

Write your name here

Surname

Other names

Centre Number

Candidate Number

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

Biology

Paper 1

Foundation Tier

Sample Assessment Materials 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** Eye colour is controlled by genes.

The allele for brown eyes, B, is dominant to the allele for blue eyes, b.

- (a) A female with blue eyes and a male with brown eyes are about to have a child.

Complete the Punnett square to determine the phenotype of the child.

(2)

		man	
		B	B
woman	b		
	b		

Phenotype of child.....

(b) A scientist recorded the eye colour of 30 people.

The results are shown in Figure 1.

blue	green	blue	brown	brown	brown	hazel	blue	
brown	hazel	blue	blue	hazel	green	brown	brown	
blue	green	brown	brown	blue	hazel	blue	brown	brown
brown	blue	brown	brown	brown				

Figure 1

(i) Complete the tally chart, in Figure 2, for this data.

(2)

eye colour			
blue	brown	green	hazel
total.....	total.....	total.....	total.....

Figure 2

(ii) Give another appropriate method of displaying this information.

(1)

A section of one allele for eye colour has the following DNA sequence:

ATGGCTAAGTA

(c) (i) Which sequence is the complementary DNA strand?

(1)

- ☐ **A** ATGGCTAAGTA
- ☐ **B** CGTTAGCCTGC
- ☐ **C** TACCGATTCAT
- ☐ **D** GCAATGGACG

(ii) Give **one** way in which a second allele for eye colour might be different.

(1)

Figure 3 outlines a method that can be used to extract DNA from fruit.

Crush fruit with a buffer solution containing detergent



Filter the mixture



Add ethanol and remove the DNA

Figure 3

(d) (i) Give a reason for filtering the mixture.

(1)

(ii) What is the role of the ethanol?

(1)

- ☐ **A** denature the enzymes
- ☐ **B** disrupt cell membranes
- ☐ **C** supercoil the DNA
- ☐ **D** to precipitate the DNA

(Total for Question 1 = 9 marks)

2 Antibiotics can be used to treat Chlamydia, which is a sexually transmitted infection.

(a) What type of pathogen causes Chlamydia?

(1)

- ☐ A bacteria
- ☐ B fungus
- ☐ C protist
- ☐ D virus

Figure 4 shows the number of new cases of Chlamydia diagnosed each year, in a region of the UK, between 2000 and 2008.

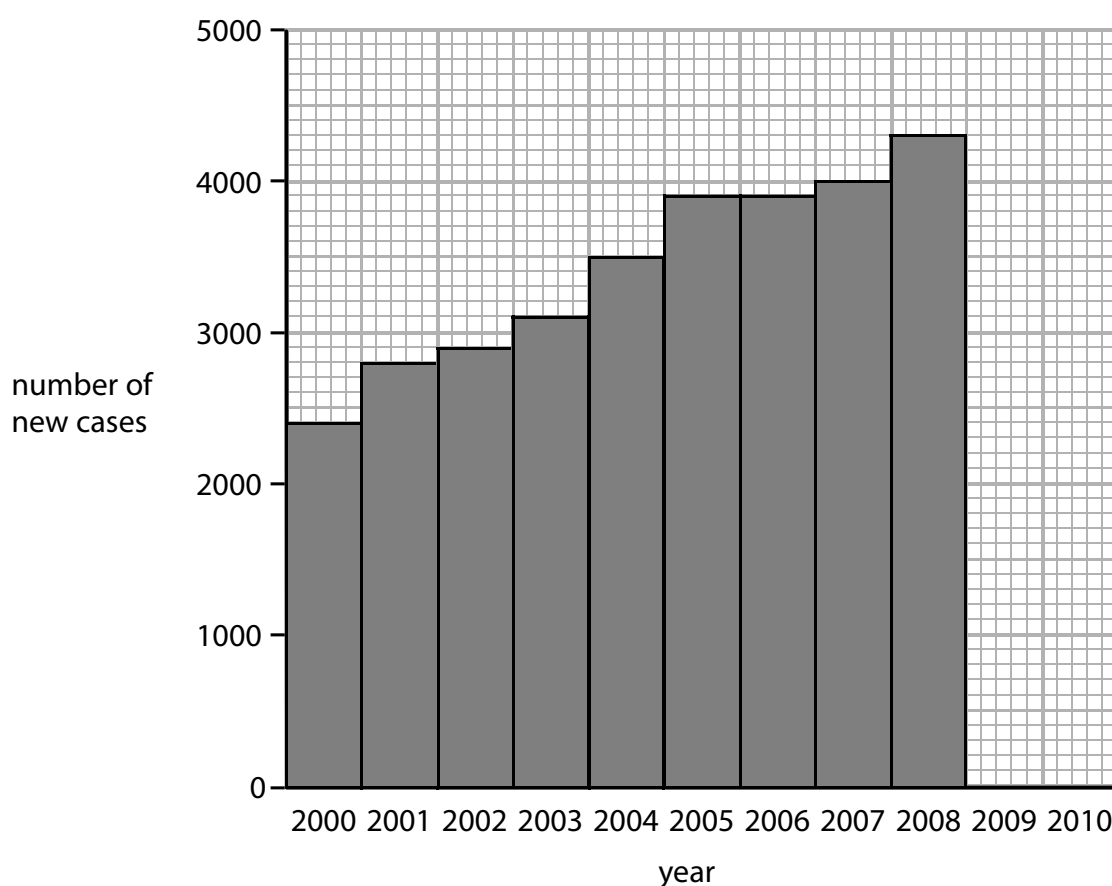


Figure 4

(b) (i) In 2009 there were 4800 new cases diagnosed.

In 2010 there were 4100 new cases diagnosed.

Plot this data on the graph in Figure 4.

(1)

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(ii) Describe the trend in cases between 2000 and 2010.

(2)

People infected with Chlamydia are more likely to be infected with the STI
Gonorrhoea.

(iii) Explain how people become infected with both Chlamydia and Gonorrhoea.

(2)

HIV is a sexually transmitted infection.

(c) Explain how infection with HIV can lead to AIDS.

(2)

(Total for Question 2 = 8 marks)

3 The sugar molecule glucose can be detected by a chemical test.

(a) Use words from the box to complete the sentences.

(2)

blue-black	iodine	brick red
Biuret	lilac	Benedict's

The reagent is added to a tube containing a solution of glucose.

The tube is heated and the colour changes to a colour.

Sugary drinks have been linked to tooth decay.

Tooth decay occurs when the enamel on teeth is dissolved.

A scientist investigates the effect of five different drinks on artificial tooth enamel.

She places 10 g of artificial tooth enamel into 100 ml of each drink. These are left for seven days.

The percentage change of mass for each sample of enamel is calculated.

Figure 5 shows the results.

drink	cola	milk	lemonade	squash	milkshake
percentage change of mass (%)	-3.4	0.0	-2.8	-0.6	-1.6

Figure 5

(b) (i) Which drink is most likely to cause tooth decay?

(1)

- ☐ **A** cola
- ☐ **B** lemonade
- ☐ **C** milkshake
- ☐ **D** squash

(ii) Explain why it might be better to drink milk rather than a milkshake.

Use data from Figure 5.

(2)

The scientist is concerned that the conclusions from this experiment might **not** show the real effect of sugary drinks on teeth.

(iii) Give **two** ways in which the scientist could improve the investigation.

(2)

1

2

The sugar content of drinks is not the only dietary factor that can affect health.

(iv) Give **one** other dietary factor that a person should consider when choosing a drink.

(1)

(Total for Question 3 = 8 marks)

4 Figure 6 shows a diagram of a cell.

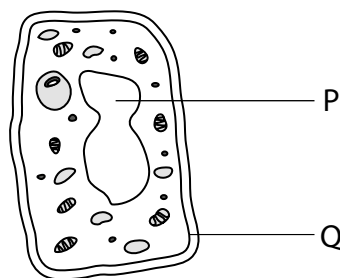


Figure 6

(a) (i) Which row of the table identifies both structure P and structure Q?

(1)

	structure P	structure Q
☐ A	nucleus	cell membrane
☐ B	nucleus	cell wall
☐ C	vacuole	cell membrane
☐ D	vacuole	cell wall

(ii) Plant cells have a cell wall and a large vacuole.

Draw one straight line from each structure to its function.

(2)

structure

function

cell wall

large vacuole

where respiration occurs

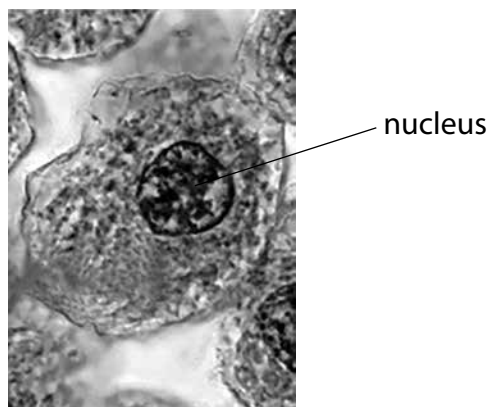
contains cellulose to provide support

where photosynthesis occurs

controls the cell

stores cell sap

Figure 7 shows an image of an animal cell taken using a microscope with a $10\times$ eyepiece lens and a $40\times$ objective lens.



(Source: © Ed Reschke/Getty Images)

Figure 7

(b) (i) The total magnification of the animal cell is

(1)

- ☐ **A** $\times 50$
- ☐ **B** $\times 140$
- ☐ **C** $\times 400$
- ☐ **D** $\times 4000$

(ii) The diameter of the cell is $15\text{ }\mu\text{m}$.

Use Figure 7 to estimate the diameter of the cell nucleus.

(1)

diameter of nucleus = μm

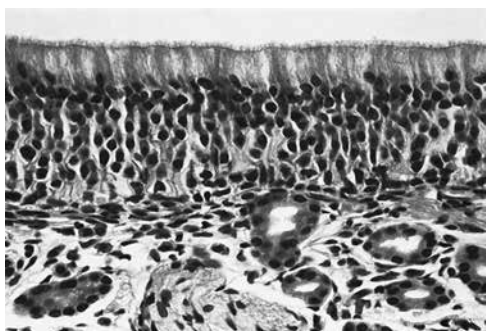
(iii) Give the measurement of $15\text{ }\mu\text{m}$ in mm.

(1)

..... mm

The development of electron microscopes has increased our understanding of cells and their features.

Figure 8 shows two images of ciliated epithelium, one taken using a light microscope and one using an electron microscope.



Light microscope



Electron microscope

(Science photolibrary Epithelium C022/2228 ©Steve Gschmeissner/Science Photolibrary)

Figure 8

- (c) Explain how the electron microscope image helps us to understand more about ciliated epithelium.

(3)

(Total for Question 4 = 9 marks)

5 Cell division processes are used to produce body cells and gametes.

The nucleus of a daffodil cell has 46 chromosomes.

- (a) (i) State the number of chromosomes in each pollen grain from this daffodil.

(1)

- (ii) Humans share 35% of their DNA with a daffodil.

The human genome contains 6600 million bases.

Calculate the number of bases that are the same as a daffodil.

(2)

number of bases = million

- (b) Figure 9 shows the development of a human embryo from a fertilised egg.

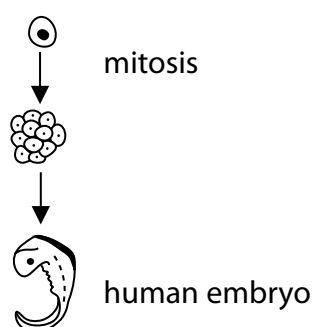


Figure 9

- (i) Explain how many cells are produced from one fertilised egg, after two cell divisions by mitosis.

(2)

(ii) Which process occurs causing the divided cells to become specialised?

(1)

- ☐ A meiosis
- ☐ B cloning
- ☐ C differentiation
- ☐ D cytokinesis

A student wanted to observe dividing cells under a microscope.

The student squashed the root tip of an onion plant on a microscope slide.

(c) (i) Describe how the student should use a light microscope to view the squashed root tip.

(3)

(ii) Even though the slide was at the correct magnification, the student could not see the chromosomes in the dividing cells.

State what could be done to the slide to make the chromosomes more visible.

(1)

(Total for Question 5 = 10 marks)

6 Figure 10 shows the human eye.

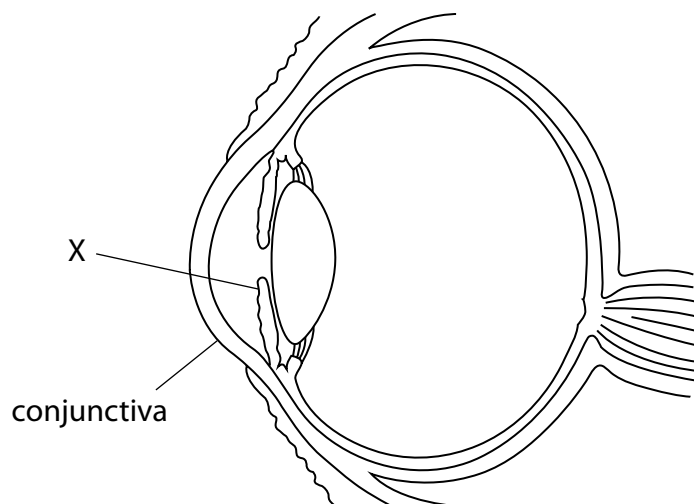


Figure 10

(a) (i) What is the part labelled X?

(1)

- ☐ A cornea
- ☐ B pupil
- ☐ C lens
- ☐ D iris

The conjunctiva is a membrane that covers the eyeball and inner surface of the eyelid.

(ii) Describe how the conjunctiva helps protect the eye from infection.

(2)

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Cataracts are caused by cloudy patches that develop on the lens. The chance of being affected by cataracts is related to age.

Figure 11 shows the percentage of people affected by cataracts in different age categories.

age category / years	percentage chance of being affected by cataracts (%)
0–14	3.8
15–44	6.5
45–59	30.7
> 60	59.0

Figure 11

- (b) (i) Explain one conclusion that can be made about the occurrence of cataracts, using the data above.

(2)

In a survey of one of the age categories, 80 people out of 256 showed signs of developing cataracts.

- (ii) Calculate which age category the 256 people are most likely to be taken from.

(2)

Age category

The retina is a light receptor consisting of rod and cone cells.

(c) Describe how the information detected by the retina is transmitted to the brain.

(2)

(Total for Question 6 = 9 marks)

- 7 Figure 12 shows the times when *Homo sapiens* and some of their ancestral species are thought to have lived.

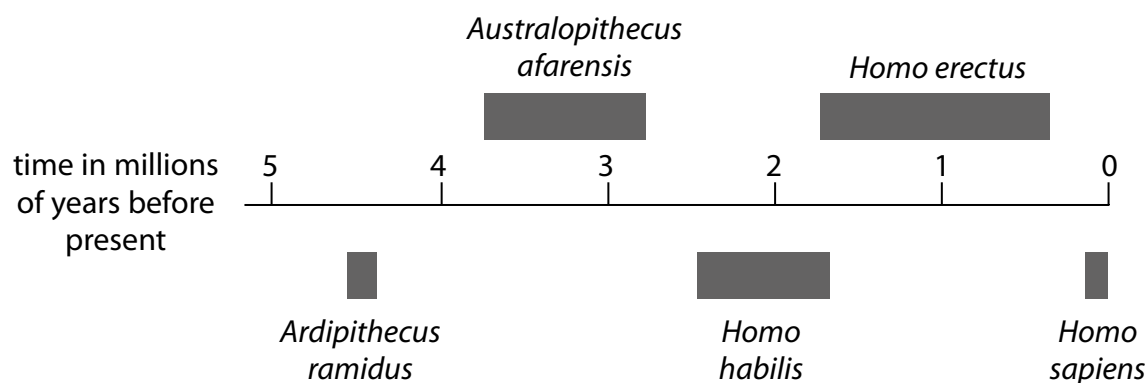


Figure 12

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

- (i) Calculate the number of years *Ardipithecus ramidus* is thought to have inhabited the Earth.

(2)

Answer

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

(2)

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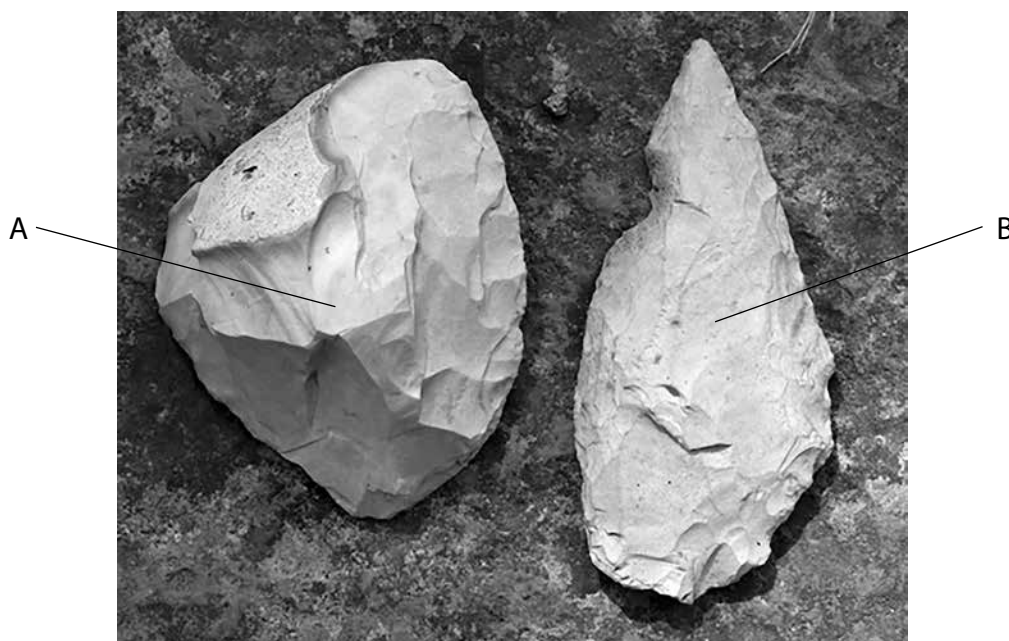
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(iii) Suggest an explanation for the extinction of *Homo habilis*.

(2)

(iv) Figure 13 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 13

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

Use information from Figure 12 and Figure 13.

(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)

(Total for Question 7 = 11 marks)

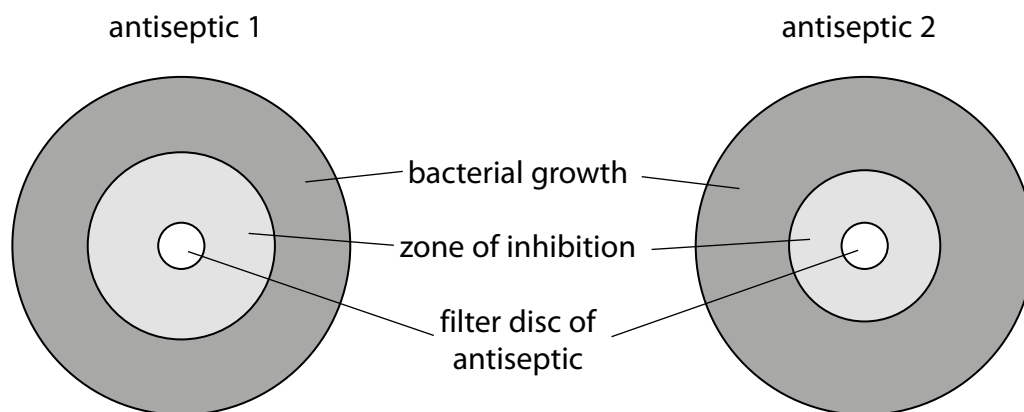
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8 *Streptococcus pyogenes* is a bacterium that causes communicable infections.

(a) Scientists tested the ability of two antiseptics to kill *Streptococcus pyogenes* bacteria.

They spread *Streptococcus pyogenes* bacteria on two agar jelly plates and placed a small disc of filter paper containing antiseptic in the centre of each dish.

Figure 14 shows the results of the test after 24 hours of incubation.



antiseptic 1 zone of inhibition	
radius (mm)	12
area (mm ²)	452

Figure 14

(i) Calculate the area of the zone of inhibition for antiseptic 2.

Give the answer to 3 significant figures.

($\pi = 3.14$)

(3)

zone of inhibition for antiseptic 2 = mm²

(ii) Give the antiseptic that is the most effective.

(1)

(iii) Both plates were incubated for 24 hours.

State **two** other variables the scientist would need to control during the test.

(2)

1

2

(b) The wire loop used to spread bacteria on an agar plate was heated in a Bunsen burner flame before being used.

(i) Explain why this aseptic precaution was used.

(2)

(ii) State **one** additional aseptic technique which would have been used for this investigation.

(1)

(c) Garlic is a plant that produces antiseptic chemicals.

Explain **one** benefit to garlic plants of producing antiseptic chemicals.

(2)

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(Total for Question 8 = 11 marks)

9 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.

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.

- (i) State **two** other factors the scientist should control when selecting the people.

(2)

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- (ii) 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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Smoking is a lifestyle factor that can cause many diseases.

Figure 15 shows the trends in smoking between 1960 and 2010 for men and women.

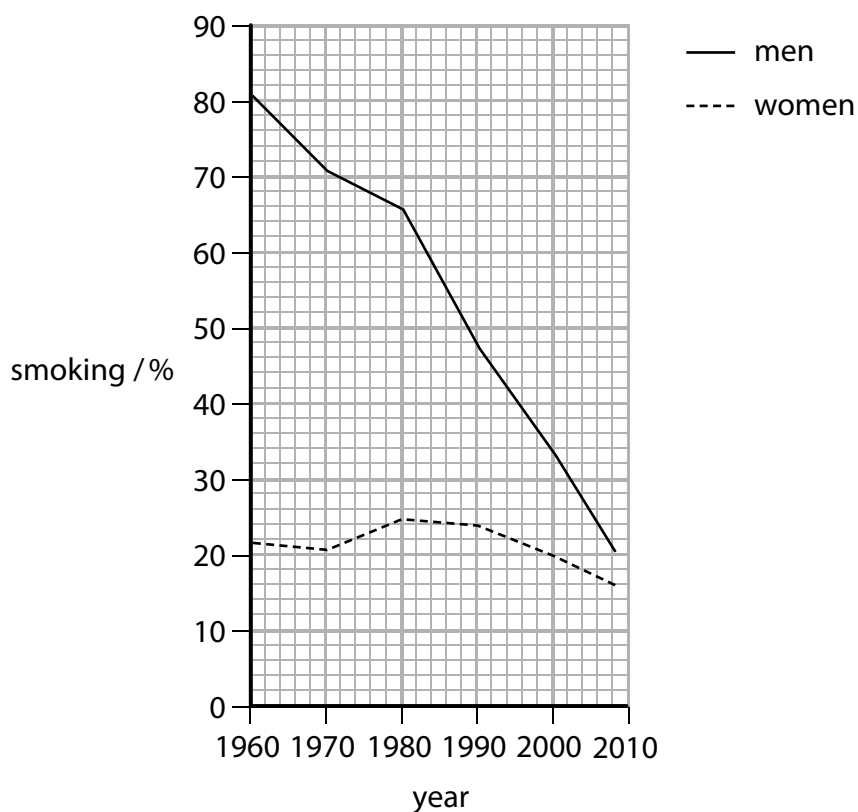


Figure 15

*(c) Explain how the changes in the trends for smoking may affect the occurrence of cardiovascular disease.

(6)

(Total for Question 9 = 13 marks)

10 Gregor Mendel investigated the genetics of peas.

He did not know about genes but showed that inherited characteristics can be dominant or recessive.

- (a) Explain how Mendel used homozygous tall and homozygous short pea plants to show that the tall allele is dominant to the short allele.

(2)

*(b) Figure 16 shows a drosophila fruit fly.



(Source: Science Photo Library)

Figure 16

The brown body colour of a drosophila fruit fly is dominant to black body colour and is not sex-linked.

Explain how Gregor Mendel could have used a brown drosophila fruit fly and a black drosophila fruit fly to show that brown body colour is dominant to black body colour.

(6)

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- (c) Figure 17 shows a strawberry plant that has produced several runners and new strawberry plantlets are growing at the end of each runner. This is an example of asexual reproduction.

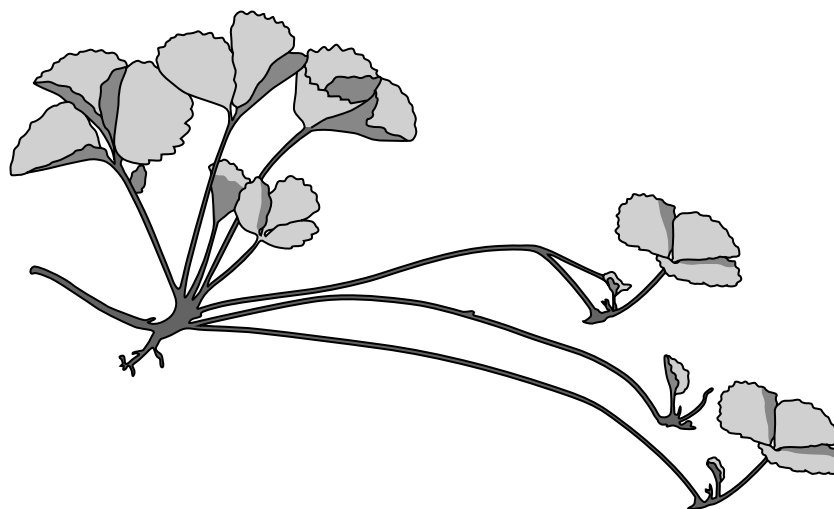


Figure 17

- (i) Explain why asexual reproduction in strawberries is beneficial to strawberry farmers.

(2)

Strawberry fruits, containing seeds, are produced after a flower is fertilised.

- (ii) Explain why seed production is an advantage to the strawberry plant.

(2)

(Total for Question 10 = 12 marks)

TOTAL FOR PAPER = 100 MARKS