Write your name here

Surname	Other names

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

Centre Number	Candidate Number

Biology

Paper 1

Foundation Tier

Additional Sample Assessment Material for first teaching September 2016

Time: 1 hour 45 minutes

Paper Reference
1BI0/1F

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 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 ▶

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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 The human immune system helps defend the body against disease.

Figure 1 shows a bacterial cell that can cause disease.

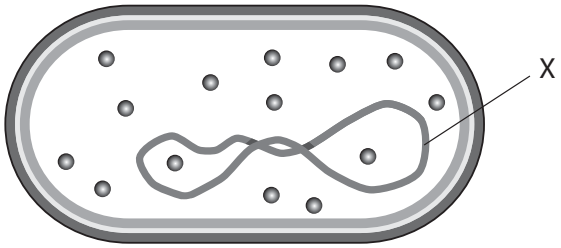


Figure 1

(a) What is the part of the cell labelled X?

(1)

☒ **A** cytoplasm

☒ **B** nucleus

☒ **C** chromosome

☒ **D** plasmid

(b) Bacteria and other microorganisms can cause infectious diseases.

Use the words in the box to complete the passage about treating infectious diseases.

(3)

antigens	painkillers	toxins	viruses
antibiotics	stimulants	pathogens	

Bacteria and other microorganisms that cause infectious diseases are called

..... .

Drugs called ..... can be used to treat infectious diseases caused by bacteria. These drugs do not work against infectious diseases caused by

..... .

(c) In 1796, the work of Edward Jenner led to the development of a vaccine used to immunise people against a disease called smallpox.

Describe how the body responds to immunisation.

(3)

(Total for Question 1 = 7 marks)

2 Some students investigated the effect of pH on the action of the enzyme trypsin.

Trypsin breaks down a protein found in milk. This turns the milk into a clear, colourless solution.

The students set up five test tubes. Each test tube contained trypsin and milk at either pH 5, 6, 7, 8 or 9.

The students then timed how many minutes it took for the milk in each test tube to turn colourless.

(a) Design a table that could be used to record the results for this investigation.

(3)

(b) Trypsin works best at pH 7.8.
Predict the results of this investigation.

(2)

(c) Which of these changes to the investigation would improve the accuracy of the results?

(1)

- ☒ **A** using different volumes of trypsin
- ☒ **B** measuring the time in seconds
- ☒ **C** using a wider range of pH in milk
- ☒ **D** leaving the test tubes for a longer length of time

(d) Trypsin is an enzyme found in the human body.
This investigation was carried out at the optimum temperature for the action of trypsin.

(i) State the optimum temperature for the action of trypsin.

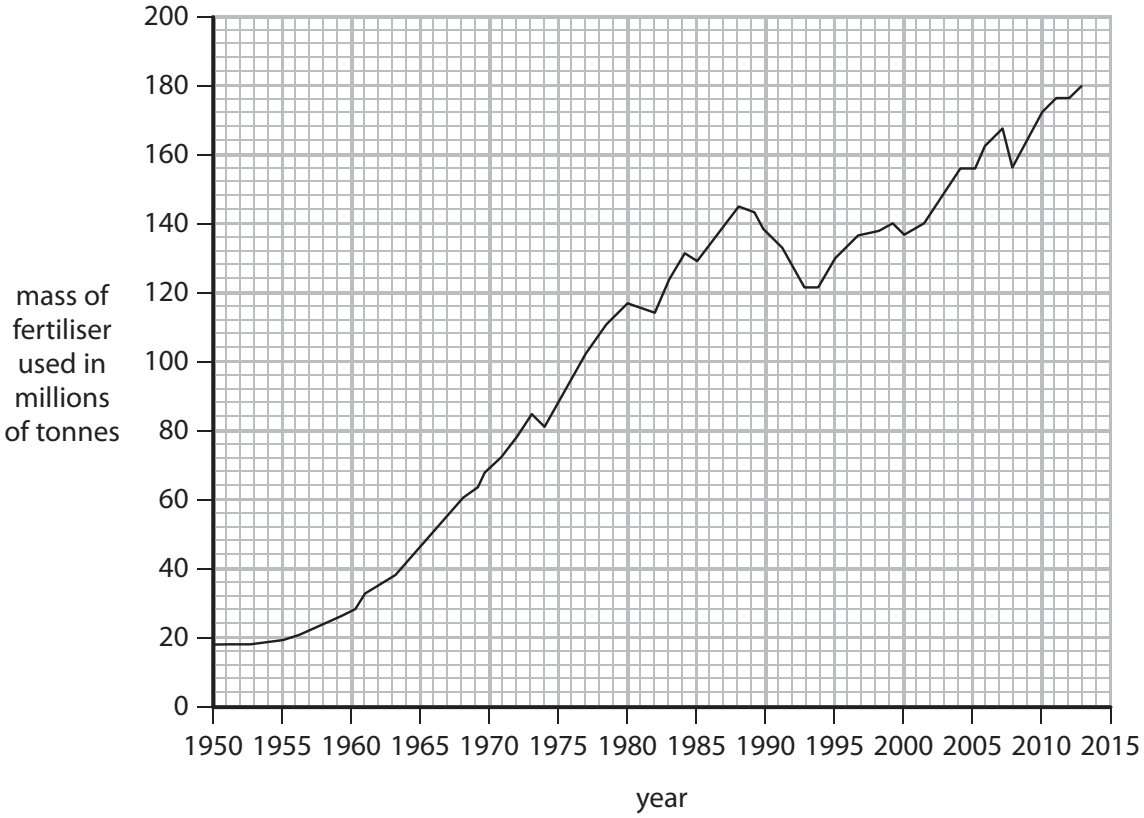
(1)

(ii) Describe how the temperature could be controlled in this investigation.

(1)

(Total for Question 2 = 8 marks)

3 The graph shows the mass of fertiliser used worldwide between 1950 and 2013.



(a) (i) Compare the mass of fertiliser used in 1950 with the mass of fertiliser used in 2013.

(2)

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(ii) Give **one** reason why the mass of fertiliser used worldwide shows this trend.

(1)

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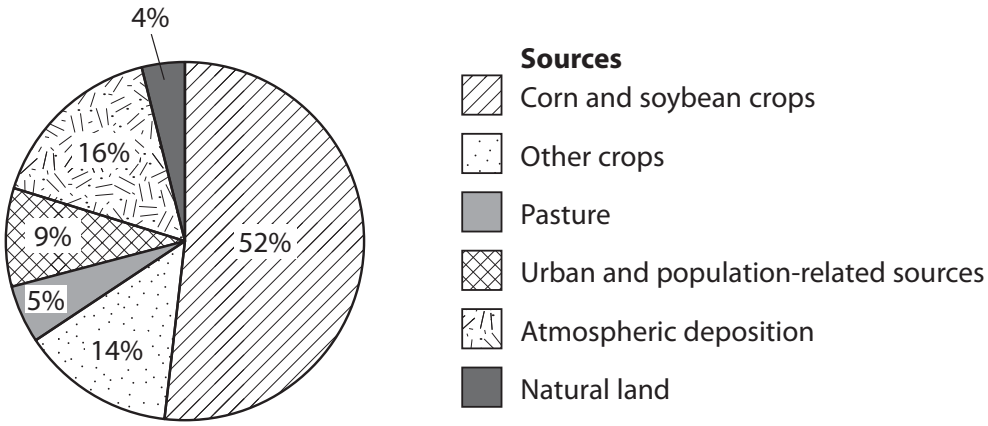
(b) The pie chart shows the percentage of nitrates that flows into the Gulf of Mexico from various sources each year.



(i) Calculate the ratio of nitrates released from natural land to that released from corn and soybean crops.

(2)

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(ii) State a disadvantage of excess nitrates draining into the Gulf of Mexico.

(1)

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.....

(Total for Question 3 = 6 marks)

4 (a) Figure 2 shows the mass of protein and carbohydrate in different types of seed.

type of seed	mass of protein in grams	mass of carbohydrate in grams
pumpkin	30	11
sesame	18	23
flax	18	29
sunflower	21	20
chia	17	42

Figure 2

(i) Plot a bar chart to show the mass of protein in each of these types of seed.

(3)

(ii) What is used to test for the presence of protein in the seeds?

(1)

☒ **A** Biuret reagent

☒ **B** Benedict's solution

☒ **C** iodine solution

☒ **D** ethanol test

(iii) Some of the carbohydrates found in the seeds are reducing sugars.

Describe a method to test for the presence of a reducing sugar in the seeds.

(3)

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(iv) State **one** safety precaution that should be taken when testing the seeds for the presence of a reducing sugar.

(1)

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(b) Chia seeds contain the highest mass of carbohydrate.
Reducing sugar forms 85% of the carbohydrate in the chia seeds.

Calculate the mass of reducing sugar in the sample of chia seeds.

(2)

.....g

(Total for Question 4 = 10 marks)

5 Red blood cells can be stored for use in blood transfusions. They are stored in a solution that has the same concentration of solutes as the blood cells.

(a) What name is given to the movement of solutes, such as glucose, into and out of cells?

(1)

☒ **A** osmosis

☒ **B** diffusion

☒ **C** absorption

☒ **D** transmission

(b) (i) Explain why the storage solution must have the same concentration of solutes as the red blood cells.

(3)

(ii) Describe how scientists could determine the concentration of solutes needed for the storage of red blood cells.

(2)

(iii) State why the scientists should repeat their investigation.

(1)

(iv) Give a potential risk associated with handling blood samples.

(1)

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.....

(v) Suggest **one** way to minimise this risk.

(1)

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(Total for Question 5 = 9 marks)

6 (a) The part of an onion plant that is used as a vegetable grows underground.

Figure 3 shows an onion plant.

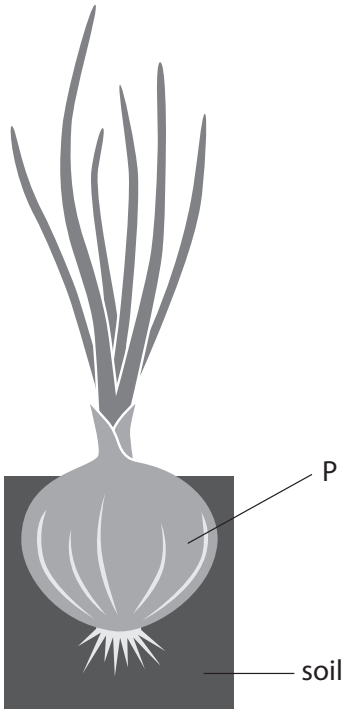

Figure 3

Explain why onion cells from part P are not able to carry out photosynthesis.

(2)

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(b) Figure 4 shows micrographs of the different stages of mitosis in the root tips of an onion. The stages are not in the correct order.

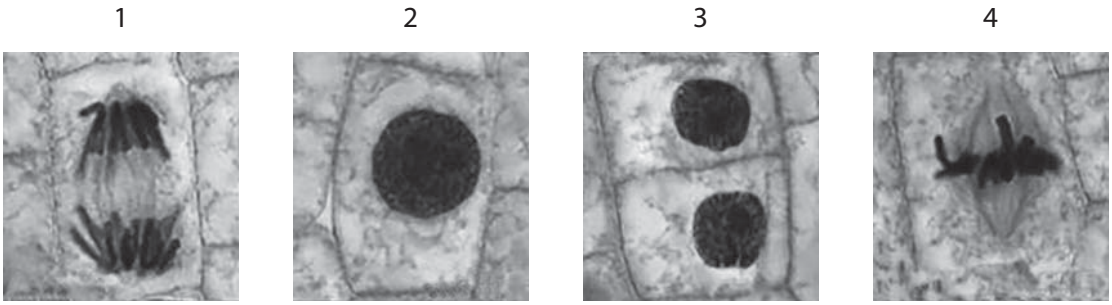

Figure 4

(i) Which order of micrographs shows the correct sequence of stages in mitosis?

(1)

☒ **A** 2, 3, 1, 4

☒ **B** 2, 3, 4, 1

☒ **C** 2, 1, 4, 3

☒ **D** 2, 4, 1, 3

(ii) Figure 5 shows a magnified onion cell.
The actual width of this onion cell is 100 μm.

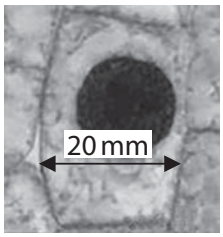

Figure 5

Calculate the magnification of this onion cell.

(2)

magnification = ...

(iii) Describe the importance of mitosis in the root tips of plants.

(2)

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(c) (i) One complete cell cycle in an onion cell takes 24 hours. Mitosis takes up 30% of this time. The remainder of the time is spent in interphase.

Calculate the length of time, in minutes, an onion cell spends in interphase.

(3)

interphase ..... minutes

(ii) Describe the events that take place in the onion cell during interphase.

(2)

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(Total for Question 6 = 12 marks)

7 (a) Blood group is an inherited characteristic.

Use the information in the box to complete the passage about the inheritance of blood groups.

(2)

dominant	codominant	cells
recessive	ribosomes	alleles

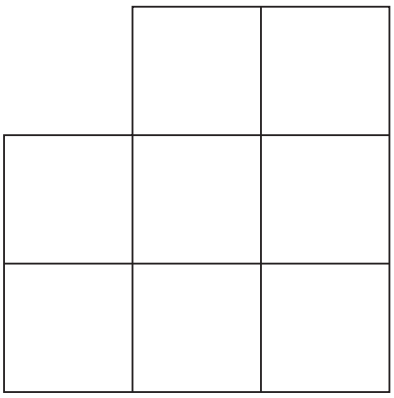
A person's blood group is determined by ..... .

Two of these are ..... because they are equally expressed in the phenotype of a person.

(b) Two parents produce offspring that can only have blood group AB.

Complete the Punnett square, to show this inheritance.

(2)



(c) Explain how a father who is blood group A and a mother who is blood group B can have a child that has blood group O.

(2)

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(d) The blood groups of 1400 individuals from England were screened.

Figure 6 shows the percentage of individuals in each blood group.

percentage of individuals in each blood group			
O	**A**	**B**	**AB**
47	41	9	3

Figure 6

(i) Calculate the number of individuals with blood group O.

(2)

.....

(ii) People with blood group O are known as universal donors as they do not have antigens for blood group A or B.

Blood group O can be used for a blood transfusion for any individual.

Give one reason why an individual may refuse a blood transfusion.

(1)

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(e) Antigens are involved in the development of herd immunity.

Explain how herd immunity can develop in a population.

(2)

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.....

(Total for Question 7 = 11 marks)

8 In 2014, nearly 155 000 people died from cardiovascular disease in the UK.

(a) Give the reason why cardiovascular disease is a non-communicable disease.

(1)

(b) Coronary heart disease is a type of cardiovascular disease.

Figure 7 shows the number of deaths worldwide in 2002 for coronary heart disease for different age groups.

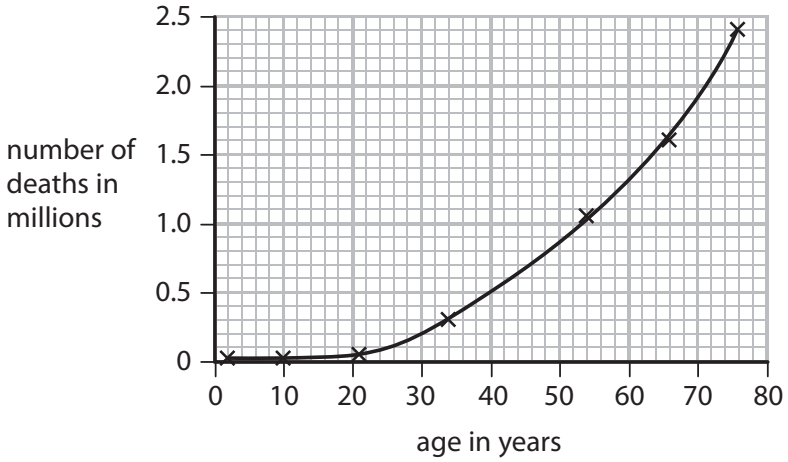

Figure 7

Describe the relationship between coronary heart disease and age.

(2)

(c) Drugs have been developed to treat people with cardiovascular disease.

Developing drugs involves many stages.
One stage involves testing a drug on other mammals before testing it on humans.

Give **one** disadvantage of using other mammals for drug testing.

(1)

.....

.....

(d) Figure 8 shows information about the BMI and the lifestyle of two males, P and Q, who have the same height and age.

male	BMI	physical exercise in hours per week	percentage of total daily intake of nutrients		
			carbohydrate	protein	fat
P	24	7	50	20	30
Q	29	2	50	15	35

Figure 8

(i) Which measurements are used to calculate BMI?

(1)

☒ **A** waist and hip

☒ **B** hip and mass

☒ **C** height and mass

☒ **D** waist and height

(ii) Explain which male has a greater risk of developing cardiovascular disease.

(3)

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(e) Figure 9 shows the use of a stent to treat cardiovascular disease.

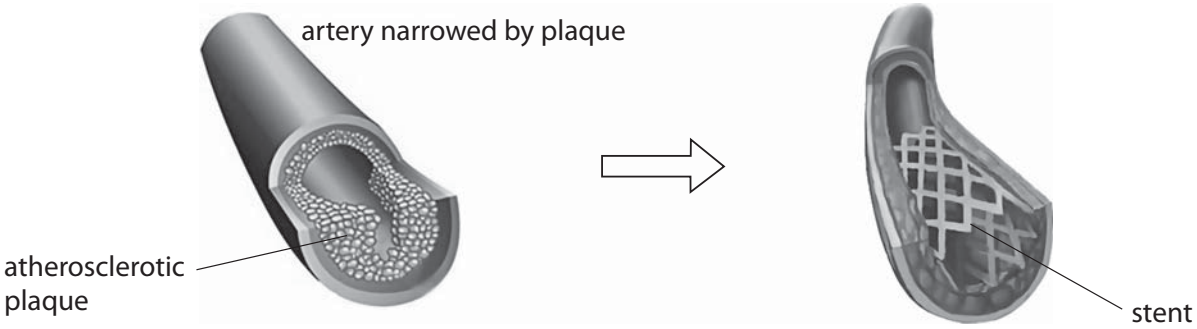


Figure 9

Explain how a stent works to treat cardiovascular disease.

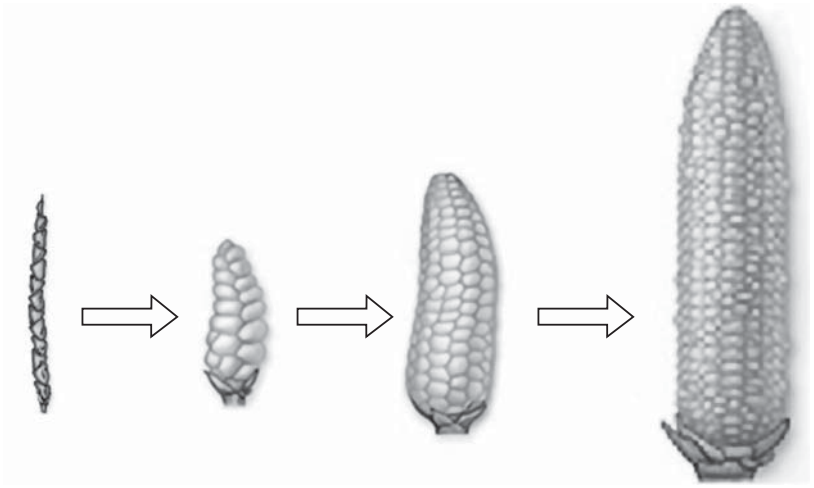
(3)

(Total for Question 8 = 11 marks)

9 Corn is one of the world's most important crop plants.

Native Americans grew an early form of corn called teosinte.
Modern corn has been developed by selective breeding of teosinte plants.

Figure 10 shows some stages in the development of modern corn.



teosinte modern corn

Figure 10

(a) Give reasons why native Americans selectively bred teosinte.

(2)

(b) Describe how selective breeding has produced modern corn.

(3)

(c) Genetic engineering can also be used to produce a new variety of modern corn.

Describe how the genome of this new variety of corn is different from the genome of corn that has not been genetically engineered.

(2)

*(d) Compare and contrast the use of selective breeding and genetic engineering to produce modern varieties of corn.

(6)

(Total for Question 9 = 13 marks)

10 Short-sightedness, also known as myopia, is a common eye defect.

Figure 11 shows a section through the human eye with light rays from a distant object.

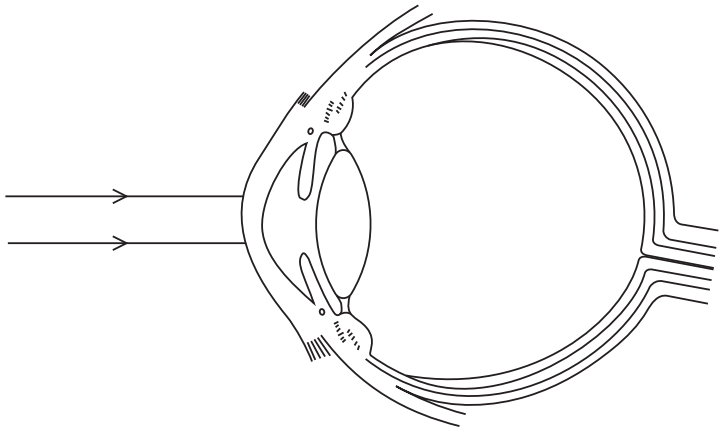


Figure 11

(a) (i) Complete the diagram to show the light rays for this individual who is short-sighted.

(2)

(ii) Explain how laser technology can be used to correct short-sightedness.

(2)

.....

.....

.....

.....

(iii) Which structure controls the amount of light entering the eye?

(1)

☒ **A** cornea

☒ **B** iris

☒ **C** retina

☒ **D** lens

(b) In an investigation, scientists asked three volunteers to look at a computer screen which changes from red to green.

Each volunteer was given a drink containing an amount of caffeine.

The volunteers hit a button with their index finger each time the screen changed colour.

Their reaction times were measured.

The results are shown in Figure 12.

	reaction time in seconds			
volunteer	**repeat 1**	**repeat 2**	**repeat 3**	**mean**
volunteer 1 – 100 mg caffeine	0.45	0.52	0.50	0.49
volunteer 2 – 300 mg caffeine	0.22	0.16	0.24	0.21
volunteer 3 – 600 mg caffeine	0.19	0.19	0.22	0.20

Figure 12

(i) Describe the effect of concentration of caffeine on the reaction times of these volunteers.

(2)

.....

.....

.....

.....

*(ii) The volunteers chosen for this investigation were not colour blind.

Explain how the eye is adapted for colour vision and why it is important that the volunteers were not colour blind.

You must refer to the structure and function of the eye in your answer.

(6)

(Total for Question 10 = 13 marks)

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