Cambridge Assessment International Education

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BIOLOGY **0610/33**

Paper 3 Theory (Core) **October/November 2021**

1 hour 15 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Any blank pages are indicated.

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1 Respiration is a process that occurs in all living organisms.

(a) (i) Complete the definition of aerobic respiration.

View solution

The ..... reactions in cells that use .....

to break down ..... molecules to release energy.

[3]

(ii) State **two** uses of the energy released by respiration in the human body.

View solution

1 .....

2 .....

[2]

(iii) Carbon dioxide is one chemical product of aerobic respiration.

View solution

State the name of the other chemical product of aerobic respiration.

..... [1]

(b) A student investigated respiration at two different temperatures in germinating pea seeds.

The apparatus is shown in Fig. 1.1.

Soda lime is a chemical that absorbs carbon dioxide.

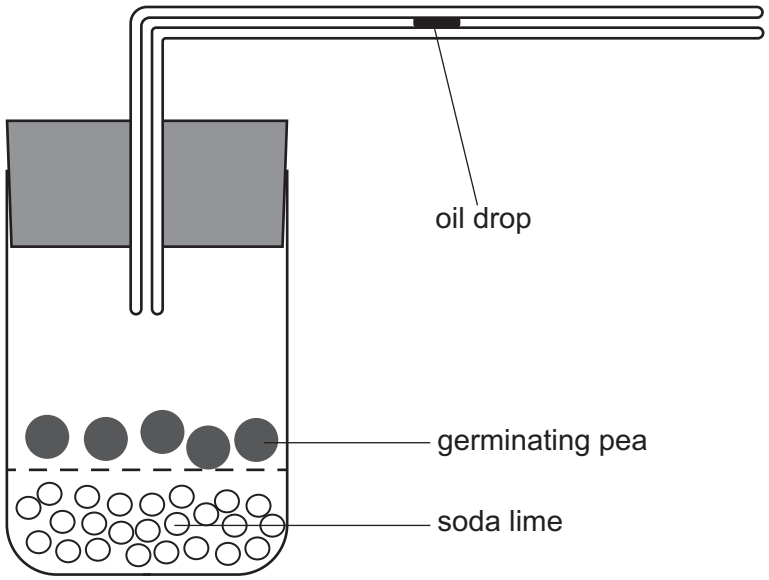

Fig. 1.1

The results of the investigation are shown in Table 1.1.

Table 1.1

temperature / °C	distance moved by the oil drop / cm
5	2.3
25	5.0

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(i) Calculate the percentage increase in the **distance** the oil drop moved, when the temperature changed from 5 °C to 25 °C.

View solution

Give your answer to **one** decimal place.

Space for working.

..... %
[3]

(ii) State **two** environmental conditions that the pea seeds shown in Fig. 1.1 would need for germination.

1 .....

2 .....
[2]

[Total: 11]

View solution

2 Transmissible diseases are caused by pathogens.

(a) Cholera is a transmissible disease that causes diarrhoea.

View solution

State the type of organism that causes cholera.

..... [1]

(b) One method of controlling the spread of disease is to treat raw sewage to make it safe.

(i) Describe how raw sewage is treated to make the water safe to drink and safe to release into the sea.

.....

.....

.....

.....

.....

.....

..... [3]

(ii) State **one** other method of controlling the spread of disease.

View solution

..... [1]

(c) The body has defences against diseases.

View solution

(i) The body has barriers that prevent pathogens from entering the body.

State the name of **one** mechanical barrier and **one** chemical barrier.

mechanical .....

chemical .....

[2]

(ii) State **one** product of white blood cells that defends the body from pathogens.

..... [1]

[Total: 8]

View solution

3 **(a)** Fig. 3.1 shows a diagram of a cross-section through a leaf.

View solution

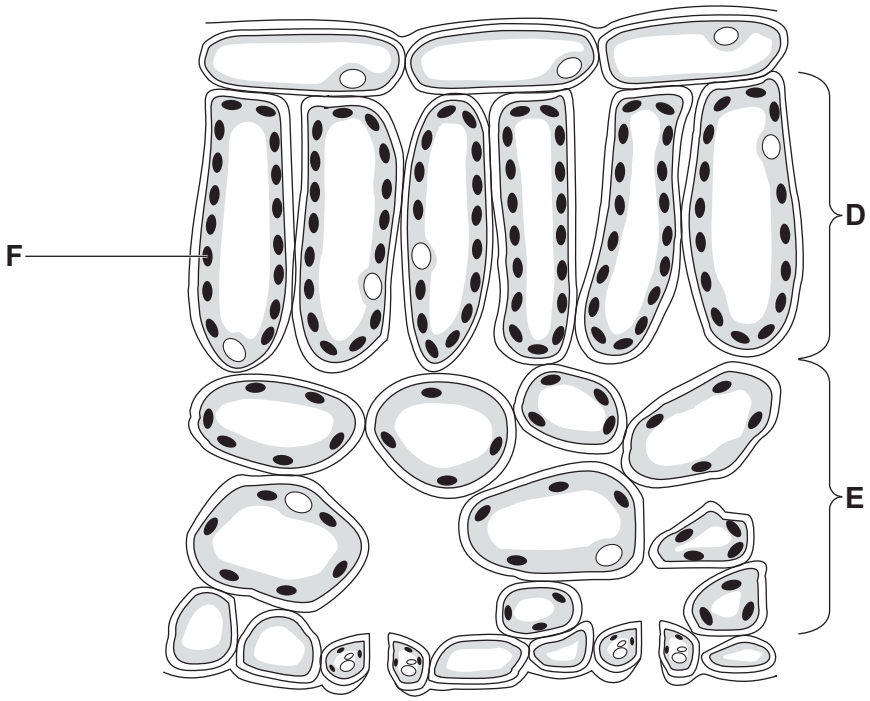

Fig. 3.1

(i) State the name of the tissues labelled **D** and **E**.

D .....

E .....

[2]

(ii) State the name of the cell structure labelled **F**.

View solution

..... [1]

(b) Plant cells photosynthesise.

View solution

State the word equation for photosynthesis.

..... [2]

(c) A student investigated the effect of light on the rate of photosynthesis.

View solution

Fig. 3.2 shows the apparatus used.

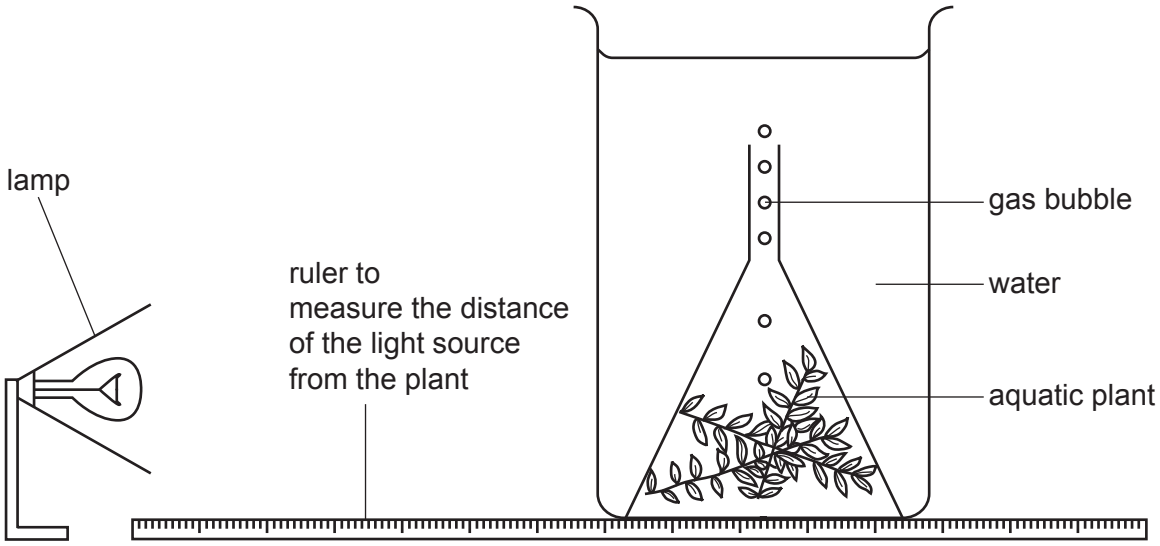

Fig. 3.2

A lamp was used as the only source of light. The lamp was placed 10 cm from the aquatic plant. The number of bubbles the aquatic plant produced in three minutes was counted and the rate of photosynthesis was calculated. This method was repeated at 10 cm intervals.

The results are shown in Table 3.1.

Table 3.1

distance of the lamp from the aquatic plant / cm	number of bubbles counted in three minutes	rate of photosynthesis / bubbles per minute
10	87	29
20	87	29
30	75	
40	48	16
50	24	8

(i) Use the information in Table 3.1 to calculate the rate of photosynthesis when the lamp was 30 cm from the aquatic plant.

..... bubbles per minute [1]

(ii) State the **two** distances between which the rate of photosynthesis halved.

..... cm and ..... cm [1]

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(iii) State **two** distances which have the same rate of photosynthesis.

.....cm and .....cm [1]

(iv) Predict what would happen to the rate of photosynthesis if the lamp was switched off.

Give a reason for your answer.

prediction .....

.....

reason .....

.....

.....

[2]

[Total: 10]

4 **(a)** Fig. 4.1 is a diagram of the female reproductive system.

View solution

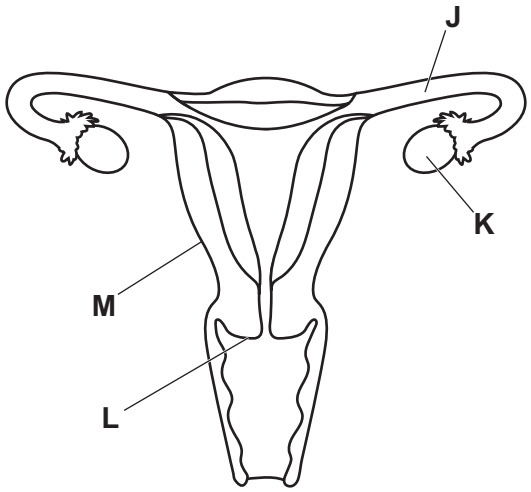

Fig. 4.1

Table 4.1 shows some of the names and functions of the structures labelled with letters **J** to **M** in Fig. 4.1.

Complete Table 4.1.

Table 4.1

letter in Fig. 4.1	name of the structure	function of the structure
J		transfers egg cells to the uterus
K		production of eggs
L	cervix	
M	uterus wall	

[4]

(b) There are a range of birth control options available to humans. Table 4.2 shows some information about types of birth control.

Complete Table 4.2.

View solution

Table 4.2

type of birth control	example of birth control
barrier	
	contraceptive implant
natural	

[3]

[Total: 7]

5 **(a)** A class of students measured their wrist circumference, as shown in Fig. 5.1.

Wrist circumference is an example of a characteristic that shows **continuous** variation in humans.



Fig. 5.1

Fig. 5.2 shows the results of the investigation.

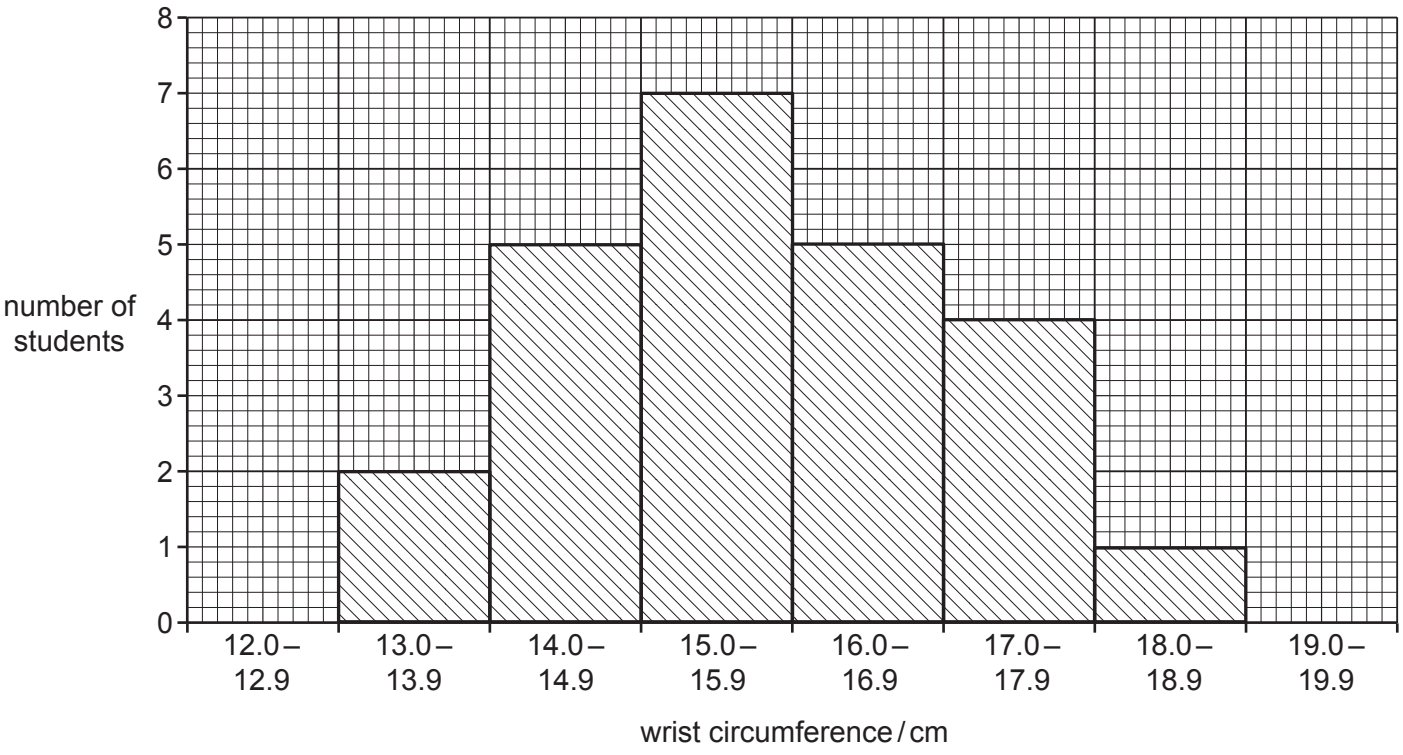

Fig. 5.2

(i) Calculate the total number of students in this investigation.

..... [1]

(ii) State the most frequent wrist circumference range.

View solution

..... [1]

(iii) Explain how these data show that wrist circumference is an example of continuous variation.

.....

.....

..... [1]

(b) State **one** example of discontinuous variation.

View solution

..... [1]

(c) Variation can be caused by mutation.

View solution

Complete the sentences about mutation.

A mutation is a ..... change.

Mutation is the way new ..... are formed which are versions of a gene.

Mutation can be caused by ..... radiation and some chemicals.

[3]

[Total: 7]

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6 Carbon is a part of many biological molecules.

(a) Fig. 6.1 is a diagram of part of the carbon cycle.

View solution

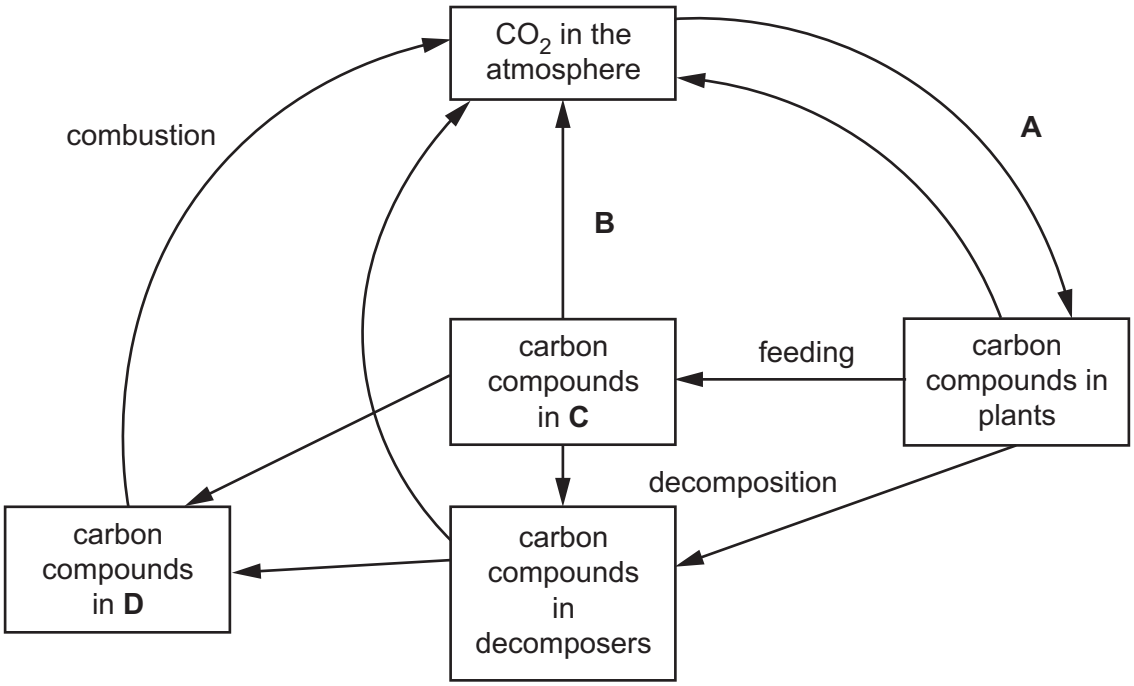

Fig. 6.1

(i) State the name of the process labelled **A**.

..... [1]

(ii) State the name of the process labelled **B**.

View solution

..... [1]

(iii) State the name of **C**.

View solution

..... [1]

(iv) State the name of **D**.

..... [1]

View solution

(b) Describe the undesirable effects of deforestation.

View solution

.....

.....

.....

.....

.....

.....

..... [3]

(c) Methane is a gas that pollutes the atmosphere.

View solution

(i) State **one** source of the methane that pollutes the atmosphere.

..... [1]

(ii) State the effects of an increased concentration of methane in the atmosphere.

View solution

.....

.....

.....

.....

..... [2]

[Total: 10]

7 **(a)** Fig. 7.1 is a diagram of an animal cell.

View solution

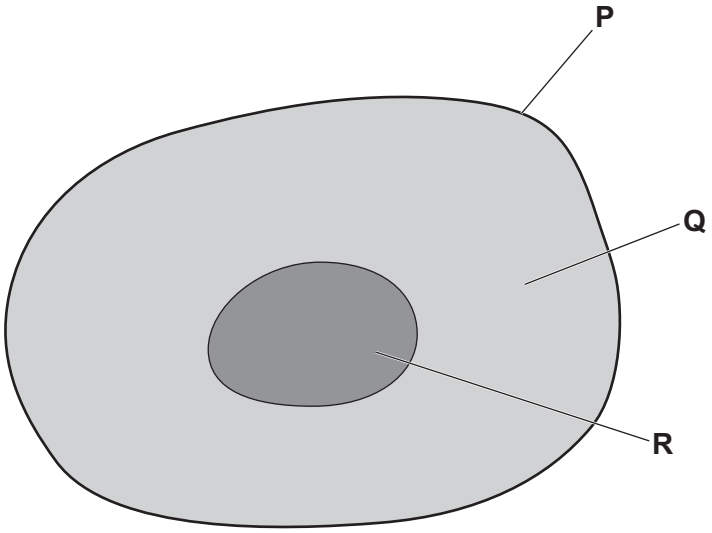

Fig. 7.1

Complete Table 7.1 by stating the functions of the structures labelled in Fig. 7.1.

Table 7.1

structure label	function of the structure
P	
Q	
R	

[3]

(b) Cell structure can be specialised to perform a specific function. A range of animal cell types are shown in Fig. 7.2.

View solution

The boxes on the left contain the names of four specialised cells.

The boxes in the middle contain diagrams of different specialised cells.

The boxes on the right contain descriptions of functions.

Draw **one** line from each name of a specialised cell to the diagram of that cell.

Draw **one** line from each diagram of a specialised cell to its function.

Two lines have been drawn for you. Draw **six** more lines.

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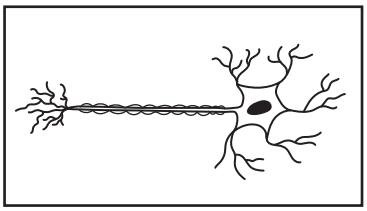
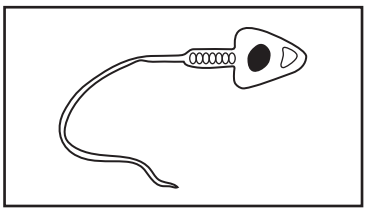
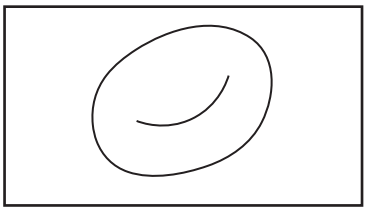
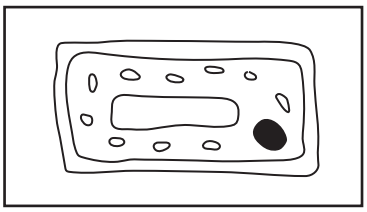
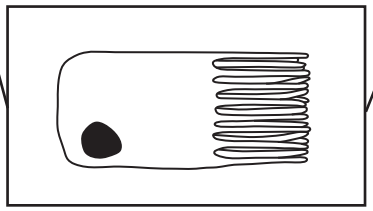
specialised cell names	specialised cell diagrams	functions
ciliated cell		absorption of mineral ions
nerve cell		conduction of impulses
red blood cell		movement of mucus in the trachea
sperm cell		sexual reproduction
		transport of oxygen

Fig. 7.2

[6]

[Total: 9]

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8 **(a)** **(i)** State the type of pathogen that can be treated with antibiotics.

..... [1]

(ii) State the **name** of the pathogen that can lead to AIDS. View solution

..... [1]

(b) Many pathogens have developed resistance to some antibiotics. A study took samples of pathogens and tested them for resistance to various types of antibiotics. Fig. 8.1 shows the percentage of pathogens sampled that were resistant to various antibiotics. The samples were taken between 2000 and 2013.

View solution

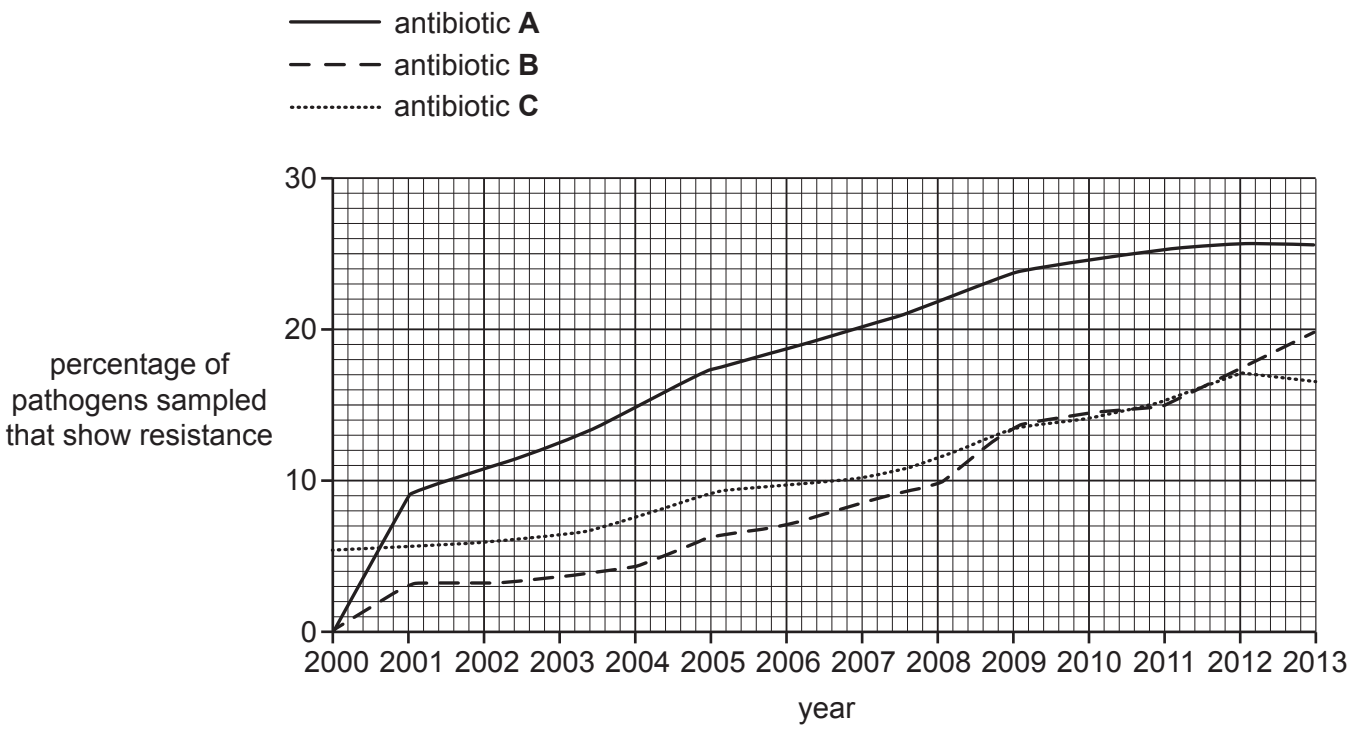


Fig. 8.1

(i) State the meaning of antibiotic resistance.

..... [1]

(ii) Describe the pattern of resistance for the three antibiotics shown in Fig. 8.1. View solution

.....

.....

.....

.....

.....

.....

..... [3]

(c) Some medicinal drugs, such as human insulin, can be made using biotechnology and genetic engineering.

View solution

(i) State where insulin is produced in humans.

..... [1]

View solution

(ii) State the function of insulin in humans.

..... [1]

View solution

(d) **(i)** State why bacteria are useful in biotechnology.

.....

.....

.....

.....

..... [2]

View solution

(ii) Describe the role of yeast in biotechnology.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 13]

9 **(a)** Define inheritance.

.....

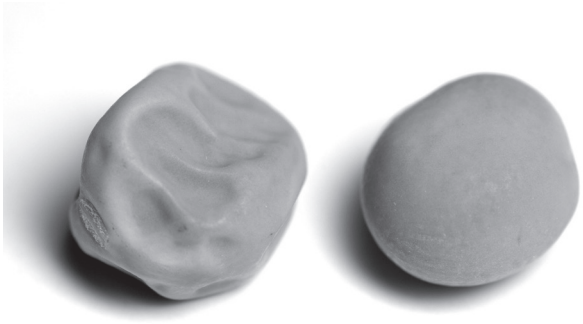
.....

..... [2]

View solution

(b) Some of the characteristics of pea plants are controlled by genes. An example of a characteristic of pea seeds is shown in Fig. 9.1. The allele for a smooth seed coat is dominant and is represented by the letter **R**. The allele for a wrinkled seed coat is recessive and is represented by the letter **r**.

View solution



wrinkled seed coat smooth seed coat

Fig. 9.1

The boxes on the left contain descriptions of genotypes.

The boxes on the right contain examples of the possible genotypes of the pea seeds shown in Fig. 9.1.

Draw a line to link **each** description to the correct genotype.

Draw **two** lines.

description of a genotype	**genotype**
	r
heterozygous genotype	**rr**
homozygous recessive genotype	**Rr**
	RR

[2]

(c) Complete the sentence.

A gene is a length of DNA that codes for a ..... . [1]

[Total: 5]

View solution

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