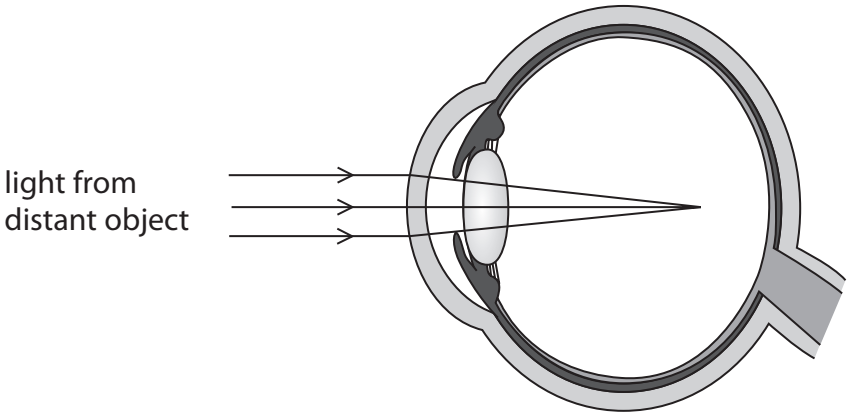

Figure 15

Explain why this person cannot see distant objects clearly and how the problem can be corrected.

(6)

why distant objects cannot be seen clearly

• person is near-sighted / short-sighted / has myopia
• light is not focused on retina
• light is focused in front of the retina
• the eyeball is too long
• the cornea is too curved / convex /converging
• the lens cannot be made thin enough
• so the light is refracted too much

how the problem can be corrected

• go to the opticians

• go to have your eyesight tested
• have glasses / contact lenses prescribed
• glasses / contact lenses need to be concave / diverging
• have laser treatment (of cornea)
• cornea needs to be less convex

• so light is refracted less before it enters the eye
• so light is focused on the retina

(Total for Question 7 = 12 marks)

8 (a) DNA molecules contain base pairs.

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

(2)

weak (1)

hydrogen bonds (1)

(b) Figure 16 shows part of a DNA molecule.

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

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

Figure 16

(i) Write the code for the complementary DNA strand in Figure 16.

(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)

(protease) breaks down proteins (1)

• in the {cell/nuclear} membrane (1)

(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)

to precipitate the DNA /

because DNA is insoluble in ethanol

(iii) The student wanted to compare the mass of DNA found in fresh peas with the mass of DNA found in fresh beans.

Give **two** variables the student would need to control to make this a valid comparison.

(2)

1 mass of peas and beans (1)

2

• method of crushing (1)

(Total for Question 8 = 11 marks)

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9 (a) Figure 17 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 17

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

(1)

Gonorrhoea

(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)

66 000 000 ÷ 1000 = 66 000 (1)

(66 000) x 3.7 =244 200 (people)

..... people

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

(1)

it is {passed/spread} from

person to person (1)

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

(1)

avoid sexual contact (1)

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

(2)

it is {killed / inhibited} by antibiotics (1)

• because chlamydia is caused by bacteria (1)

*(b) When a person is infected with a disease, the immune system will respond to protect their body.

Explain how the immune system will respond to an infection caused by bacteria.

(6)

Area A
• antigens are on the bacteria
• which are detected by WBCs / phagocytes
• white blood / phagocytes engulf bacteria (phagocytosis)
• swelling / inflammation of tissues / fever

Area B
• number of white blood cells increases
• antibodies are produced
• by lymphocytes / white blood cells
• antibodies surround / cover / inactivate the antigens / pathogens

Area C
• memory lymphocytes / cells are produced
• which remain in the blood
• then if a secondary infection occurs
• memory lymphocytes produce antibodies faster / in greater numbers
• so the bacteria / pathogens are destroyed faster

(Total for Question 9 = 13 marks)

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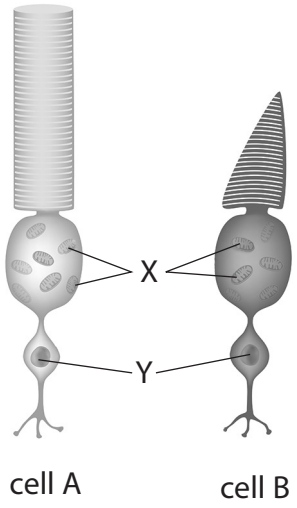
10 (a) Figure 18 shows two light receptor cells from the human eye.



(Source: © Kokhanchikov/Shutterstock)

Figure 18

(i) Which part of the eye contains light receptor cells?

(1)

☒ **A** cornea

☒ **B** iris

☒ **C** lens

☒ **D** retina

(ii) These cells require energy.

The cell organelles labelled X release energy during respiration.

Name the organelles labelled X.

(1)

mitochondria / mitochondrion

(iii) The cell organelle labelled Y contains chromosomes.

Name the organelle labelled Y.

(1)

nucleus / nuclei

(iv) Cell A responds to dim light and is responsible for night vision.

Name cell A.

(1)

ROD /ROD CELLS

(v) Describe how the role of light receptor cell B is different from the role of light receptor cell A.

(2)

cell B is a cone cell (1)

• involved in colour vision (1)

(b) The optic nerve carries information from the back of the eye to the brain.

The optic nerve is 47 mm in length.

Nerve impulses travel at 75 metres per second.

(i) Calculate the time an impulse takes to travel the length of the optic nerve.

Use the equation: $\text{speed} = \frac{\text{distance}}{\text{time}}$

(3)

Change the subject of the equation

time = distance ÷ speed (1)

Conversion of mm to m

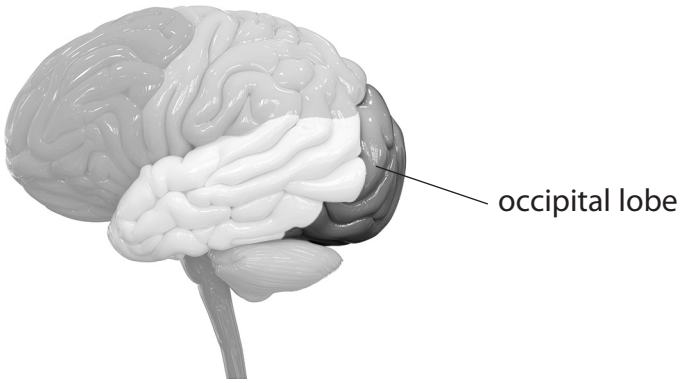
47 ÷ 1000 = 0.047(m) (1)

Substitution

0.047 ÷ 75 = 0.0006267 (seconds)

..... seconds

(ii) The impulse travels to the occipital lobe of the brain.
The occipital lobe is labelled in Figure 19.



(Source: © Magic mine/Shutterstock)

Figure 19

Which part of the brain contains the occipital lobe?

(1)

☒ **A** cerebral hemispheres

☒ **B** medulla oblongata

☒ **C** cerebellum

☒ **D** hypothalamus

(iii) State the sense most likely to be affected if the occipital lobe is damaged.

(1)

(eye)sight / vison / seeing / being able to see

(Total for Question 10 = 11 marks)

TOTAL FOR PAPER = 100 MARKS