

Surname:

First Name:

Current School:



Shrewsbury
School

SHREWSBURY SCHOOL

SIXTH FORM ENTRANCE EXAMINATION 2023 ENTRY

BIOLOGY (1 Hour)

Instructions to candidates:

Please answer all questions. Calculators may be used.

Questions 1-40 are multiple choice: **record your answers in the grid provided.**

Be sure to leave about 20 minutes for questions 41 and 42: these should be answered in the spaces provided in the booklet.

Multiple choice answers

1	11	21	31
2	12	22	32
3	13	23	33
4	14	24	34
5	15	25	35
6	16	26	36
7	17	27	37
8	18	28	38
9	19	29	39
10	20	30	40

- 1 What is defined as the chemical reactions that break down food molecules in cells to release energy?
- A excretion
 - B movement
 - C nutrition
 - D respiration

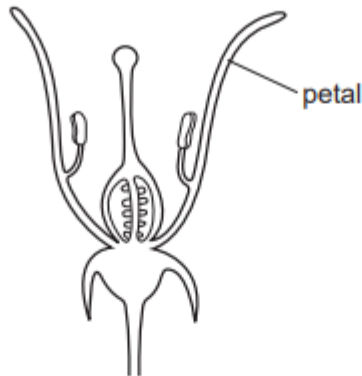
- 2 The diagram shows an arthropod animal.



Which features are characteristic of **all** arthropods?

- A jointed legs and segmented body
- B jointed legs and thorax
- C segmented body and wings
- D thorax and wings

3 The diagram shows a section through a flower.



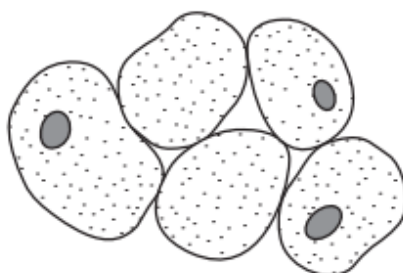
Using the key, identify this flower.

- 1 sepals present go to 2
- sepals absent go to 3
- 2 stamens attached to petals **A**
- stamens not attached to petals **B**
- 3 stigma above anthers **C**
- stigma below anthers **D**

4 Which row shows the most likely number of chloroplasts in three types of cell in a leaf?

	epidermis	palisade mesophyll	guard cells
A	0	6	17
B	0	17	6
C	6	17	0
D	17	0	6

5 The diagram shows some liver cells as they appear under the microscope.



How many cell walls can be seen?

- A 0 B 2 C 3 D 5

6 Which row shows the structures present in plant and animal cells?

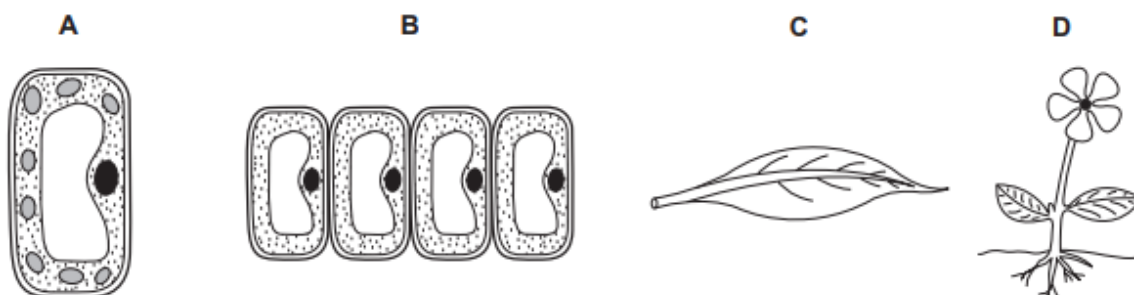
		cell wall	cytoplasm	nucleus	cell membrane
A	plant cell	x	✓	✓	✓
	animal cell	✓	✓	x	✓
B	plant cell	✓	✓	✓	✓
	animal cell	x	✓	✓	✓
C	plant cell	✓	✓	x	✓
	animal cell	x	✓	✓	x
D	plant cell	x	x	✓	✓
	animal cell	✓	✓	✓	x

key
 ✓ = present
 x = absent

7 Which structure is at a different level of organisation from the other three?

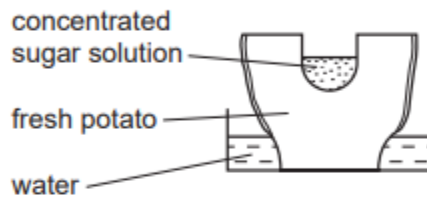
- A kidney
 B liver
 C neurone
 D testis

8 Which diagram shows one organ only?



- 9 On a dry, sunny day, how does water vapour move through the stomata of a leaf?
- A into the leaf by diffusion
 - B into the leaf by osmosis
 - C out of the leaf by diffusion
 - D out of the leaf by osmosis

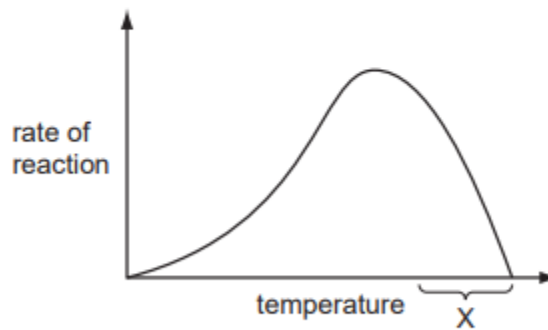
- 10 The diagram shows an experiment using a potato.



Which shows the result of the experiment after 24 hours?



- 11 The graph shows how the rate of an enzyme-controlled reaction changes with temperature.



What is happening within the temperature range marked X?

- A The enzyme is becoming denatured.
- B The enzyme is being used up.
- C The reaction is occurring at body temperature.
- D The reaction is occurring at the optimum temperature.

12 Which condition can sometimes be prevented by eating plenty of fresh fruit and vegetables?

- A bleeding gums
- B brittle bones
- C diabetes
- D soft bones

13 Which solutions are used for testing for protein, reducing sugar and starch?

	test for protein	test for reducing sugar	test for starch
A	Benedict's	iodine	biuret
B	biuret	Benedict's	iodine
C	biuret	iodine	Benedict's
D	iodine	biuret	Benedict's

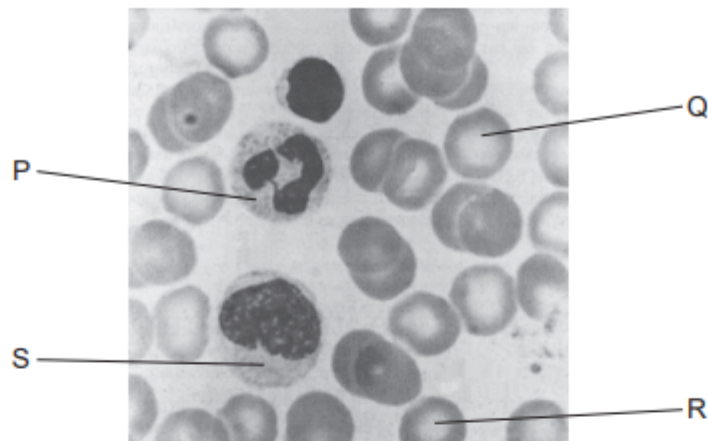
14 A protease is added to a suspension of egg protein in a test-tube and kept at 37 °C.

After 8 minutes, the protein changes from cloudy to transparent.

Which product, or products, will now be present in the test-tube?

- A amino acids
- B a simple sugar
- C fatty acids and glycerol
- D water

15 The photograph shows human blood cells as seen under a microscope at high power.



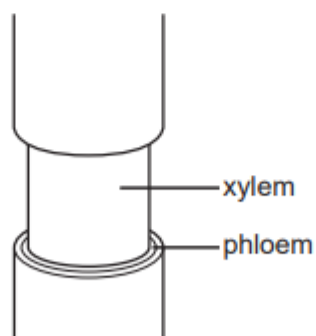
Which are red cells?

- A** P and Q **B** Q and R **C** R and S **D** S and P

16 What is a description of transpiration?

- A** exchange of gases between the leaf and the atmosphere
B loss of water vapour from the leaves and stems of a plant
C movement of water from the roots to the leaves
D movement of water through the cells of the leaf

17 The diagram shows the stem of a plant. A strip of the outer tissue including the phloem has been removed.



How is transport in the plant affected?

- A** Amino acids and sucrose cannot pass to the roots.
B Dissolved salts cannot pass to the leaves.
C Water cannot pass to the leaves.
D Water cannot pass to the roots.

18 The diagram shows someone blowing up a balloon.



What percentage of the gas in the balloon is carbon dioxide?

- A** 0.04% **B** 0.4% **C** 4.0% **D** 40%

19 The table shows some of the features of respiration.

Which row is correct for anaerobic respiration?

	energy remaining in products	amount of energy released	chemical pathway	releases carbon dioxide
A	high	high	always the same	sometimes
B	high	low	different in different organisms	sometimes
C	low	high	different in different organisms	always
D	low	low	always the same	always

20 Four words are shown below.

alcohol anaerobic sugar yeast

These words can be used in the spaces P, Q, R and S to complete the sentence below.

'In brewing and bread making, respiration takes place. The micro-organism calledP..... usesQ..... as a source of food. The product of thisR..... respiration isS......'

Which combination of words correctly completes the sentences?

	alcohol	anaerobic	sugar	yeast
A	P	Q	R	S
B	Q	P	S	R
C	R	S	Q	P
D	S	R	Q	P

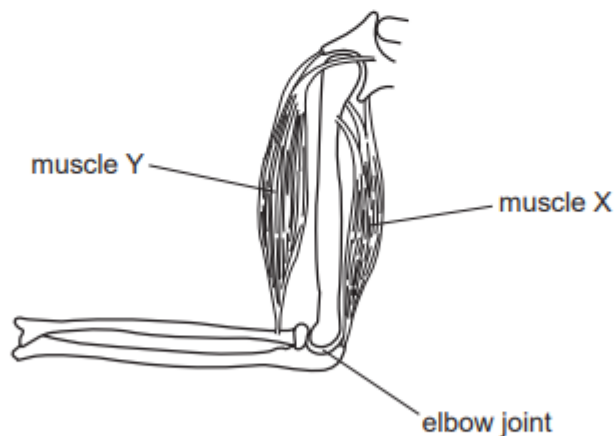
21 Which organ produces urea?

- A bladder
- B kidney
- C liver
- D pancreas

22 What happens when the body temperature rises above normal?

	blood vessels in the surface of skin	sweat production
A	constrict	decreases
B	constrict	increases
C	dilate	decreases
D	dilate	increases

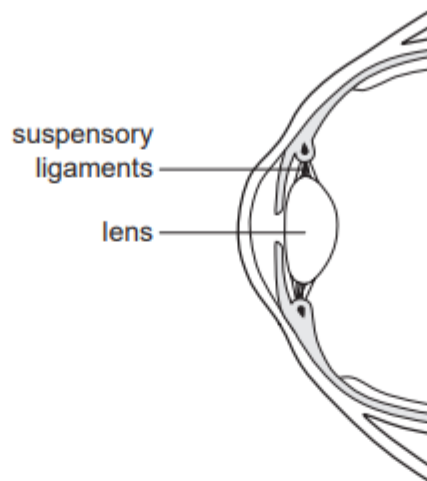
23 The diagram shows some of the muscles and bones of the human arm.



When muscle X contracts, what happens to the arm and what happens to muscle Y?

	arm	muscle Y
A	bends	contracts
B	bends	relaxes
C	straightens	contracts
D	straightens	relaxes

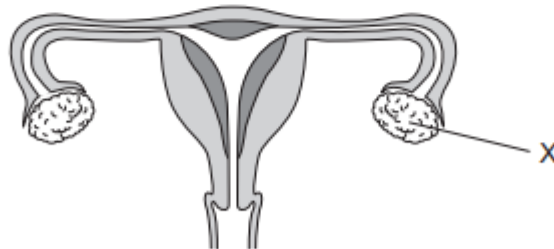
24 The diagram shows a section through part of the human eye.



When a person looks at an object which is close to their eye, which of the following takes place?

	suspensory ligaments	lens
A	slacken	becomes fatter
B	slacken	becomes thinner
C	tighten	becomes fatter
D	tighten	becomes thinner

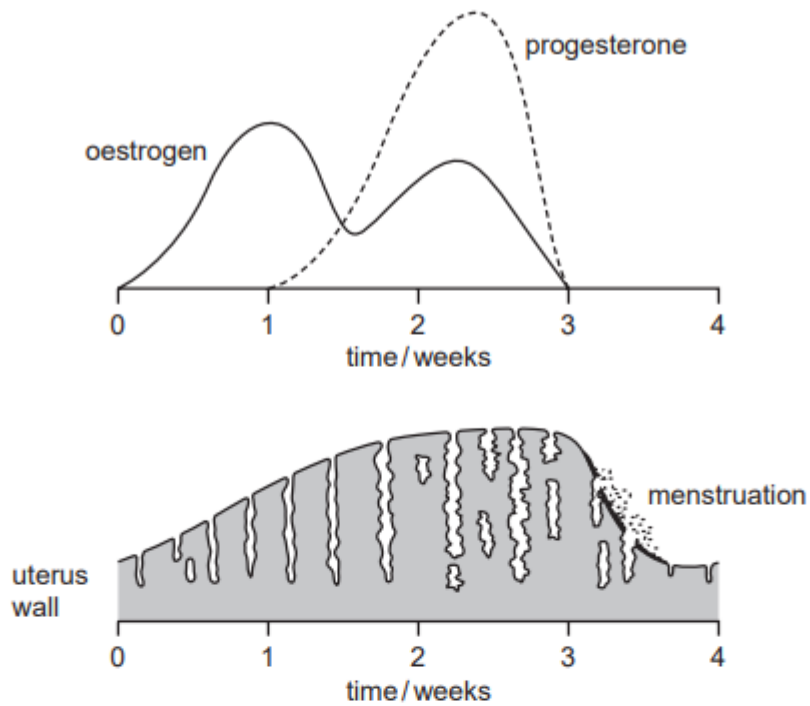
25 The diagram shows the female reproductive system.



What is the function of the part labelled X?

- A** gamete production and hormone secretion
- B** gamete production only
- C** hormone secretion only
- D** zygote production and hormone secretion

26 The diagram shows the changes which take place during a woman's menstrual cycle.

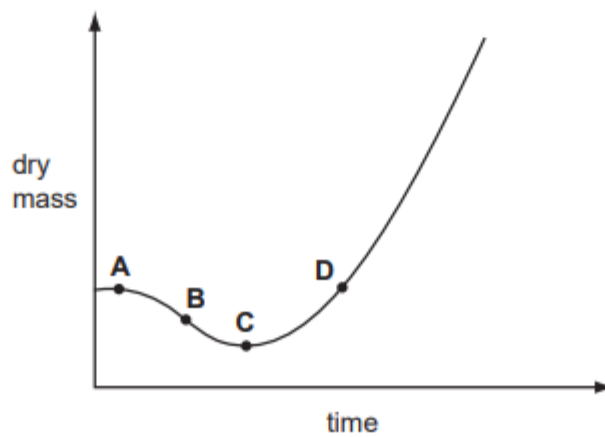


What is occurring at the time of ovulation?

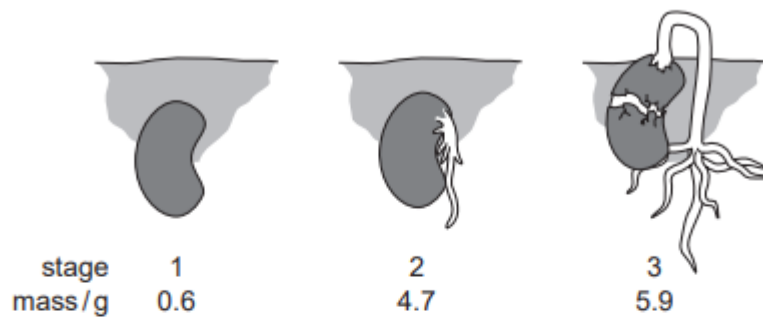
- A a fall in the levels of oestrogen and progesterone
- B a fall in the level of progesterone only
- C a rise in the levels of oestrogen and progesterone
- D a rise in the level of oestrogen only

27 The graph shows how dry mass of a plant changes with time.

Where on the graph is growth occurring?



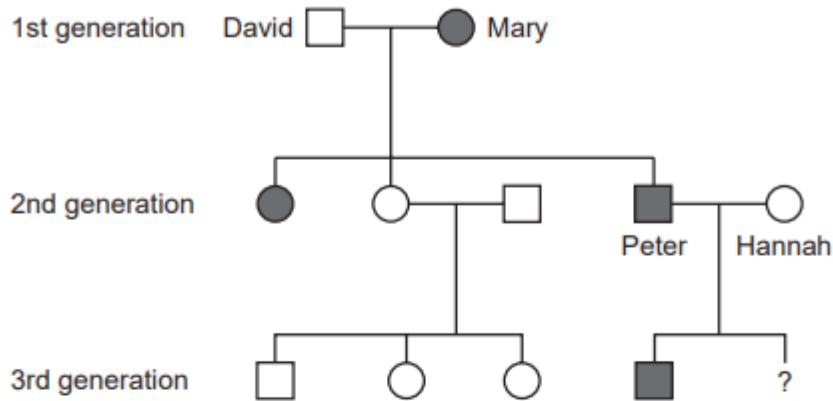
- 28 The diagram shows some of the stages in the germination of a seed. The figures show the total mass at each stage.



Which process causes the increase in mass between stage 1 and stage 2?

- A absorption of water
 - B enzyme action on starch
 - C photosynthesis
 - D respiration
- 29 What term is used for the transference of a gene from one organism to another?
- A artificial selection
 - B genetic engineering
 - C mutation
 - D natural selection

- 30 The family tree shows the inheritance of the ability to taste a certain substance. The allele for the ability to taste this substance is dominant to the allele for the inability to taste it.



key

■ represents a male 'taster'
● represents a female 'taster'

□ represents a male 'non-taster'
○ represents a female 'non-taster'

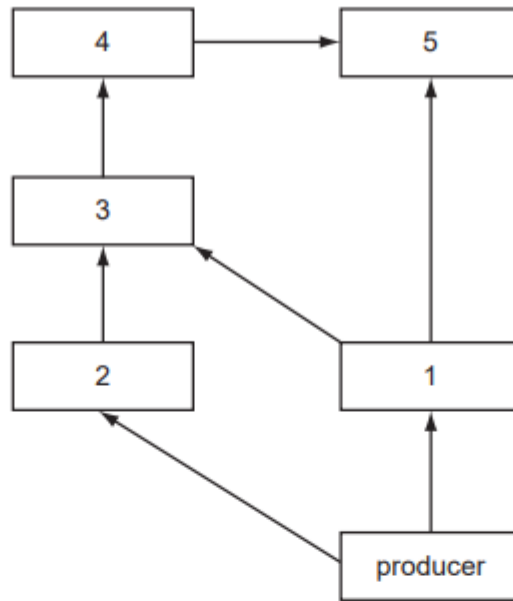
What is the chance of the second child of Peter and Hannah being a 'non-taster'?

- A 1 in 1 B 1 in 2 C 1 in 3 D 1 in 4
- 31 The size of the arrows shows the approximate, relative amounts of energy passing from one stage to the next in a food chain.

Which chain represents the energy losses between trophic levels?

- A sun \longrightarrow grass \longrightarrow rabbit \longrightarrow fox
- B sun \longrightarrow grass \longrightarrow rabbit \longrightarrow fox
- C sun \longrightarrow grass \longrightarrow rabbit \longrightarrow fox
- D sun \longrightarrow grass \longrightarrow rabbit \longrightarrow fox

32 The diagram shows a food web.

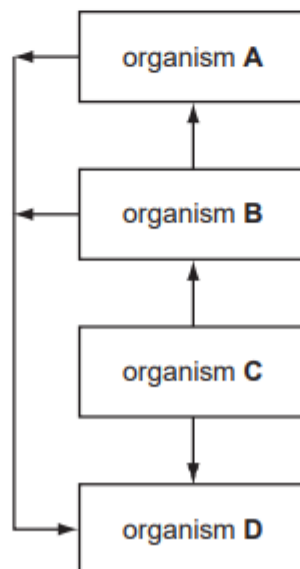


Which organisms occupy the same trophic level?

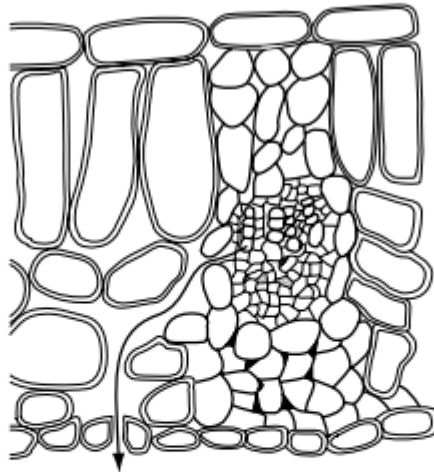
- A** 3 and 2 **B** 4 and 1 **C** 5 and 2 **D** 5 and 3

33 The diagram shows the flow of energy in a food chain.

Which organism is the producer in the food chain?



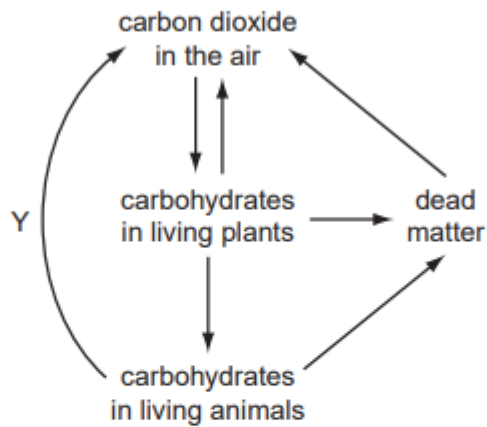
34 The diagram shows part of a section through a leaf.



The arrow represents part of the

- A carbon cycle only.
- B flow of energy.
- C water and carbon cycles.
- D water cycle only.

35 The diagram shows part of the carbon cycle.

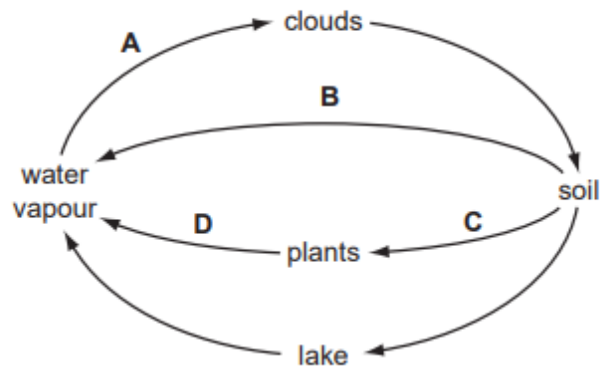


Which process occurs at Y?

- A combustion
- B decay
- C photosynthesis
- D respiration

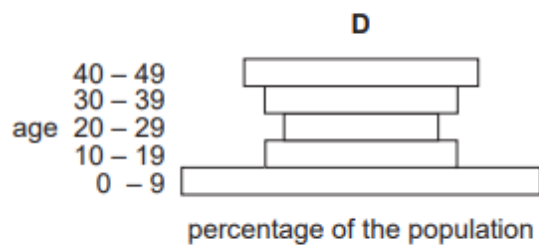
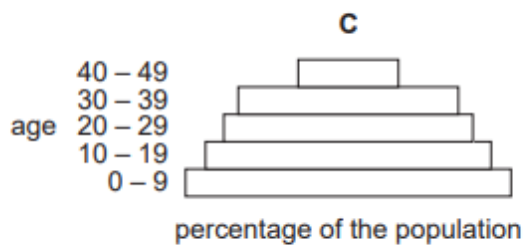
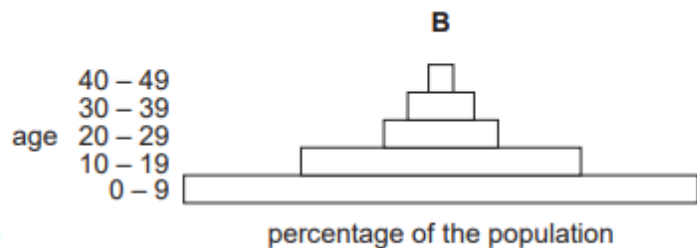
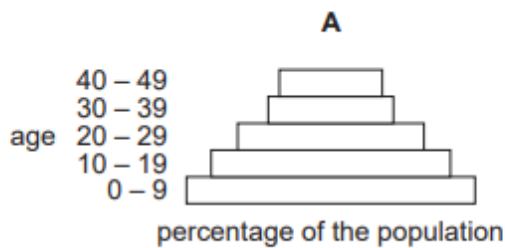
36 The diagram shows part of the water cycle.

Where is osmosis occurring?



37 The diagrams show the current population sizes for people below 50 years of age in four different countries.

Which country will be likely to have the largest population of people 60 – 70 years of age in 20 years time?



38 What makes nuclear fall-out dangerous to living organisms?

- A It causes flooding.
- B It causes global warming.
- C It damages DNA.
- D It damages soils.

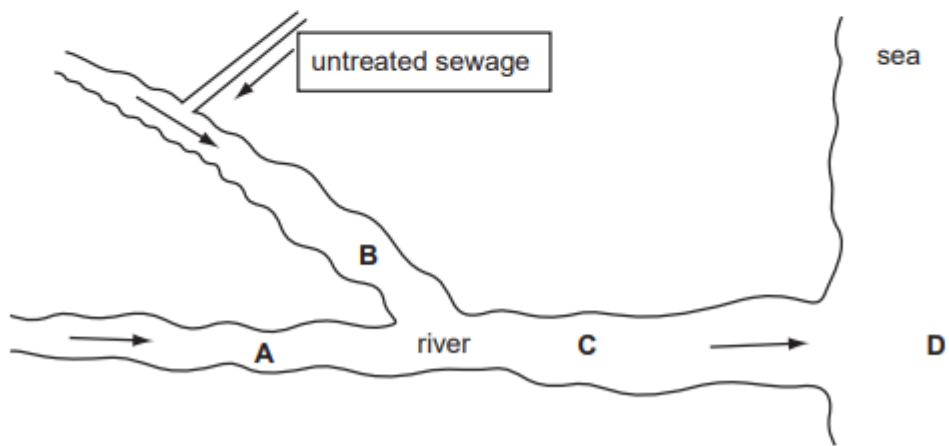
39 A very large area of land has been cleared of rainforest and planted with soybean.

What result of deforestation will encourage the growth of the soybean plants?

- A decrease in atmospheric oxygen
- B decrease in rainfall
- C increase in atmospheric carbon dioxide
- D increase in soil erosion

40 The map shows a river flowing into the sea. The river is polluted by untreated sewage.

At which labelled point will the oxygen content of the water be lowest?



42. Here are a student's results from a study on changes in heart rate over time before, during and after exercise. Unfortunately, the student didn't make a proper table! Plot a graph to show these results more clearly. [5]

