

CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

BIOLOGY

5090/01

Paper 1 Multiple Choice

October/November 2003

1 hour

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Write your name, Centre number and candidate number on the answer sheet in the spaces provided unless this has been done for you.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A, B, C, and D**.

Choose the **one** you consider correct and record your choice in **soft pencil** on the separate answer sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.

This document consists of **20** printed pages.



1 Which shows the increasing level of complexity in plants?

	simplest \longrightarrow most complex			
A	cell	chloroplast	organ	tissue
B	cell	tissue	chloroplast	organ
C	chloroplast	cell	tissue	organ
D	chloroplast	organ	tissue	cell

2 Four strips are cut from a fresh potato. The length of each strip is measured. One strip is placed in water, the others in different concentrations of sugar solution.

After an hour, the strips are measured again. The results are shown in the table.

Which liquid is water?

liquid	original length of strip / mm	final length of strip / mm
A	75	75
B	78	85
C	82	80
D	86	87

3 The table shows the concentration of a substance inside and outside four different cells.

Which cell would need the most energy to absorb the substance by active transport?

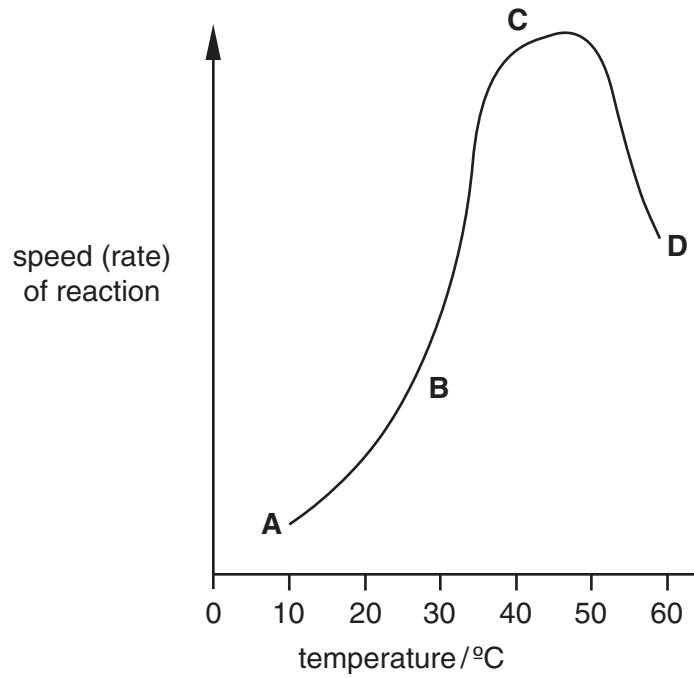
cell	concentration (arbitrary units) inside cell	concentration (arbitrary units) outside cell
A	3	6
B	3	9
C	6	3
D	9	3

4 Which processes can take place in a root hair cell when oxygen is not available?

- A** active transport only
- B** diffusion only
- C** active transport and osmosis
- D** diffusion and osmosis

- 5 The graph shows the effect of temperature on a chemical reaction which is controlled by enzymes.

At which point are most product molecules being released?

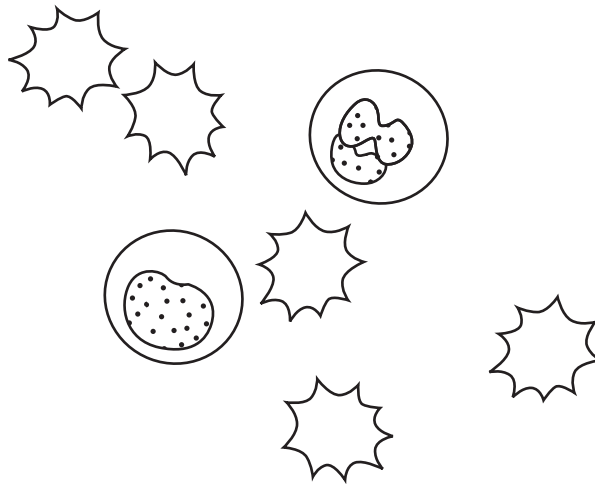


- 6 Starch is digested to maltose by the enzyme amylase.

According to the 'lock and key' hypothesis, which is the 'key' and which is the 'lock'?

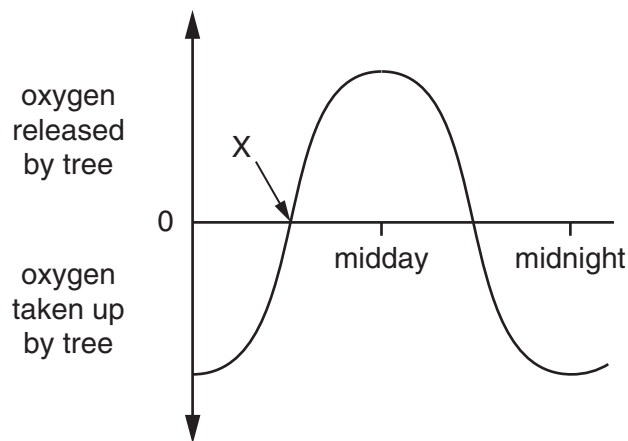
	'key'	'lock'
A	amylase	maltose
B	amylase	starch
C	starch	amylase
D	starch	maltose

- 7 The diagram shows cells in fresh blood, after the blood is diluted with a liquid.



Which statement describes the liquid?

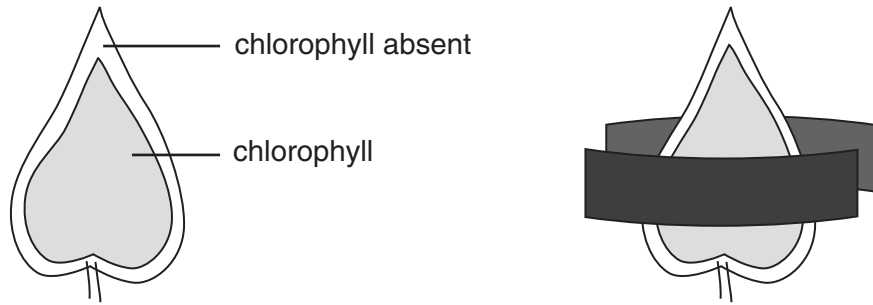
- A The water potential of the liquid is equal to that of pure water.
 - B The water potential of the liquid is equal to that of the cytoplasm.
 - C The water potential of the liquid is higher than that of the cytoplasm.
 - D The water potential of the liquid is lower than that of the cytoplasm.
- 8 The graph shows the oxygen released and taken up by a tree during a 24 hour period.



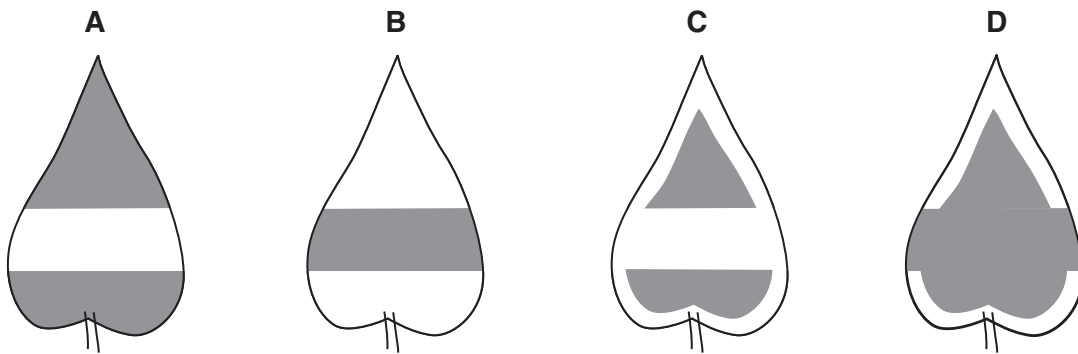
Which statement describes the situation at point X?

- A Respiration begins.
- B Photosynthesis stops.
- C The rate of respiration is equal to the rate of photosynthesis.
- D The rate of respiration is greater than the rate of photosynthesis.

- 9 A variegated plant is destarched. One leaf is then partly covered with a black paper strip on both sides and exposed to light for several hours.



The leaf is then tested for starch. What is the result?



Key



- 10 Sunflower seeds contain a nutrient which is broken down by lipase during germination.

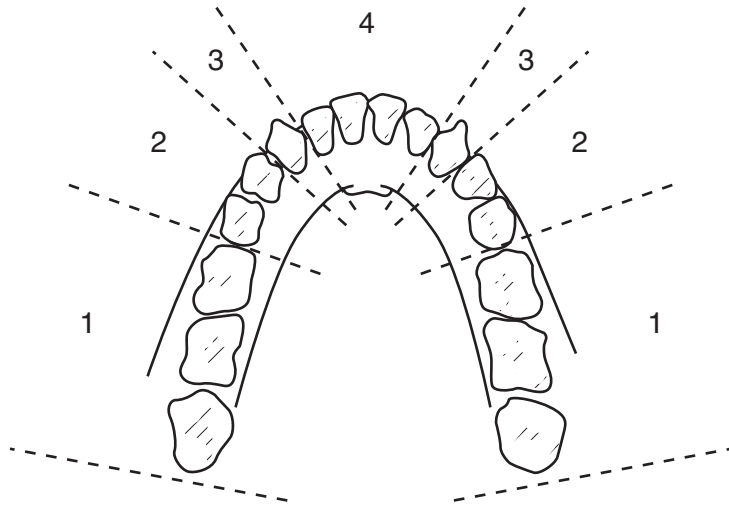
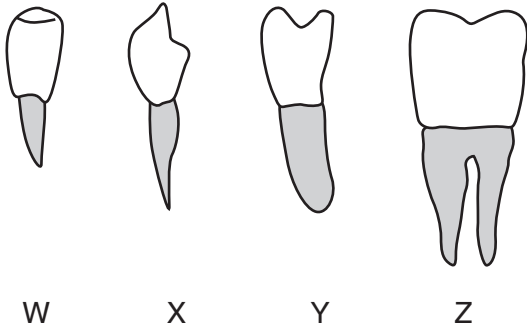
Which test would detect this nutrient?

- A Benedict's test
 - B biuret test
 - C ethanol emulsion test
 - D iodine test
- 11 A person's diet contains more protein than is needed for growth and repair.

This causes increased production of

- A carbon dioxide.
- B hormones.
- C sweat.
- D urea.

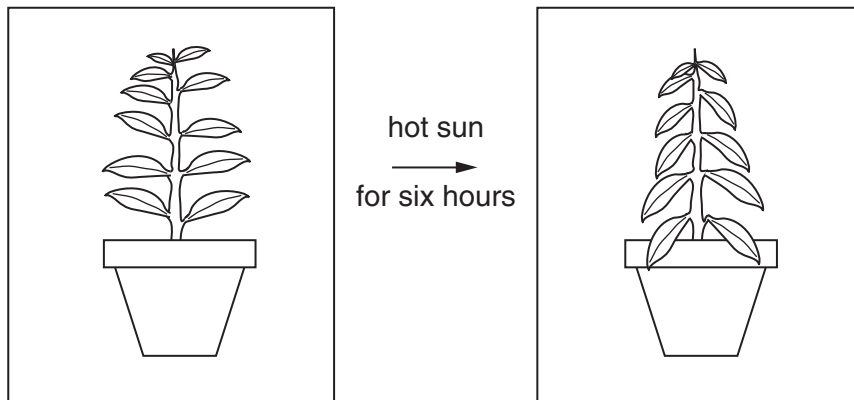
12 The diagram shows four types of teeth and a human jaw.



Which teeth are found in the numbered positions?

	1	2	3	4
A	Y	Z	W	X
B	Y	Z	X	W
C	Z	Y	W	X
D	Z	Y	X	W

- 13 A plant is left in the hot sun for six hours.



The diagram shows how the appearance of the plant changes during this time.

Which statement explains the change in appearance of the plant?

- A More water is lost by transpiration than is absorbed.
 - B Stomata have closed.
 - C The water potential of the cells has increased.
 - D There is less support provided by the xylem.
- 14 The cell sap of a root hair cell has a higher concentration of nitrates than the surrounding soil.

Which feature of the cell stops these nitrates moving back from the cell to the soil?

- A cell membrane
 - B cell wall
 - C large surface area
 - D water potential gradient
- 15 The table shows the characteristics of the blood in one blood vessel in the body.

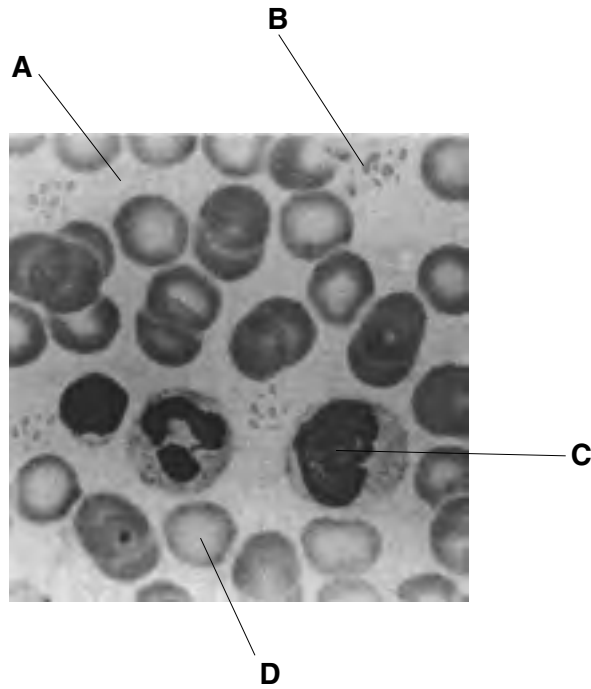
oxygen concentration	carbon dioxide concentration	pressure
high	low	high

Which blood vessel contains blood with these characteristics?

- A aorta
- B pulmonary artery
- C pulmonary vein
- D vena cava

16 The diagram shows the main components of human blood.

Which component cannot function effectively if a person's diet lacks iron?

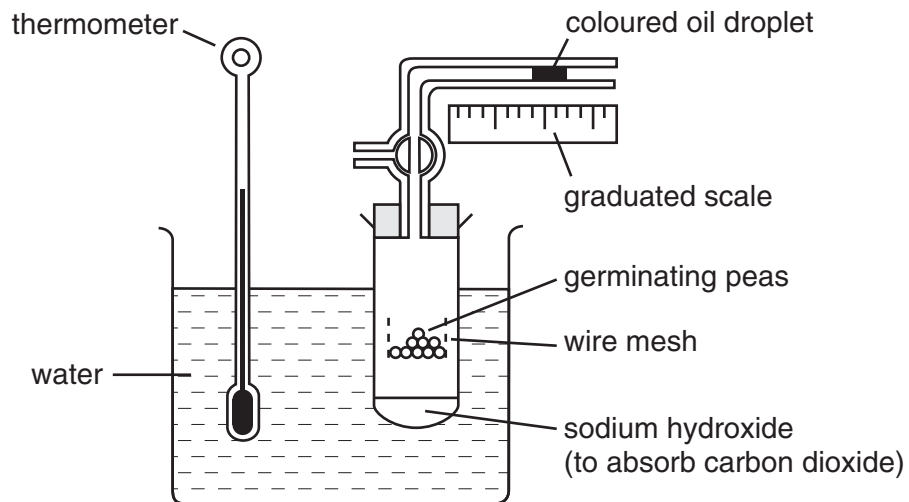


magnification $\times 100$

17 Which sequence of structures does an oxygen molecule pass through as it is taken into the body?

	first	→				last	
A	larynx	→	trachea	→	bronchioles	→	capillaries
B	trachea	→	larynx	→	bronchioles	→	capillaries
C	larynx	→	trachea	→	capillaries	→	bronchioles
D	trachea	→	larynx	→	capillaries	→	bronchioles

18 The diagram shows apparatus used to investigate respiration.



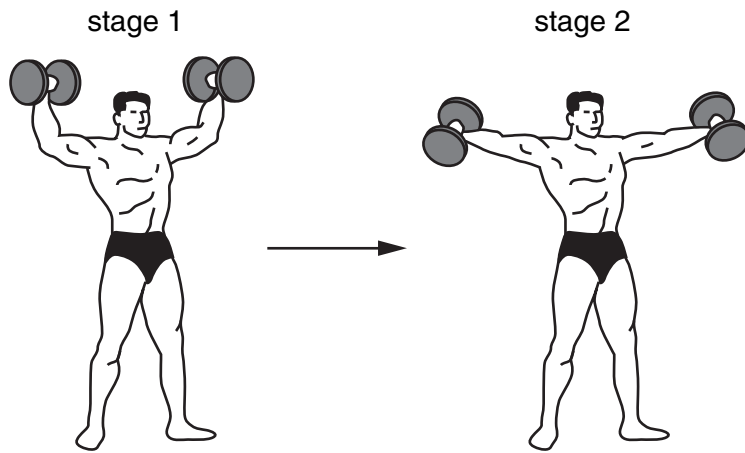
What can be measured using this apparatus?

- A carbon dioxide released
- B heat energy released
- C oxygen released
- D oxygen used

19 Which occur during breathing out?

	volume of thorax	air pressure in lungs
A	decreases	increases
B	decreases	remains constant
C	increases	increases
D	increases	remains constant

20 The diagrams show two stages in weightlifting.



What are the actions of the muscles and elbow joints in moving from stage 1 to stage 2?

	biceps	triceps	elbow joints
A	contract	relax	move in 1 plane
B	contract	relax	rotate
C	relax	contract	move in 1 plane
D	relax	contract	rotate

21 When the external temperature drops, the following changes may take place in the human body.

- 1 body temperature falls
- 2 body temperature rises
- 3 brain detects cooler blood
- 4 shivering begins

In which order do they occur?

	first	—————>	last
A	1	3	4 2
B	1	4	3 2
C	3	2	4 1
D	3	4	2 1

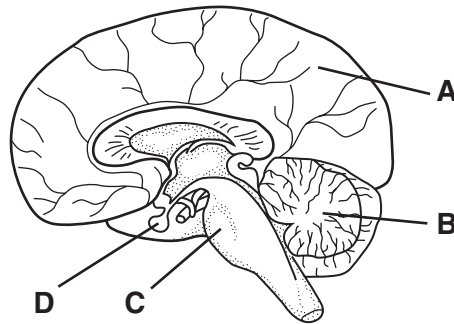
22 A child is frightened by a loud noise and shouts for help.

In which order are the different types of neurone involved in this response?

	involved first	—————>	involved last
A	motor neurone	relay neurone	sensory neurone
B	motor neurone	sensory neurone	relay neurone
C	sensory neurone	motor neurone	relay neurone
D	sensory neurone	relay neurone	motor neurone

23 The diagram shows a section of the brain.

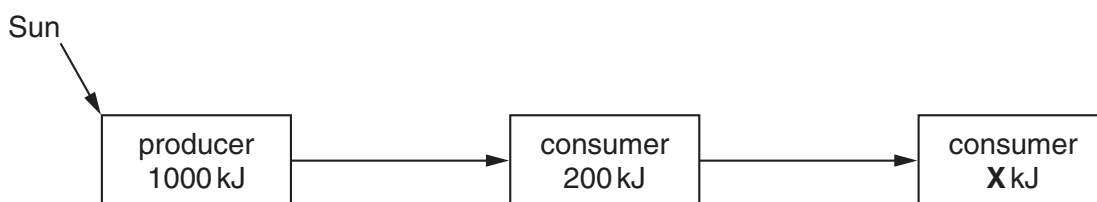
Which part produces hormones?



24 Which changes take place in the iris of the eye when a person moves quickly from darkness into bright light?

	circular muscles of the iris	radial muscles of the iris	diameter of pupil
A	contract	relax	increases
B	contract	relax	decreases
C	relax	contract	decreases
D	relax	contract	increases

- 25 The diagram represents the amount of energy transferred from one trophic level to the next.



What is the likely value of **X**?

- A 200 kJ
 B 100 kJ
 C 20 kJ
 D 2 kJ
- 26 Which aspect of behaviour is correctly linked with the health risks in the table?

key

✓ = risk

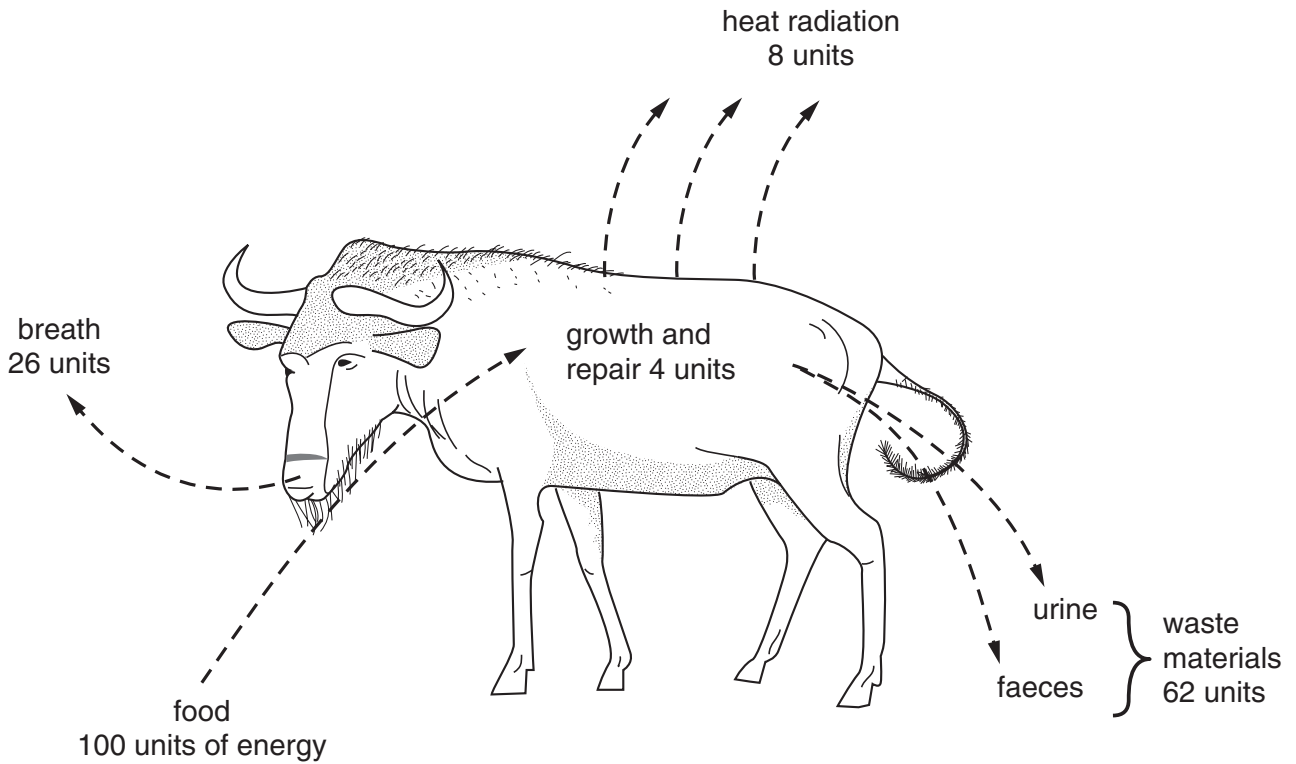
X = not at risk

aspect of behaviour		health risk				
		emphysema	lung cancer	liver damage	contracting syphilis	HIV/AIDS
A	drinking too much alcohol	✓	X	✓	X	✓
B	having many sexual partners	X	✓	X	✓	✓
C	injecting heroin	✓	X	✓	X	X
D	smoking cigarettes	✓	✓	X	X	X

- 27 Which feature of the life history of a female mosquito makes it an effective vector of malaria?
- A It has three pairs of legs.
 B It has wings.
 C It lays eggs in water.
 D It mates frequently.

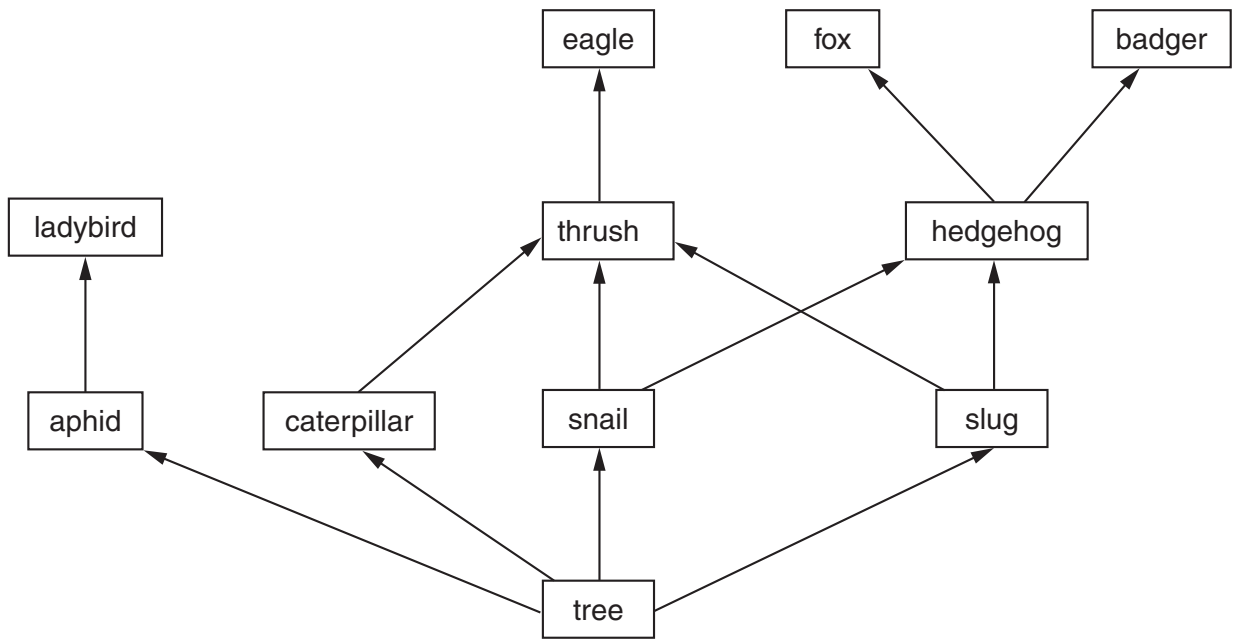
28 The diagram shows how energy from food is used by a wildebeest.

What percentage of this energy is available to consumers and decomposers?

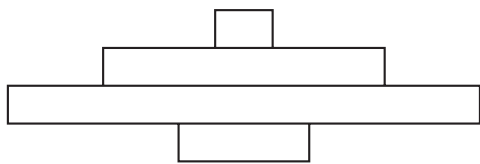


- A 100 B 96 C 66 D 4

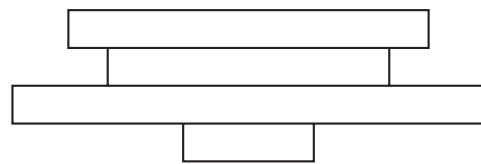
29 The diagram shows part of a food web.



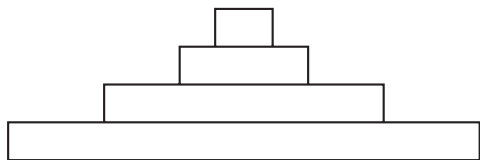
Which is a pyramid of numbers based on this food web?



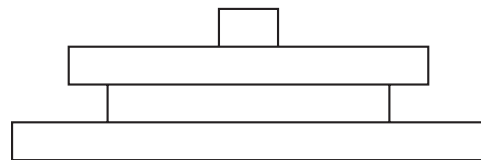
A



B

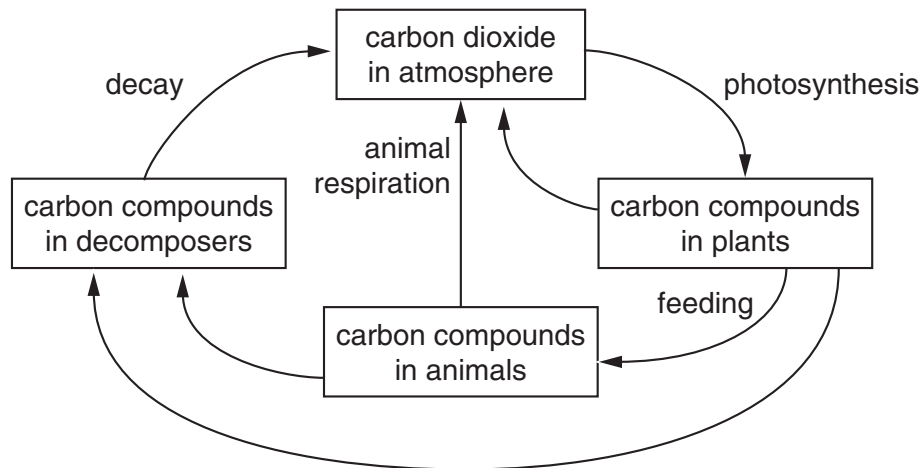


C



D

30 The diagram shows part of the carbon cycle.



Which process converts most carbon from one form to another?

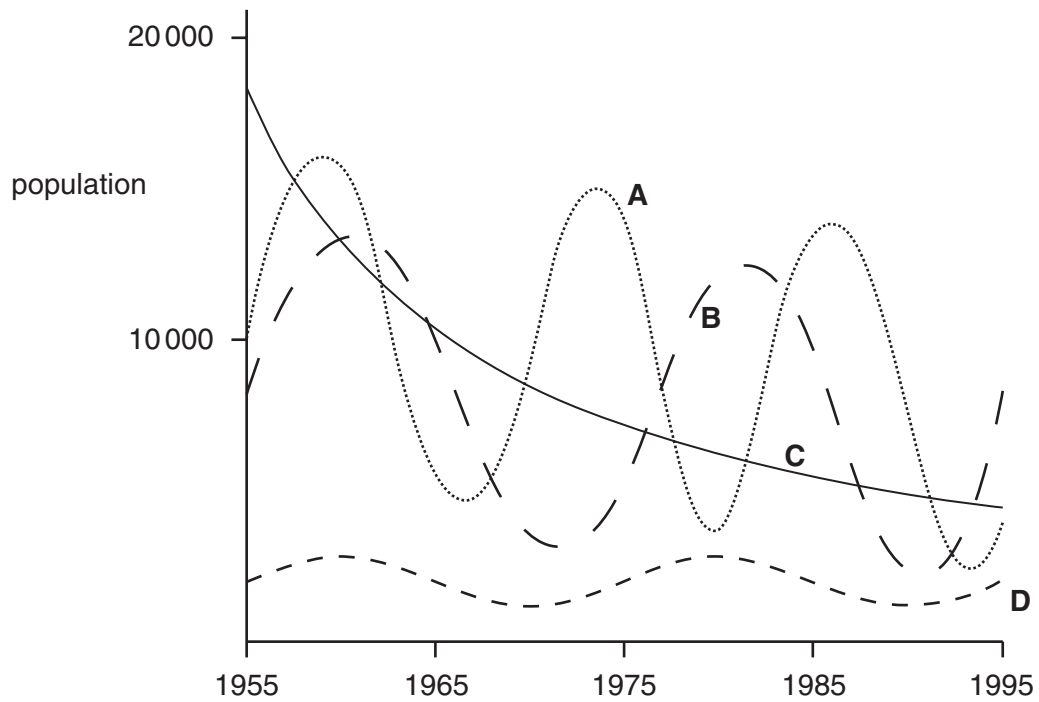
- A animal respiration
 - B decay
 - C feeding
 - D photosynthesis
- 31 Which is the most direct way that the carbon in starch stored in cereal grain can return to the atmosphere as carbon dioxide?
- A Grain is destroyed by fire during storage.
 - B Grain is eaten by birds.
 - C Grain is made into bread and eaten by humans.
 - D Grain stored in damp conditions goes mouldy and decay.

32 Which processes occur during the carbon cycle?

	carbon compounds absorbed by living organisms	carbon compounds excreted by living organisms
A	yes	yes
B	yes	no
C	no	yes
D	no	no

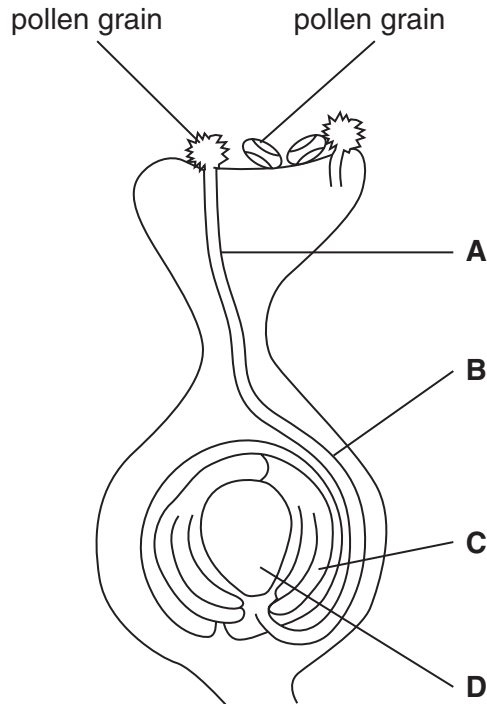
- 33 The population sizes of four different species of insect were monitored over a period of 40 years. The results are shown on the graph.

Which species is in the greatest danger of extinction?

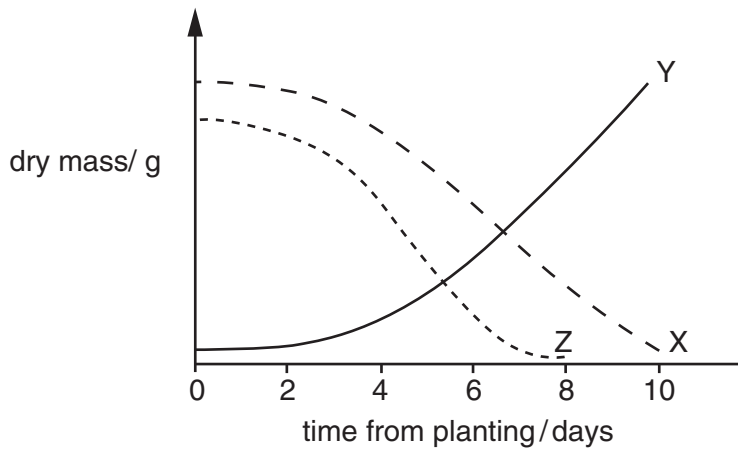


34 The diagram shows the development of a pollen tube and its entry into the ovule.

Which part develops into the testa after fertilisation?



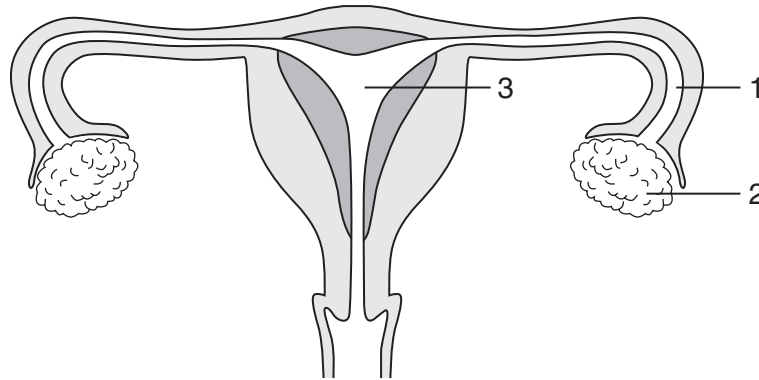
35 The graph shows the changes in dry mass of a whole germinating seed, the cotyledons of the same seed, and the plumule and radicle of the seed.



What do the three curves, X, Y and Z, represent?

	dry mass of whole seed	dry mass of cotyledons	dry mass of plumule and radicle
A	X	Z	Y
B	Y	Z	X
C	Z	X	Y
D	Z	Y	X

36 The diagram shows the female reproductive system.

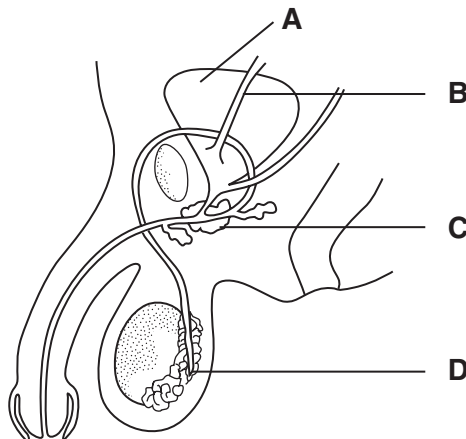


In which parts are the eggs and the zygote formed?

	eggs	zygote
A	1	2
B	1	3
C	2	1
D	2	3

37 The diagram shows the male reproductive system and part of the urinary system.

Which part is the prostate gland?



38 How many chromosomes are there in a zygote which develops into a Down's syndrome baby?

- A** 23
- B** 24
- C** 46
- D** 47

- 39 A study was made of children whose mothers were blood group O (genotype $I^O I^O$) and whose fathers were blood group AB (genotype $I^A I^B$).

Which statement about their children is correct?

- A All will have the same blood group.
 - B 50% will have the same blood group as their mother.
 - C 50% will have the same blood group as their father.
 - D None will have the same blood group as either parent.
- 40 Two heterozygous plants are crossed.

What is the ratio of homozygous genotypes to heterozygous genotypes amongst the offspring?

	homozygous genotypes		heterozygous genotypes
A	1	:	1
B	1	:	2
C	1	:	3
D	3	:	1