FOR OFFICIAL USE

Total for Sections B and C

X007/301

NATIONAL QUALIFICATIONS 2005

WEDNESDAY, 18 MAY
1.00 PM – 3.30 PM

BIOLOGY HIGHER

Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Date of birth
Day Month Year

Scottish candidate number

Number of seat

SECTION A—Questions 1–30 (30 marks)

Instructions for completion of Section A are given on page two.

SECTIONS B AND C (100 marks)

1 (a) All questions should be attempted.
(b) It should be noted that in **Section C** questions 1 and 2 each contain a choice.

2 The questions may be answered in any order but all answers are to be written in the spaces provided in this answer book, and must be written clearly and legibly in ink.

3 Additional space for answers and rough work will be found at the end of the book. If further space is required, supplementary sheets may be obtained from the invigilator and should be inserted inside the **front** cover of this book.

4 The numbers of questions must be clearly inserted with any answers written in the additional space.

5 Rough work, if any should be necessary, should be written in this book and then scored through when the fair copy has been written. If further space is required a supplementary sheet for rough work may be obtained from the invigilator.

6 Before leaving the examination room you must give this book to the invigilator. If you do not, you may lose all the marks for this paper.

LIB X007/301 6/3/13320

Read carefully

1 Check that the answer sheet provided is for **Biology Higher (Section A)**.

2 Check that the answer sheet you have been given has **your name**, **date of birth**, **SCN** (Scottish Candidate Number) and **Centre Name** printed on it.

Do not change any of these details.

3 If any of this information is wrong, tell the Invigilator immediately.

4 If this information is correct, **print** your name and seat number in the boxes provided.

5 Use **black** or **blue ink** for your answers. **Do not use red ink.**

6 The answer to each question is **either** A, B, C or D. Decide what your answer is, then put a horizontal line in the space provided (see sample question below).

7 There is **only one correct** answer to each question.

8 Any rough working should be done on the question paper or the rough working sheet, **not** on your answer sheet.

9 At the end of the exam, put the **answer sheet for Section A inside the front cover of this answer book.**

Sample Question

The apparatus used to determine the energy stored in a foodstuff is a

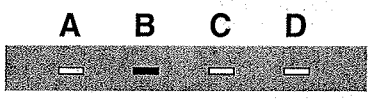
A respirometer

B calorimeter

C klinostat

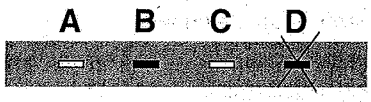
D gas burette

The correct answer is **B**—calorimeter. The answer **B** has been clearly marked with a horizontal line (see below).

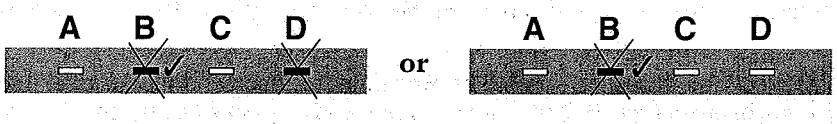


Changing an answer

If you decide to change your answer, cancel your first answer by putting a cross through it (see below) and fill in the answer you want. The answer below has been changed to **B**.



If you then decide to change back to an answer you have already scored out, put a tick (✓) to the **right** of the answer you want, as shown below:



SECTION A

All questions in this section should be attempted.

Answers should be given on the separate answer sheet provided.

1. When a red blood cell is immersed in a hypertonic solution it will

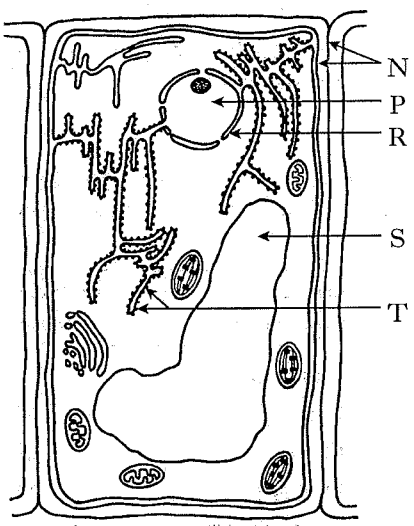
   A shrink

   B become flaccid

   C burst

   D become turgid.

2. The diagram below represents some of the structures present in a plant cell.



   Which line in the table matches the structures with the materials of which they are mainly composed?

	Materials	
	protein and phospholipid	*nucleic acid and protein*
A	R	P
B	R	S
C	T	R
D	R	N

3. Which of the following is a structural carbohydrate?

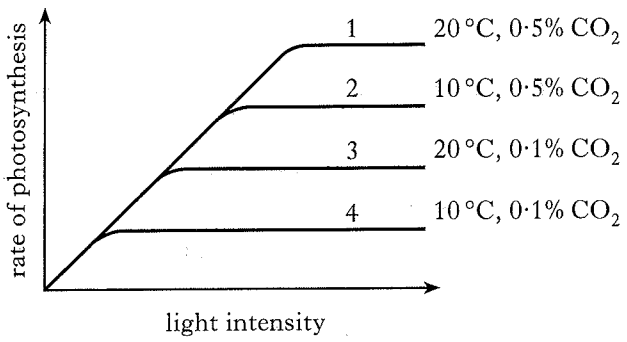
   A Glucose

   B Starch

   C Glycogen

   D Cellulose

4. The graph illustrates the effects of light intensity, temperature and carbon dioxide (CO_2) concentration on the rate of photosynthesis.



   Which of the following pairs of lines in the graph suggest that carbon dioxide is acting as a limiting factor?

   A 2 and 4

   B 2 and 3

   C 1 and 4

   D 1 and 2

5. Which of the following elements is essential to the formation of chlorophyll?

   A Potassium

   B Magnesium

   C Copper

   D Calcium

6. Which of the following is composed of protein?

   A Nucleotide

   B Glycogen

   C Antibody

   D Polysaccharide

[Turn over

7. How many adenine molecules are present in a DNA molecule of 2000 bases, if 20% of the base molecules are cytosine?

A 200

B 300

C 400

D 600

8. Which of the following statements is true of all viruses?

A They have a protein-lipid coat and contain DNA.

B They have a protein-lipid coat and contain RNA.

C They have a protein coat and a nucleus.

D They have a protein coat and contain nucleic acid.

9. The genes of viruses are composed of

A either DNA or RNA

B DNA only

C RNA only

D enzymes and nucleic acids.

10. In infertility clinics, samples of semen are collected for testing.

The table below refers to the analysis of semen samples taken from five men.

Semen sample	*1*	*2*	*3*	*4*	*5*
Number of sperm in sample (millions/cm^3)	40	19	25	45	90
Active sperm (percent)	65	60	75	10	70
Abnormal sperm (percent)	30	20	90	30	10

A man is fertile if his semen contains at least 20 million sperm cells/cm^3 and at least 60% of the sperm cells are active and at least 60% of the sperm cells are normal.

The semen samples that were taken from infertile men are

A samples 3 and 4 only

B samples 2 and 4 only

C samples 2, 3 and 4 only

D samples 1, 2, 4 and 5 only.

11. Alleles can be described as

A opposite types of gamete

B different versions of a gene

C identical chromatids

D non-homologous chromosomes.

12. Which of the following defines linkage?

A Genes which are transferred from one chromosome pair to another

B Genes which are present on the same chromosome

C Genes which are transferred from one chromosome to its partner

D Genes which are present on different chromosomes

13. The table below shows the recombination frequency between genes on a chromosome.

Crossing over between genes	*Recombination frequency*
F and G	4%
F and J	6%
G and H	6%
H and J	4%

Use the information in the table to work out the order of genes on the chromosome.

The order of the genes is

A H G F J

B F G H J

C F G J H

D G H F J.

14. In *Drosophila*, white eye colour is a sex-linked recessive character. If a homozygous white-eyed female is crossed with a red-eyed male, what will be the phenotype of the first generation?

A All females will be white-eyed and all males red-eyed.

B All females will be red-eyed and all males white-eyed.

C All females will be red-eyed and 1 in 2 males will be white-eyed.

D 1 in 4 will be white-eyed irrespective of sex.

15. Which of the following may result in the presence of an extra chromosome in the cells of a human being?

A Non-disjunction

B Crossing over

C Segregation

D Inversion

16. Which of the following is an example of the result of natural selection?

A Modern varieties of potato have been produced from wild varieties.

B Ayrshire cows have been selected through breeding for milk production.

C Bacterial species have developed resistance to antibiotics.

D Varieties of tomato plants have resistance to fungal diseases through somatic fusion.

17. The dark variety of the peppered moth became common in industrial areas of Britain following the increase in the production of soot during the Industrial Revolution.

The increase in the dark form was due to

A dark moths migrating to areas which gave the best camouflage

B a change in the prey species taken by birds

C an increase in the mutation rate

D a change in selection pressure.

18. Which of the following is true of the kidneys of a salt-water bony fish?

A They have few large glomeruli.

B They have few small glomeruli.

C They have many large glomeruli.

D They have many small glomeruli.

19. The Soft Brome Grass and Long Beaked Storksbill are species of plant which grow on the grasslands of California. The Storksbill is a low-growing plant with a more extensive root system than the Soft Brome, but does not grow as tall as the Soft Brome.

Under which of the following conditions would the Storksbill become the more abundant species?

A Drought

B High soil moisture levels

C High light intensity

D Shade

20. Which of the following best describes habituation?

A The same escape response is performed repeatedly.

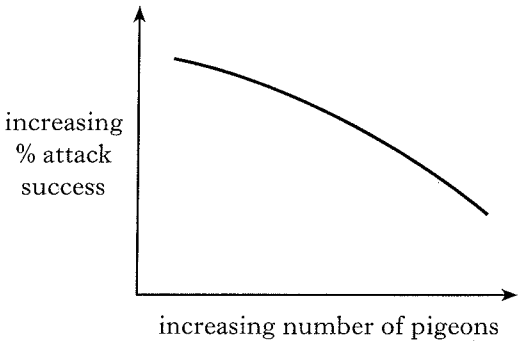
B The same response is always given to the same stimulus.

C A harmless stimulus ceases to produce a response.

D Behaviour is reinforced by regular repetition.

[Turn over

21. Hawks are predators which attack flocks of pigeons. The graph below shows how attack success by a hawk varies with the number of pigeons in a flock.



Which of the following statements could explain the observations shown in the graph?

A A hawk only needs to eat a small percentage of a large flock of prey.

B Co-operative hunting is more effective with small numbers of prey.

C A predator can be more selective when prey numbers increase.

D A hawk has difficulty focussing on one pigeon in a large flock.

22. Root tips are widely used for the study of mitosis because

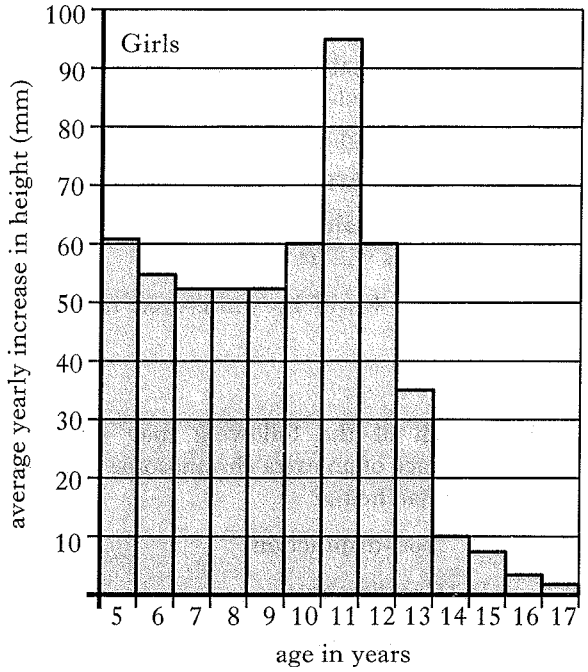
A the cells are larger than other cells

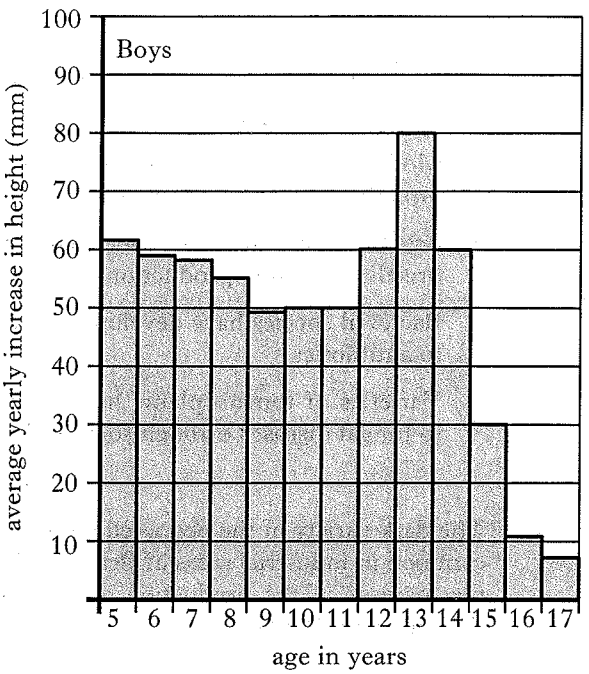
B they contain many meristematic cells

C their nuclei have large chromosomes

D their nuclei stain easily.

23. The graphs below show the average yearly increase in height of girls and boys.





Which of the following statements is correct?

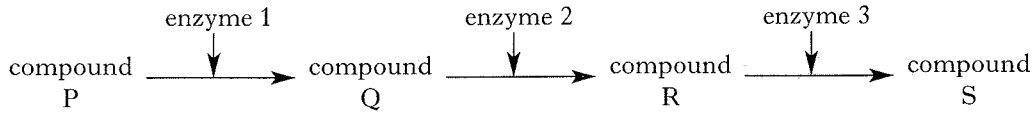
A The greatest average yearly increase for boys occurs one year later than the greatest average yearly increase for girls.

B Boys are still growing at seventeen but girls have stopped growing by this age.

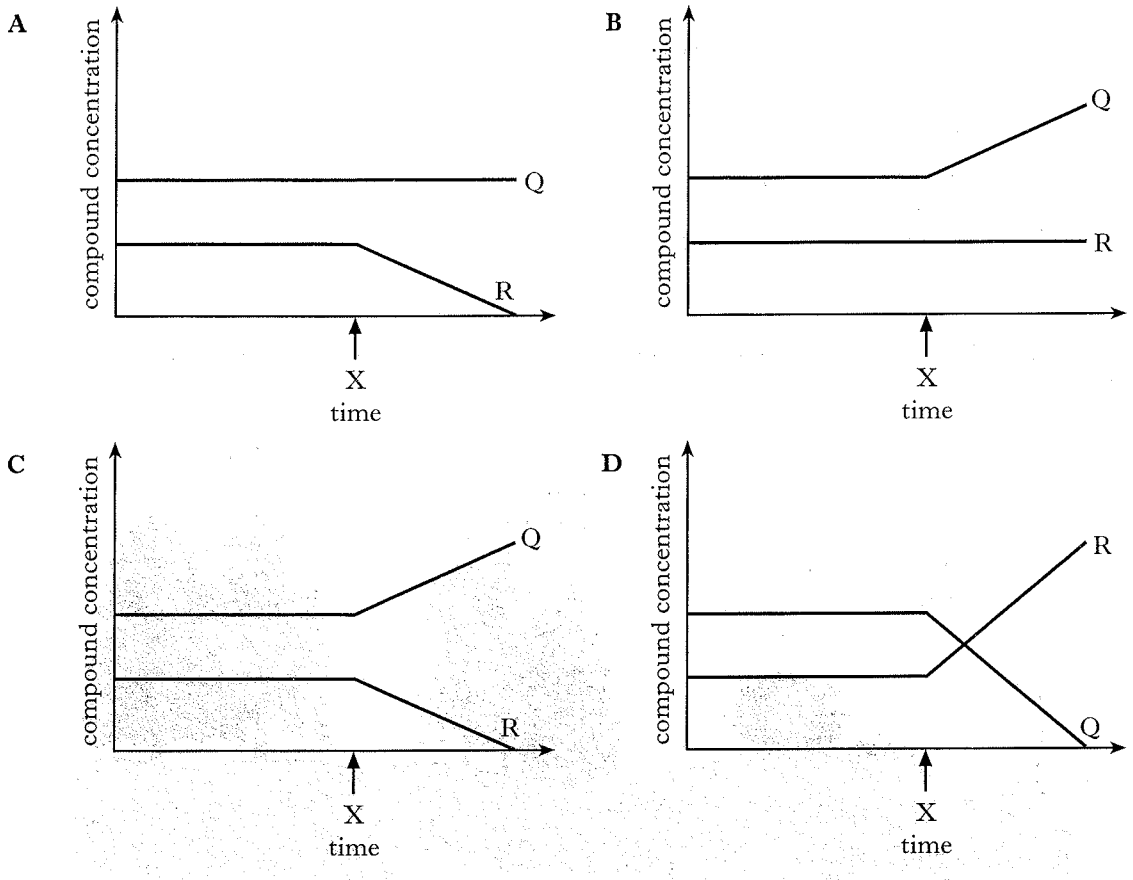
C Between the ages of five and eight boys grow more than girls.

D There is no age when boys and girls show the same average yearly increase in height.

24. The following diagram shows an enzyme-controlled metabolic pathway.



If enzyme 2 is inactivated (eg by adding an inhibitor) at time X shown in the graphs below, which graph predicts correctly the final concentration of compounds Q and R?



25. The table shows the results of an experiment carried out to study the effects of a plant growth substance on the roots of tomato plants.

Concentration of growth substance		*Control* 0 mg/litre	10^{-1} mg/litre
Average length of 20 roots	Before treatment	16 mm	16 mm
	After treatment	24 mm	20 mm

Which of the following states the effect of the plant growth substance on the lengths of the roots compared to the control treatment?

A 25 percent stimulation

B 50 percent stimulation

C 25 percent inhibition

D 50 percent inhibition

26. A short day plant is one which

A will flower only if the night length is less than the critical value

B will flower only if daylight is less than 12 hours

C will flower only if the hours of daylight are less than a critical value

D flowers only if the hours of daylight are more than a critical value.

27. A plant becomes etiolated when it

A grows in poor soil

B grows in the dark

C is treated with gibberellin

D has the apical bud removed.

28. If the concentration of glucose in the blood of a healthy man or woman rises above normal, the pancreas produces

A more insulin but less glucagon

B more insulin and more glucagon

C less insulin but more glucagon

D less insulin and less glucagon.

29. If body temperature drops below normal, which of the following would result?

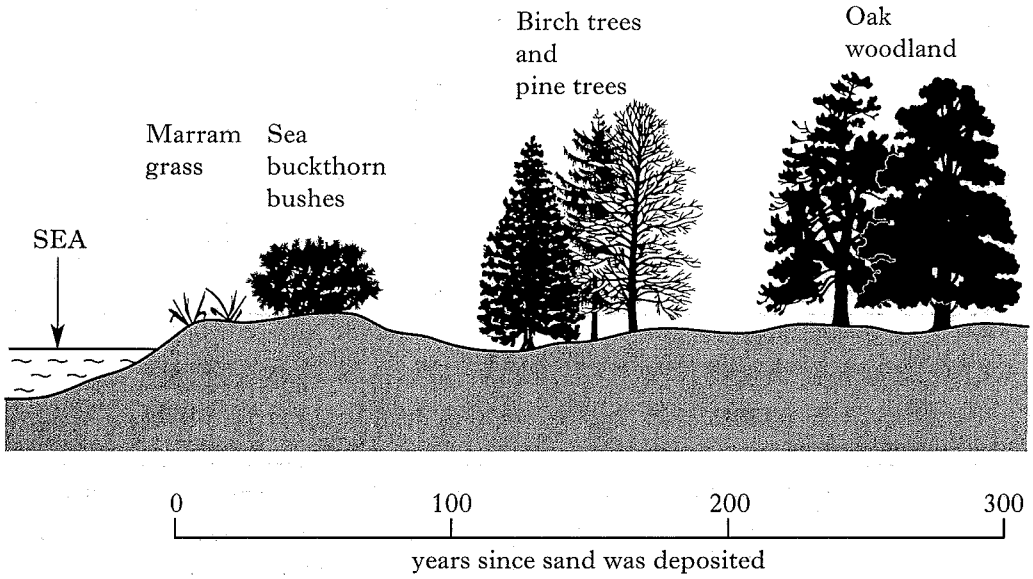
A Vasodilation of skin capillaries

B Vasoconstriction of skin capillaries

C Decreased metabolic rate

D Increased sweating

30. The diagram below represents a sandy coastal area. The sand deposits support various communities of plants.



What term is used to describe the sequence of communities shown?

A Colonisation

B Climax

C Progression

D Succession

Candidates are reminded that the answer sheet MUST be returned INSIDE the front cover of this answer book.

[Turn over for Section B on *Page ten*

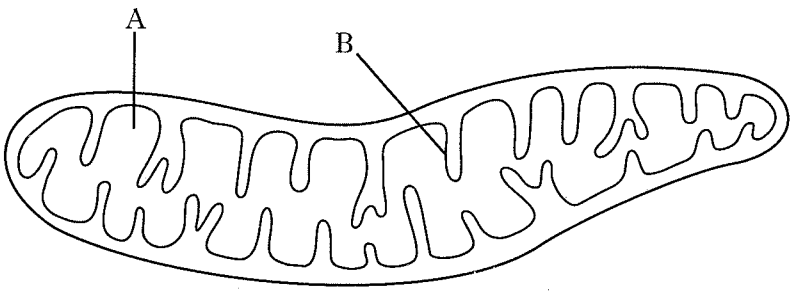
DO NOT WRITE IN THIS MARGIN

Marks

SECTION B

All questions in this section should be attempted.

1. The diagram shows a mitochondrion from a human muscle cell.



(*a*) Name regions A and B.

A _____

B _____ **1**

(*b*) The table shows some substances involved in respiration.

(i) Complete the table by inserting the number of carbon atoms present in each substance.

Substance	*Number of carbon atoms present*
Pyruvic acid	
Acetyl group	
Citric acid	

2

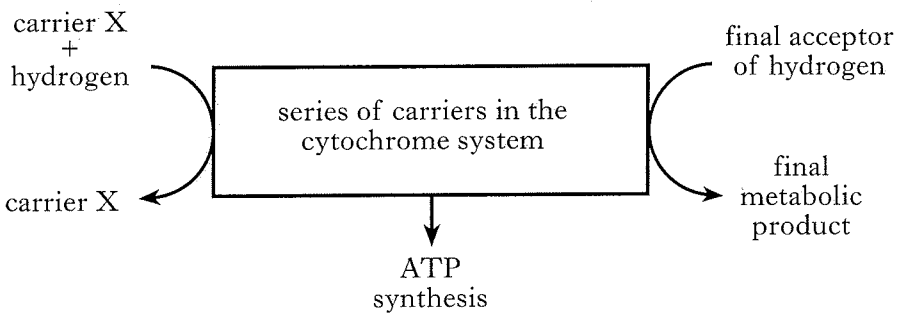
(ii) To which substance is the acetyl group attached before it enters the citric acid cycle?

_____ **1**

Marks

1. (continued)

(*c*) In region B, hydrogen is passed through a series of carriers in the cytochrome system as shown in the diagram below.



(i) Name carrier X.

_____ **1**

(ii) Name the final acceptor of hydrogen.

_____ **1**

(iii) Describe the importance of ATP in cells.

_____

_____ **1**

(iv) The quantity of ATP present in the human body remains relatively constant yet ATP is continually being broken down.

Suggest an explanation for this observation.

_____

_____

_____ **1**

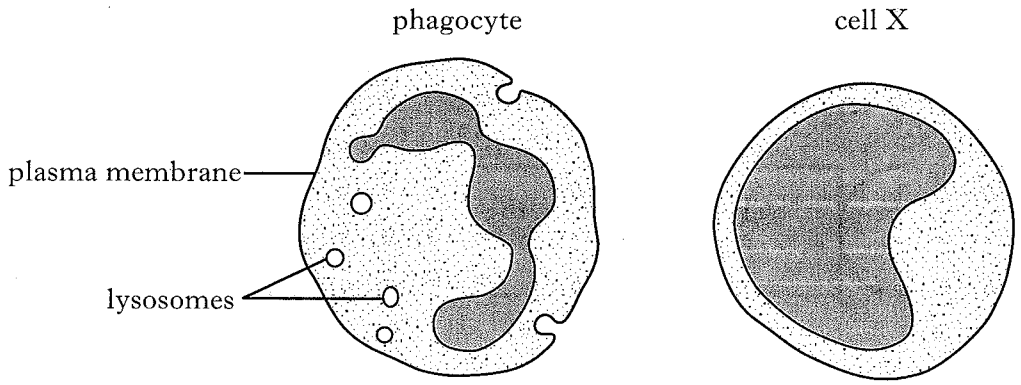
(*d*) Name the final metabolic product of **anaerobic** respiration in a muscle cell.

_____ **1**

[Turn over

Marks

2. The diagram shows two different types of blood cell involved in the defence of the human body.



(*a*) Describe how the plasma membrane and the lysosomes of phagocytes are involved in helping to destroy bacteria.

(i) plasma membrane _____

_____ **1**

(ii) lysosomes _____

_____ **1**

(*b*) (i) Name cell X.

_____ **1**

(ii) Explain how cell X may be involved in tissue rejection following a transplant operation.

_____

_____

_____ **1**

(iii) What treatment is given to prevent tissue rejection?

_____ **1**

Marks

3. In Dachshund dogs, the genes for hair texture and hair length are located on different chromosomes.

The allele for wire hair (**A**) is dominant to the allele for smooth hair (**a**).
The allele for short hair (**B**) is dominant to the allele for long hair (**b**).

Wire hair is **always** short so dogs with allele **A** are **always** short haired.

Two Dachshunds with the genotype **AaBb** were crossed.

(*a*) State the phenotype of the parents in this cross.

_____ **1**

(*b*) The grid shows all the genotypes of the offspring that may arise from this cross.

Complete the grid by adding the genotypes of the male and female gametes.

Male gametes

Female gametes				
	1 **AABB**	**AABb**	**AaBB**	**AaBb**
	AABb	2 **AAbb**	**AaBb**	**Aabb**
	AaBB	**AaBb**	3 **aaBB**	**aaBb**
	AaBb	**Aabb**	**aaBb**	4 **aabb**

1

(*c*) Complete the table below to give the phenotypes of the offspring indicated by the shaded boxes numbered 1 to 4 on the grid.

Box	*Phenotype*
1	
2	
3	
4	

2

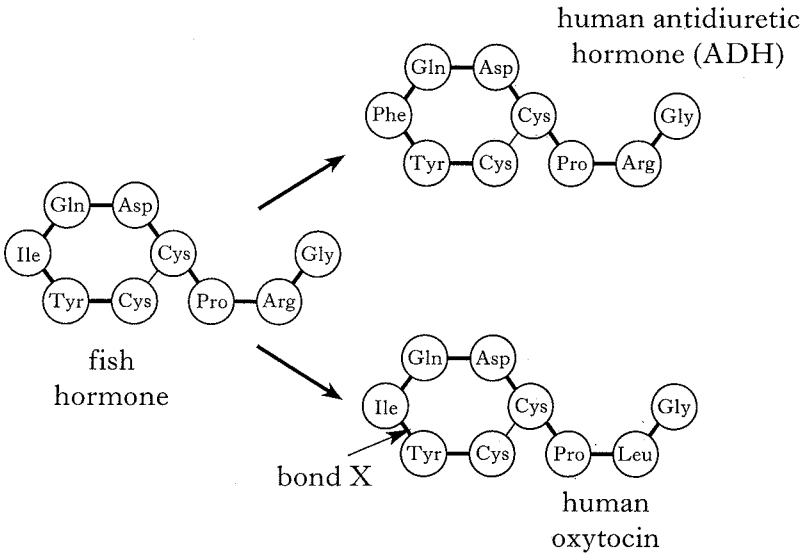
(*d*) From the grid, calculate the expected ratio of the phenotypes of **all** the offspring from this cross.

Space for working

_____ wire short hair : _____ smooth short hair : _____ smooth long hair **1**

Marks

4. (*a*) The diagram shows the amino acid sequences of a fish hormone and two human hormones which may have evolved from it.



Amino acid key

Arg	arginine
Asp	aspartic acid
Cys	cysteine
Gln	glutamine
Gly	glycine
Ile	isoleucine
Leu	leucine
Phe	phenylalanine
Pro	proline
Tyr	tyrosine

(i) Name the type of bond represented by X.

_____ **1**

(ii) In the evolution of human oxytocin from the fish hormone, a gene mutation resulted in the amino acid arginine being replaced by leucine.

The table shows four of the mRNA codons for the amino acids arginine and leucine.

Codons for arginine	*Codons for leucine*
CGU	CUU
CGC	CUC
CGA	CUA
CGG	CUG

Name the type of gene mutation that occurred and justify your answer.

Type of gene mutation _____ **1**

Justification _____

_____ **1**

(iii) Describe the change in protein structure that occurred in the evolution of human antidiuretic hormone (ADH) from the fish hormone.

_____

_____ **1**

Marks

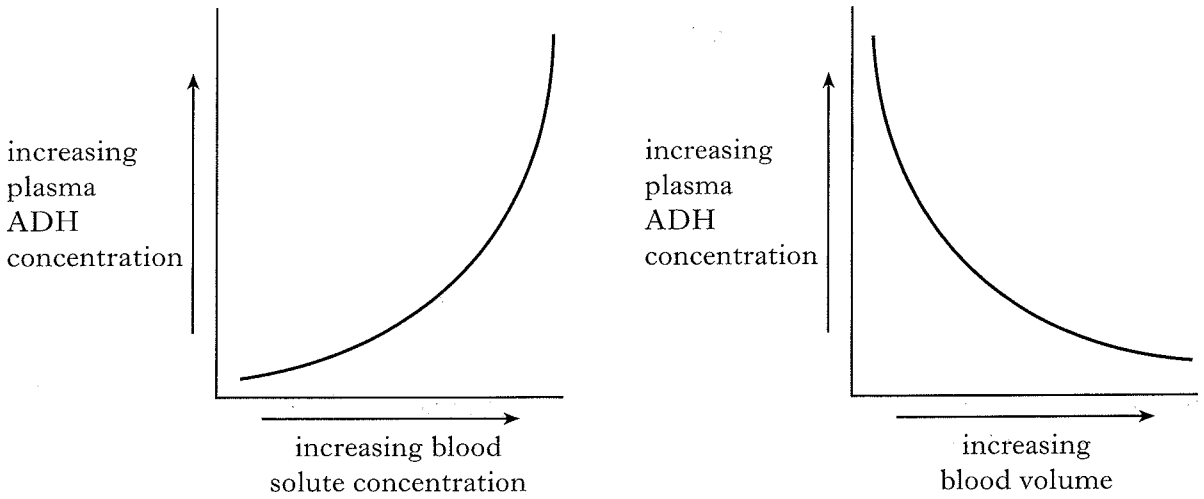
4. (continued)

(*b*) Antidiuretic hormone (ADH) is involved in osmoregulation in humans.

(i) Name the gland that releases ADH.

_____ **1**

(ii) The graphs show the effects of increasing blood solute concentration and increasing blood volume on the plasma ADH concentration.



Use the information in the graphs to complete the table by using the terms "increases", "decreases" or "stays the same" to show the effect of various activities on the plasma ADH concentration.

Each term may be used **once**, **more than once** or **not at all**.

Activity	*Effect on plasma ADH concentration*
Drinking fresh water	
Sweating	
Eating salty food	
Severe bleeding	

2

(iii) Describe the effect that an increase in plasma ADH concentration has on the activity of kidney tubules.

_____

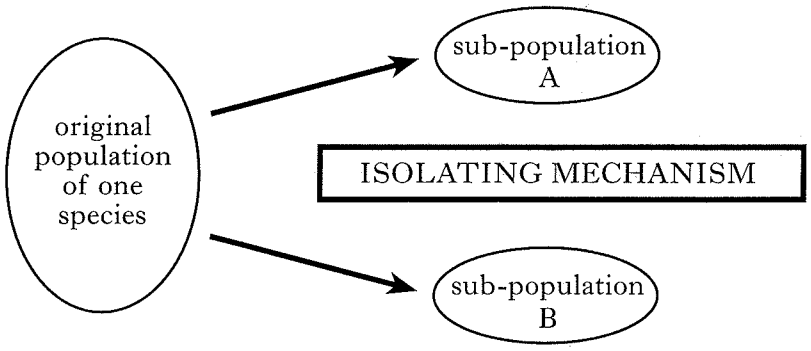
_____ **1**

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks

5. The diagram shows how an isolating mechanism can divide a population of one species into two sub-populations and then act as a barrier to prevent gene exchange between them.



(*a*) Name **one** type of isolation that could prevent gene exchange between the two sub-populations.

_____ **1**

(*b*) Over a long period of time, the gene pools of sub-populations A and B become different from each other.

(i) Explain how mutations and natural selection account for the differences.

1. Mutations _____

_____

_____ **1**

2. Natural selection _____

_____

_____

_____ **2**

(ii) Eventually, sub-populations A and B may become two different species. What evidence would confirm that this had happened?

_____

_____ **1**

DO NOT WRITE IN THIS MARGIN

Marks

6. The list below contains terms related to genetic engineering and somatic fusion.

List of terms:

cellulase
gene probe
ligase
plasmid
protoplast
restriction endonuclease.

(*a*) Complete the table to match **each** of the following descriptions to the correct term from the above list.

Description	*Term*
Contains bacterial genes	
Cuts DNA into fragments	
Locates specific genes	
Removes plant cell walls	

2

(*b*) State the problem in plant breeding that is overcome by using the technique of somatic fusion.

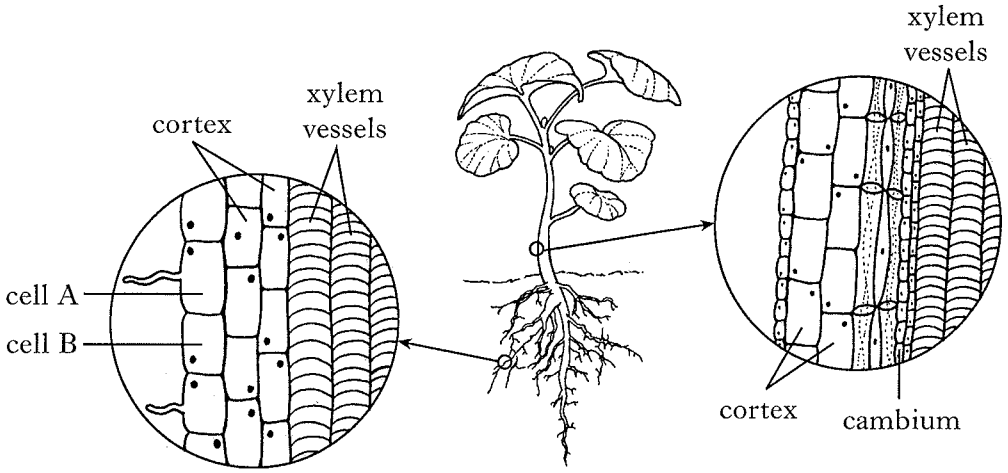
_____

1

[Turn over

Marks

7. (*a*) The diagram represents a plant with two regions magnified to show tissues involved in transport.



(i) Describe the process by which water moves into cell A.

_____

_____

_____ **1**

(ii) Cells A and B have a similar function.
Explain how the structure of cell A makes it better adapted to its function than cell B.

_____

_____

_____ **1**

(iii) Name the force that holds water molecules together as they travel up the xylem vessels.

_____ **1**

(iv) Cell division in the cambium produces new cells which then elongate and develop vacuoles.

Describe **two** further changes that take place in these cells as they differentiate into xylem vessels.

1 _____

_____ **1**

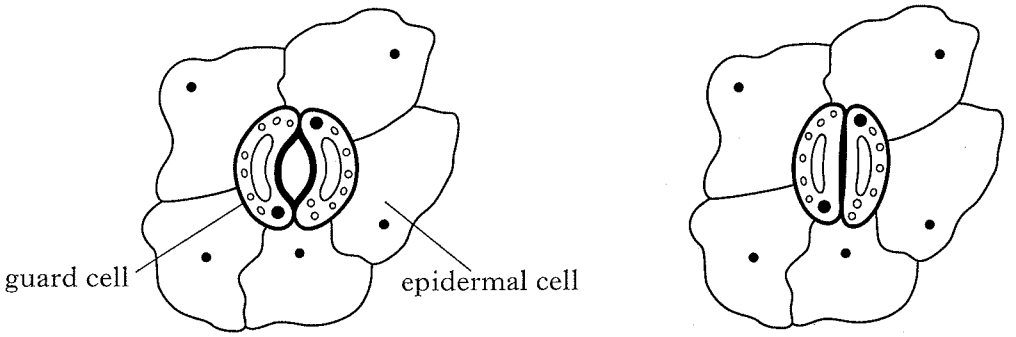
2 _____

_____ **1**

Marks

7. (continued)

(*b*) The diagrams show stomata in the lower epidermis of a leaf.



open stoma *closed stoma*

(i) In the following sentence, **underline** one of the alternatives in each pair to make the sentence correct.

Stomata close when water moves { into / out of } the guard cells and they become { more / less } turgid. 1

(ii) What is the advantage to plants in having their stomata closed at night?

_____ 1

(*c*) The grid shows factors affecting the rate of transpiration from leaves.

A increased temperature	**B** increased wind speed	**C** increased humidity
D decreased temperature	**E** decreased wind speed	**F** decreased humidity

(i) Which **three** letters indicate the changes that would result in a decrease in the rate of transpiration?

Letters _____ , _____ and _____. 1

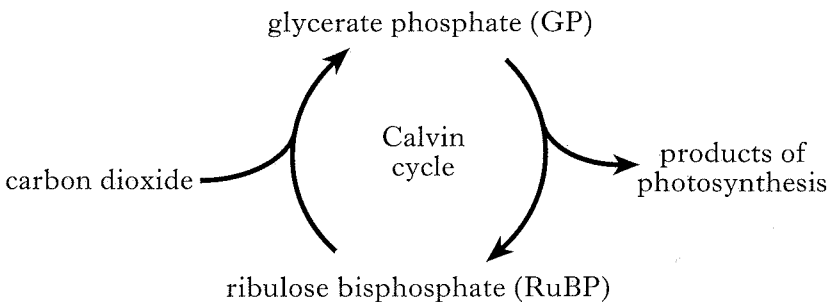
(ii) The transpiration stream supplies plant cells with water for photosynthesis.

Give **one** other benefit to plants of the transpiration stream.

_____ 1

8. **Figure 1** shows how glycerate phosphate (GP) and ribulose bisphosphate (RuBP) are involved in the Calvin cycle.

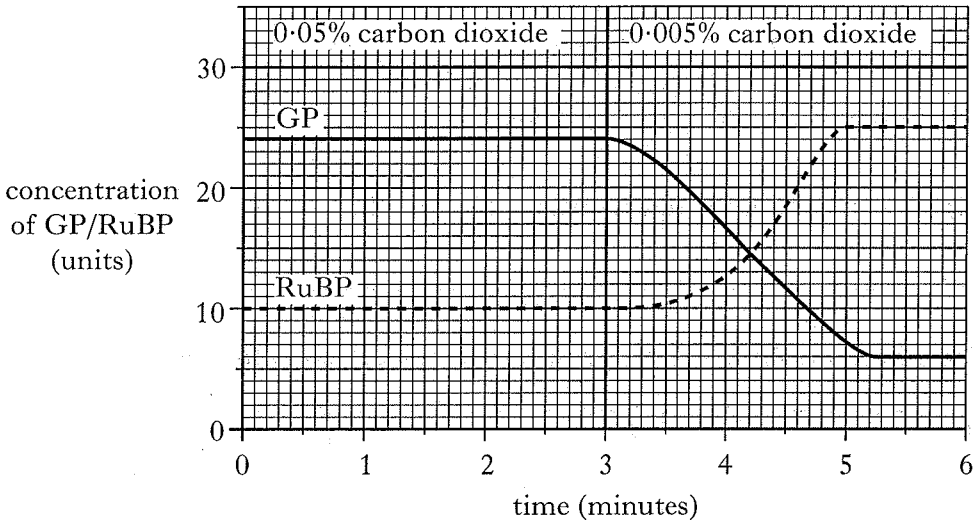
Figure 1



An investigation of the Calvin cycle was carried out in *Chlorella*, a unicellular alga.

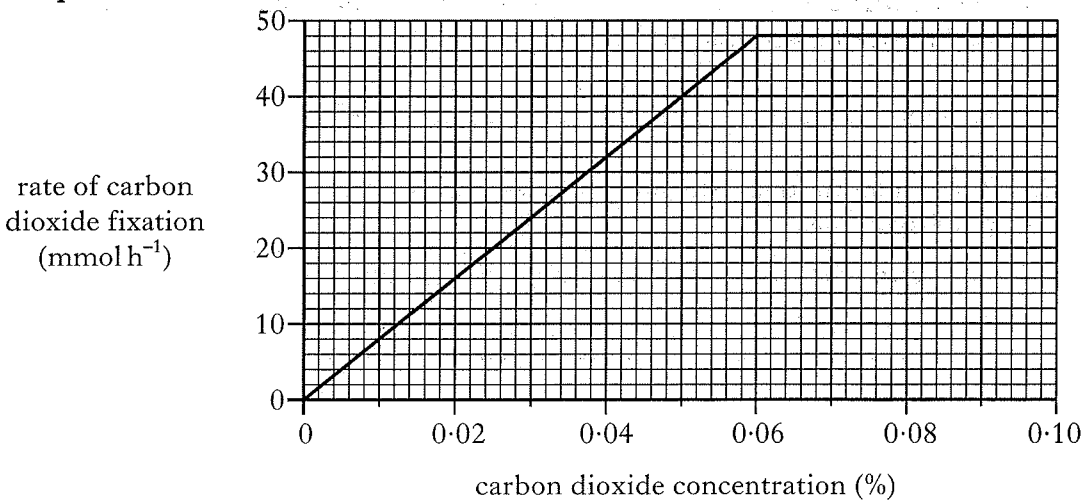
Graph 1 shows the concentrations of GP and RuBP in *Chlorella* cells kept in an illuminated flask at 15 °C. The concentration of carbon dioxide in the flask was 0·05% for the first three minutes, then it was reduced to 0·005%.

Graph 1



Graph 2 shows the rate of carbon dioxide fixation by *Chlorella* cells at various carbon dioxide concentrations.

Graph 2



8. (continued) *Marks*

(*a*) (i) Use values from **Graph 1** to describe the changes in the RuBP concentration over the first six minutes.

_____

_____

_____ 2

(ii) Use the information in **Figure 1** to explain the increase in RuBP concentration shown in **Graph 1** when the carbon dioxide concentration is decreased.

_____

_____

_____ 2

(*b*) From **Graph 1**, calculate the percentage decrease in the concentration of GP from three to six minutes.

Space for calculation

_____ % 1

(*c*) Use the terms "increase", "decrease" or "stay the same" to complete the sentence below. Each term may be used **once**, **more than once** or **not at all**.

If the carbon dioxide concentration was returned to 0·05% at 6 minutes, the concentration of RuBP would _____ and the concentration of GP would _____. 1

(*d*) From **Graph 2**, state the rate of carbon dioxide fixation by *Chlorella* at a carbon dioxide concentration of 0·01%.

_____ $mmol\,h^{-1}$ 1

(*e*) How many times greater is the rate of carbon dioxide fixation from 0 to 3 minutes compared with 3 to 6 minutes?

Space for calculation

_____ times 1

DO NOT WRITE IN THIS MARGIN

Marks

9. African wild dogs are social animals that hunt in packs. They rely on stamina to catch grazing prey such as wildebeest.

The table shows the effect of wildebeest age on the average duration of successful chases and the percentage hunting success.

Wildebeest age	*Stage*	*Average duration of successful chases* (s)	*Hunting success* (%)
up to 1 year	calves	20	75
from 1 – 2 years	juveniles	120	50
over 2 years	adults	180	45

(*a*) Describe the effect of wildebeest age on the average duration of successful chases.

_____

_____ **1**

(*b*) How many times longer does it take the wild dogs on average to successfully hunt adult wildebeest rather than calves?

Space for working

_____ times **1**

(*c*) Suggest a reason why hunting success is greatest with calves.

_____

_____ **1**

(*d*) Wild dogs kill a greater number of adult wildebeest than calves.

Explain this observation in terms of the economics of foraging behaviour.

_____

_____

_____ **1**

(*e*) State an advantage of cooperative hunting to the wild dogs.

_____ **1**

(*f*) Following a successful hunt, wild dogs may be displaced from their kill by spotted hyenas. What type of competition does this show?

_____ **1**

Marks

10. (*a*) Fulmars and Common Terns are seabirds that breed in large social groups.

The table compares features of breeding in these birds.

Feature of breeding	*Fulmar*	*Common Tern*
nest distribution and location	crowded on cliff ledges	scattered on pebble beaches
egg number and colour	single white egg	three speckled eggs
chick behaviour	remains in nest until able to fly	can move short distances from nest soon after hatching

(i) Use information in the table to explain why Fulmars are less vulnerable to predation than Common Terns.

_____

_____

_____ **1**

(ii) Suggest how features of Common Tern eggs and chicks may increase their survival chances.

1 Eggs _____

_____

_____ **1**

2 Chicks _____

_____

_____ **1**

(*b*) Explain how living in large social groups may help animals in defence against predators.

_____

_____

_____ **1**

[Turn over

Marks

11. An investigation was carried out into the effect of lead ethanoate and calcium ethanoate on the activity of catalase.

Catalase is an enzyme found in yeast cells. It acts on hydrogen peroxide to produce oxygen gas.

The stages in the investigation are outlined below.

1 Three yeast suspensions were made by adding 100 mg of dried yeast to each of the following.

- 25 cm^3 of 0·1 M lead ethanoate solution
- 25 cm^3 of 0·1 M calcium ethanoate solution
- 25 cm^3 of water

2 The suspensions were stirred and left for 15 minutes.

3 Separate syringes were used to add 2 cm^3 of each yeast suspension to 10 cm^3 of hydrogen peroxide in 3 identical containers.

4 The volume of oxygen produced in each container was measured at 10 second intervals.

The results are shown in the table.

Time (s)	*Volume of oxygen produced* (cm^3)		
	yeast suspension + lead ethanoate	*yeast suspension + calcium ethanoate*	*yeast suspension + water*
0	0	0	0
10	6	32	38
20	10	62	56
30	14	74	78
40	15	88	86
50	16	90	88
60	17	90	90

(*a*) Why was it good experimental procedure to leave the yeast suspensions for 15 minutes at stage 2?

_____

_____ **1**

(*b*) Why was a separate syringe used for each yeast suspension at stage 3?

_____

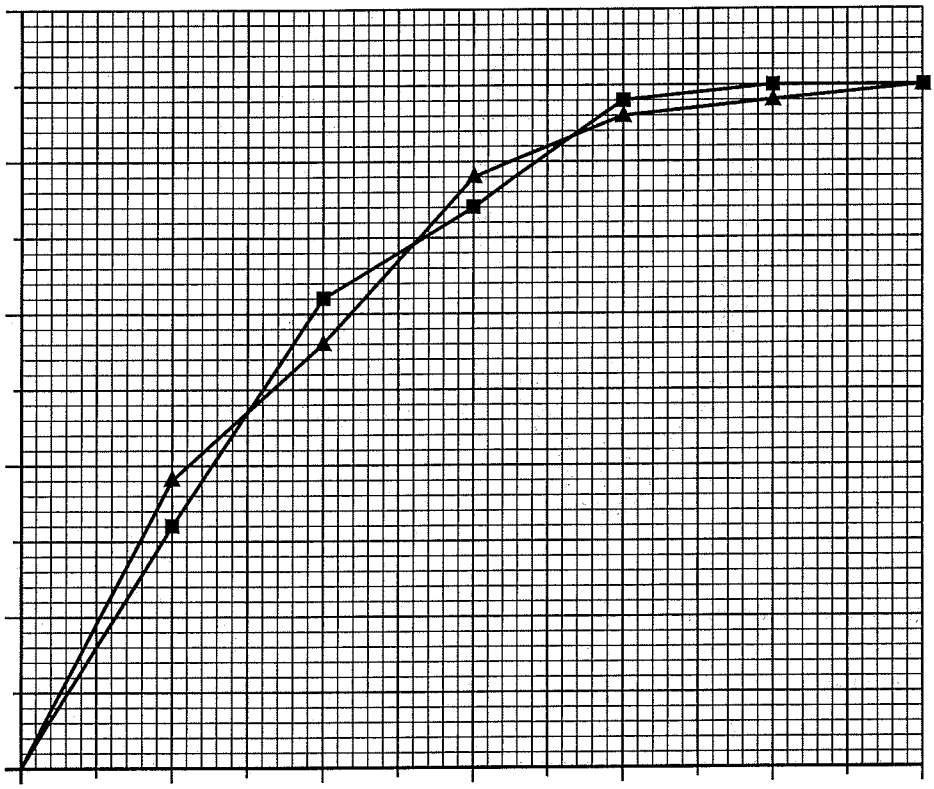
_____ **1**

(*c*) Identify **one** variable, not already described, that should be kept constant.

_____ **1**

11. (continued)

(*d*) The results for the yeast suspensions in 0·1 M calcium ethanoate and in water are shown in the graph.



DO NOT WRITE IN THIS MARGIN

Marks

Use information from the table to complete the graph by:

(i) adding the scale and label to each axis; **1**

(ii) presenting the results for the yeast suspension in 0·1 M lead ethanoate **and** completing the key. **1**

(Additional graph paper, if required, will be found on page 36.)

(*e*) Explain how the yeast suspension in water acts as a control.

_____

_____

_____ **1**

(*f*) Draw **two** conclusions from the results in the table.

1 _____

_____ **1**

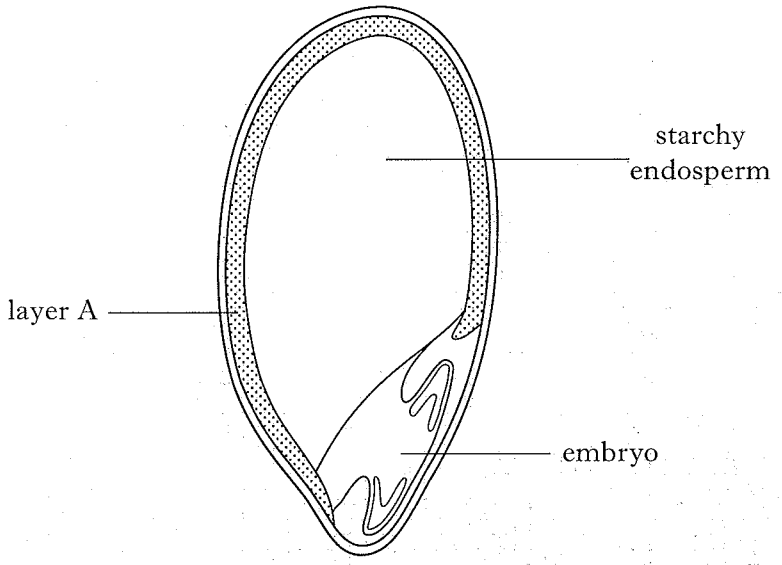
2 _____

_____ **1**

DO NOT WRITE IN THIS MARGIN

Marks

12. (*a*) The diagram shows a section through a barley grain.



Layer A produces α-amylase.

(i) Name layer A.

_____ **1**

(ii) What substance made by the embryo induces α-amylase production?

_____ **1**

(iii) Explain the role of α-amylase in the process of germination.

_____

_____

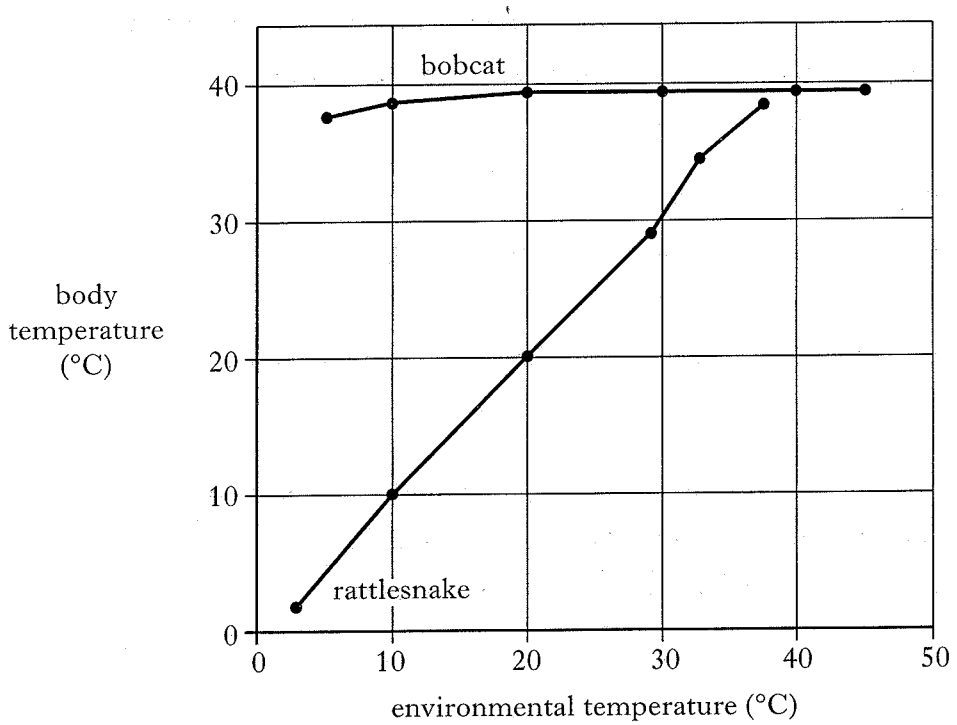
_____ **2**

(*b*) Give **one** practical application of a plant growth substance.

_____ **1**

Marks

13. The graph shows the results of an investigation into the relationship between environmental temperature and body temperature for a bobcat and a rattlesnake.



(*a*) Using information from the graph, **underline** one of the alternatives in each pair to make the sentence correct.

The rattlesnake is an {ectotherm / endotherm} because the results show that it {can / cannot} control its body temperature. **1**

(*b*) Describe a rattlesnake behaviour pattern that is likely to raise its body temperature above the surrounding air temperature.

_____

_____ **1**

(*c*) What evidence from the graph suggests that the bobcat has mechanisms to prevent overheating?

_____

_____ **1**

(*d*) Explain why the bobcat's metabolic rate is greater at 10 °C than at 30 °C.

_____

_____

_____ **2**

DO NOT WRITE IN THIS MARGIN

SECTION C

Marks

Both questions in this section should be attempted.

Note that each question contains a choice.

Questions 1 and 2 should be attempted on the blank pages which follow.

Supplementary sheets, if required, may be obtained from the invigilator.

Labelled diagrams may be used where appropriate.

1. Answer **either** A **or** B.

A. Give an account of populations under the following headings:

(i) the importance of monitoring wild populations; **5**

(ii) the influence of density-dependent factors on population changes. **5**

(10)

OR

B. Give an account of growth and development under the following headings:

(i) the influence of pituitary hormones in humans; **4**

(ii) the effects of Indole Acetic Acid (IAA) in plants. **6**

(10)

In question 2, ONE mark is available for coherence and ONE mark is available for relevance.

2. Answer **either** A **or** B.

A. Give an account of the absorption of light energy by photosynthetic pigments and the light-dependent stage of photosynthesis. **(10)**

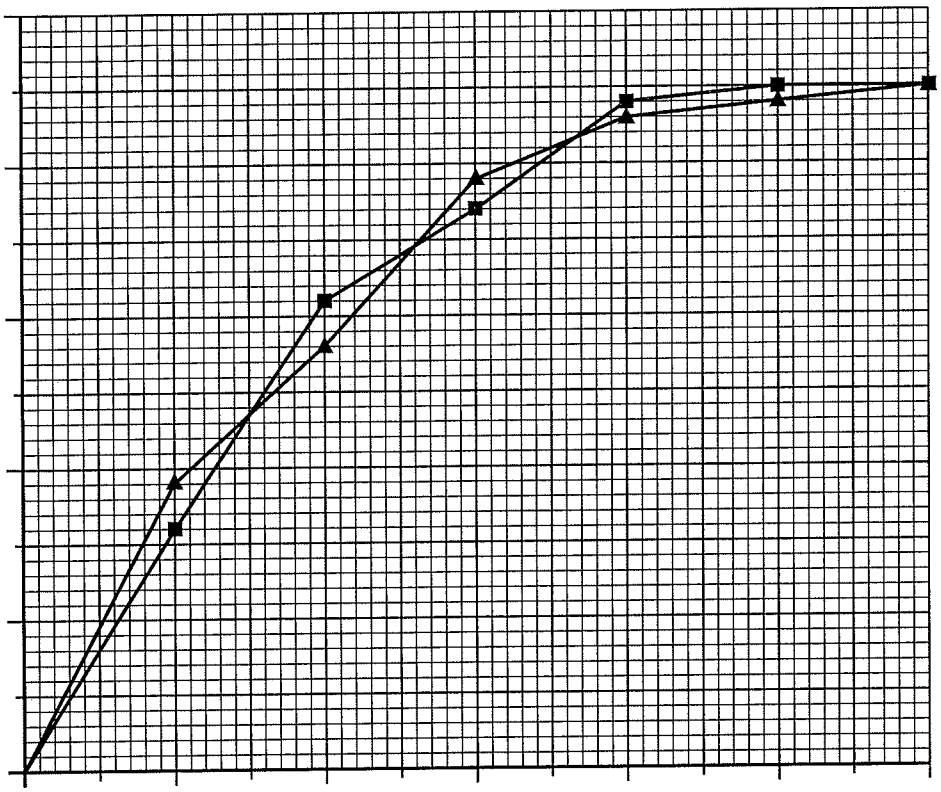
OR

B. Give an account of the structure of RNA and its role in protein synthesis. **(10)**

[END OF QUESTION PAPER]

SPACE FOR ANSWERS

ADDITIONAL GRAPH PAPER FOR QUESTION 11(*d*)



KEY

▲ Yeast suspension in water

■ Yeast suspension in 0·1M calcium ethanoate

X

DO NOT WRITE IN THIS MARGIN

SPACE FOR ANSWERS