Name: .... (   )

ASSUMPTION ENGLISH SCHOOL
PRELIMINARY EXAMINATION 2019

BIOLOGY
6093 / 01

LEVEL:	Sec 4 Express	**DATE:**	2 September 2019
CLASS:	Sec 4/2	**DURATION:**	1 hour

Additional Materials provided: 1 sheet of OAS paper

INSTRUCTIONS TO CANDIDATES
Do not open this booklet until you are told to do so.

Write your NAME and INDEX NUMBER at the top of this page and on the OAS paper.
Shade your index number on the OAS paper.

PAPER 1 (40 marks)
MULTIPLE CHOICE QUESTIONS
There are 40 questions in this paper. Answer **all** questions. For each question, there are four possible answers **A**, **B**, **C** and **D**.

At the end of the examination, hand in your OAS paper and question booklet separately.

This Question Paper consists of 17 printed pages including this page.
[Turn over

MULTIPLE-CHOICE QUESTIONS [40 marks]

For each question, **there are four** possible answers **A, B, C** and **D**.
Choose the one you consider correct and record your choice in the OAS paper provided.

1 Four statements about mitochondria are listed as shown. Which statements are correct?

1 Detoxification of metabolic waste takes place in the mitochondria.

2 The main function of mitochondria is to synthesise proteins.

3 There is a high concentration of mitochondria in root hair cells to assist the roots to take in water.

4 There is a lower concentration of oxygen in the mitochondria as compared to the cytoplasm near the cell membrane.

A 1 and 2 only

B 1, 3 and 4 only

C 3 and 4 only

D 4 only

2 Which sequence shows the correct order of increasing size and complexity?

A cells → organelles → organs → tissues → systems

B cells → tissues → organelles → organs → systems

C organelles → cells → tissues → organs → systems

D tissues → cells → organs → organelles → systems

3 What can be found in a mature red blood cell?

A antibodies and mitochondria

B carbonic anhydrase and cell membrane

C cell membrane and nucleus

D haemoglobin and fibrinogen

4 Which is an example of diffusion in a plant?

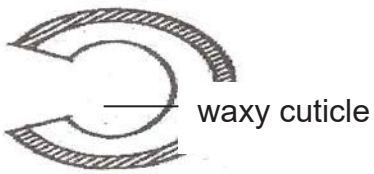
A carbon dioxide from the air moving into a photosynthesising leaf

B minerals in xylem moving up the stem to leaves

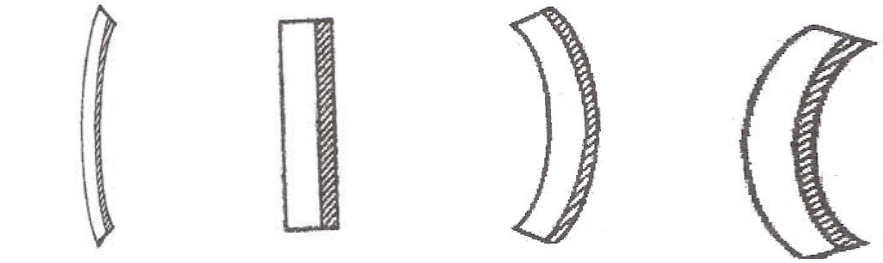
C sugars in phloem moving from leaves to roots

D water in xylem moving from roots to leaves

5 The figure shows four sections of the mustard green stem before and after immersion in solutions **P**, **Q**, **R** and **S** of different sugar concentrations.



stem before immersion



solution **P** solution **Q** solution **R** solution **S**

Which sequence shows the correct concentrations of the four solutions?

	highest concentration ⟶ lowest concentration			
A	**P**	**S**	**R**	**Q**
B	**Q**	**P**	**S**	**R**
C	**Q**	**R**	**S**	**P**
D	**R**	**S**	**P**	**Q**

6 Which element in the molecule of urea shows that it is formed from amino acids and not from glucose?

A carbon

B hydrogen

C nitrogen

D oxygen

7 Potato contains a nutrient which is broken down by amylase when inside the human alimentary canal. Which test would detect this nutrient?

A Benedict's test

B biuret test

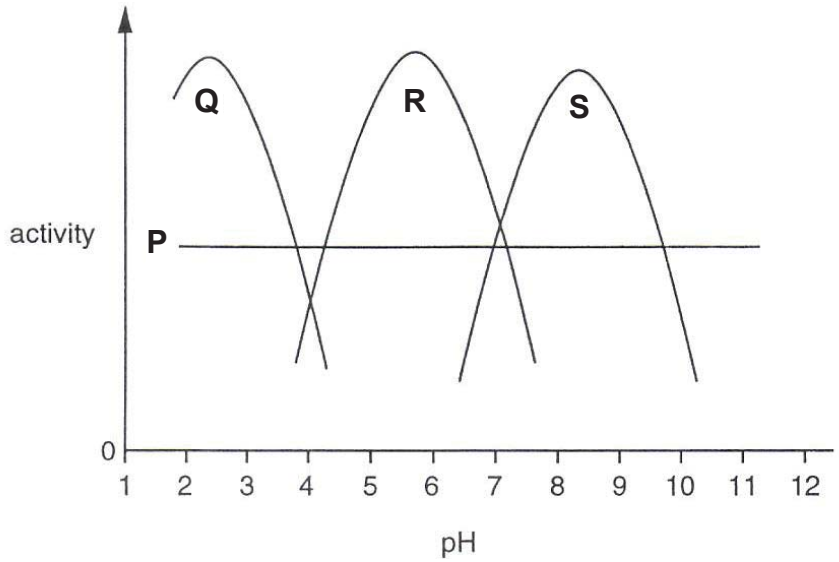
C ethanol emulsion test

D iodine test

8 In an experiment, 15 g of boiled egg white was mixed with protease solution. After 1 hour at 15 °C, 5 g of protein was digested. The experiment was repeated at 25 °C and again at 60 °C. How much protein was broken down in the second and third experiments respectively?

	experiment 2 (at 25 °C)	experiment 3 (at 60 °C)
A	5 g	0 g
B	5 g	10 g
C	10 g	0 g
D	10 g	15 g

9 The diagram below shows the effect of pH on the activity of four different enzymes.



Which pair of enzymes includes one that is not affected by pH and one that is from the stomach?

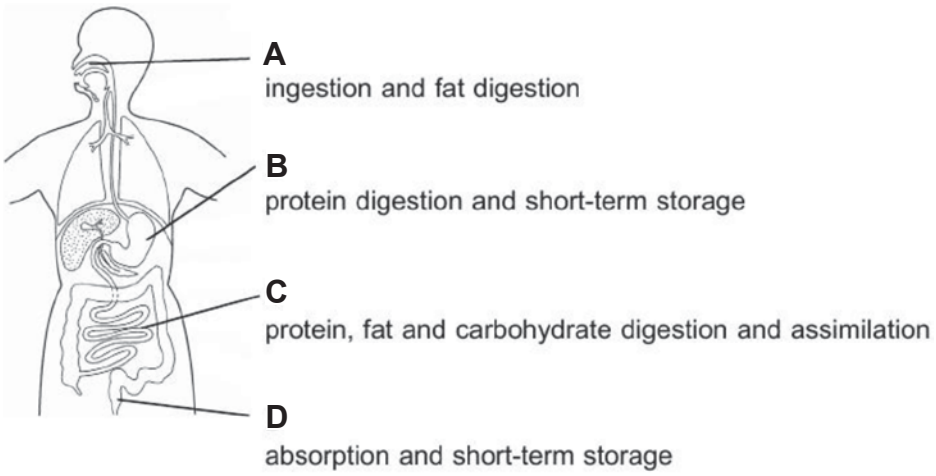
A **P** and **Q**

B **P** and **S**

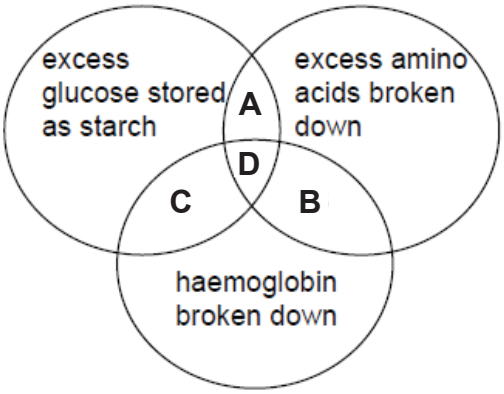
C **Q** and **R**

D **R** and **S**

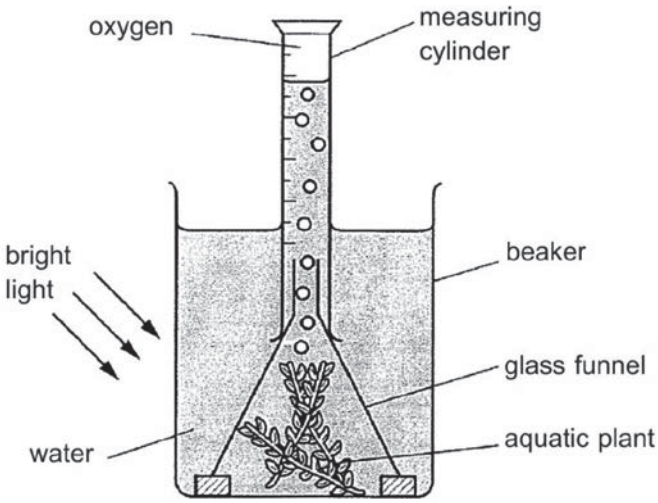
10 The diagram shows the human alimentary canal with labels for the functions of some of its parts. Which label is correct?



11 Which section of the diagram represents the function of the liver?



12 The diagram shows the apparatus used to investigate oxygen production from an aquatic plant.



The experiment was repeated several times to calculate the volume of oxygen produced. Which two factors must be kept constant in each repeat experiment?

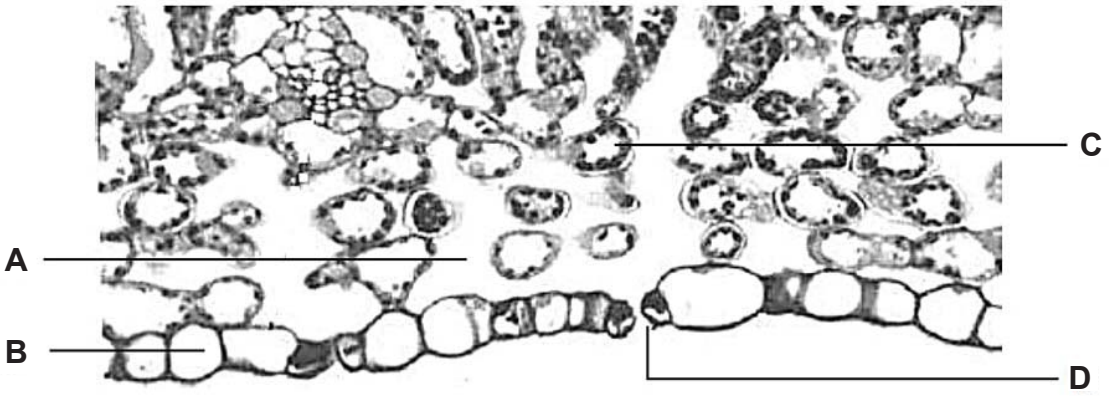
A the size of aquatic plant and the amount of oxygen in the measuring cylinder

B the size of aquatic plant and time exposed to the light

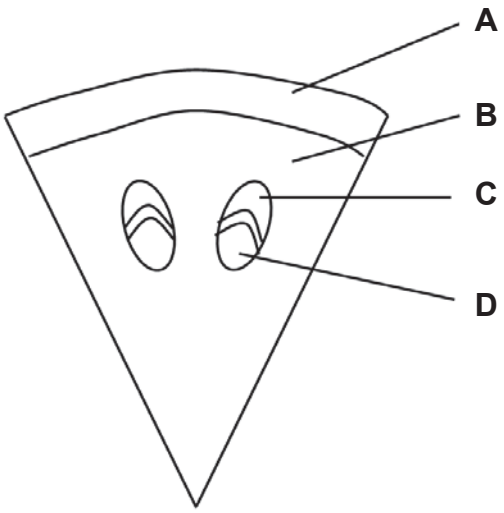
C the size of the beaker and the size of the funnel

D the volume of water in the beaker and the height of the measuring cylinder

13 The photomicrograph shows a section through the lower half of the leaf. Which region will have the lowest carbon dioxide concentration when the plant is exposed to light?



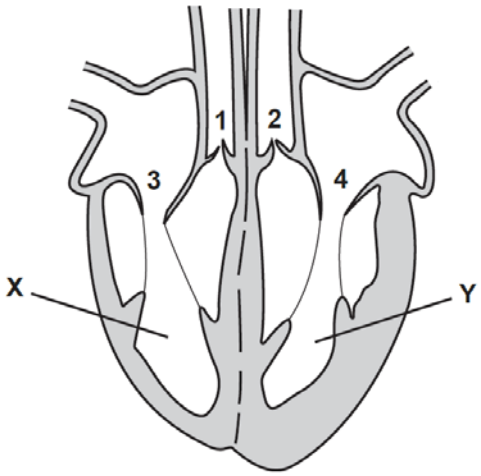
14 The diagram shows part of a transverse section of the stem of a plant. Which region is the xylem tissue?



15 A plant is exposed to different temperatures and humidities. Which set of conditions causes the plant to lose the least water?

	temperature / °C	humidity / %
A	15	30
B	15	60
C	25	30
D	25	60

16 The diagram shows a section through the heart. When X and Y are undergoing systole, which valves are opened and which are closed?



	valves **1** and **2**	valves **3** and **4**
A	closed	closed
B	closed	opened
C	opened	closed
D	opened	opened

17 Which is the shortest route that can be taken by blood travelling from a leg to an arm in the body?

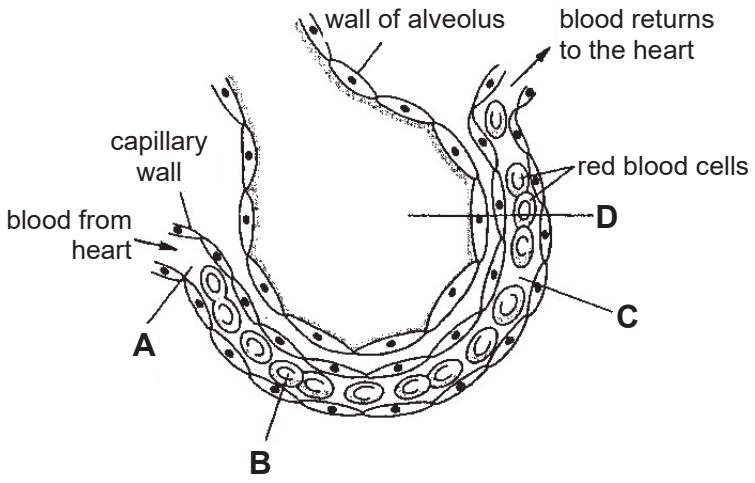
A leg → heart → lungs → heart → arm

B leg → liver → heart → lungs → arm

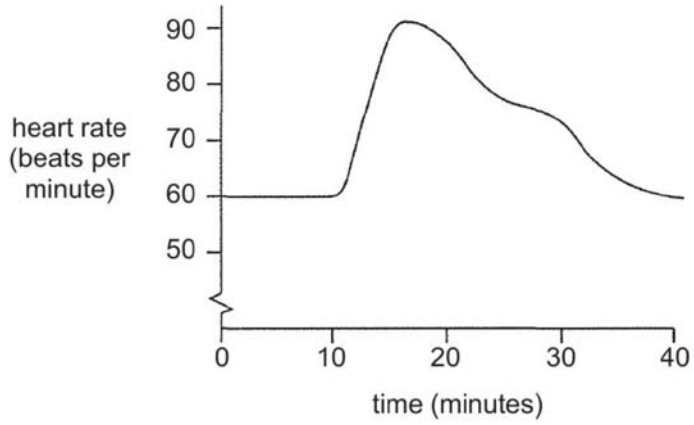
C leg → lungs → heart → liver → arm

D leg → lungs → heart → lungs → arm

18 The diagram shows a section through an alveolus and a blood capillary. In which region is the concentration of oxygen highest?



19 The diagram shows the short-term effect of smoking on heart rate. Which substance in cigarette smoke is the main cause of the change in heart rate between 10 and 18 minutes?



A carbon dioxide

B carbon monoxide

C nicotine

D tar

20 The table shows the flow rate and concentration of protein and urea in the blood vessel leading into a kidney glomerulus in a healthy person.

Total flow rate / cm^3 min^{-1}	Concentration / g per 100 cm^3	
	Protein	Urea
1000	7.40	0.03

What are the correct figures for the fluid in the collecting duct?

	Total flow rate / cm^3 min^{-1}	Concentration / g per 100 cm^3	
		Protein	Urea
A	10	0.00	1.75
B	10	7.40	0.03
C	1000	0.00	1.75
D	1000	7.40	0.03

21 Which response is not due to homeostasis?

A enlargement of iris

B increase in glucose production when blood glucose level is low

C increase in permeability of collecting duct of kidney tubules

D shivering in cold weather

22 Which statement about voluntary actions is not true?

A Motor neurones are always involved in transmitting impulses to effectors.

B Relay neurones will transmit nerve impulses to the motor neurons.

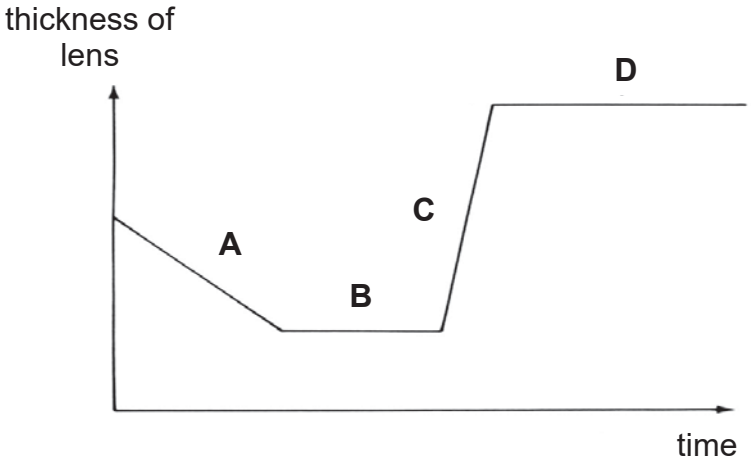
C Sensory neurones will always send nerve impulses to the brain.

D Voluntary actions are always coordinated by the brain.

23 When the eye of the pupil dilates in response to low light intensity, which is the receptor and which is the effector?

	receptor	effector
A	pupil	ciliary body
B	pupil	iris
C	retina	ciliary body
D	retina	iris

24 The graph below shows the changes in the thickness of the lens in the eye when a man looked at an object which either moved towards him, away from him or remained stationary. At which stage was the object moving towards the man?



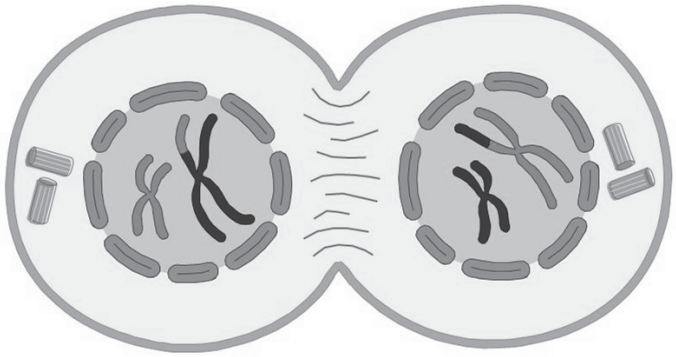
25 Hormones are chemicals involved in co-ordination in the body. Which combination in the table is correct?

	hormones are carried by	hormones are destroyed by
A	blood plasma	kidney
B	blood plasma	liver
C	red blood cells	kidney
D	red blood cells	liver

26 What effects would an increase in adrenaline have on the body?

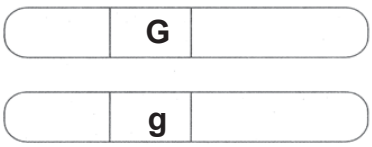
	blood flow to the gut	concentration of glucose in blood
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

27 The diagram shows a cell that is undergoing cell division. What type and stage of cell division does the diagram show?



	type of cell division	stage of cell division
A	meiosis	anaphase 1
B	meiosis	telophase 1
C	meiosis	telophase 2
D	mitosis	telophase

28 The diagram shows a pair of homologous chromosomes.



Which term best describes **Gg**?

A alleles
B gametes
C genotype
D phenotype

29 Which statement is characteristic of asexual reproduction?

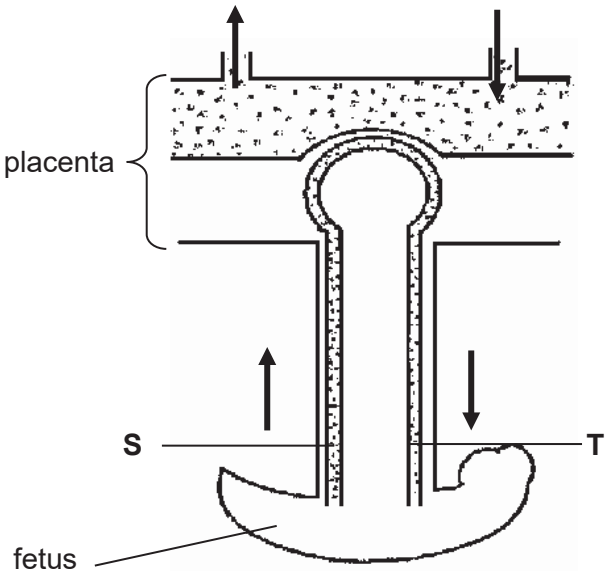
A Asexual reproduction only occurs in unicellular organisms.

B Meiosis takes place to form gametes.

C The offspring have the same genotype for all genes as their parents.

D The offspring will have the same height as their parents.

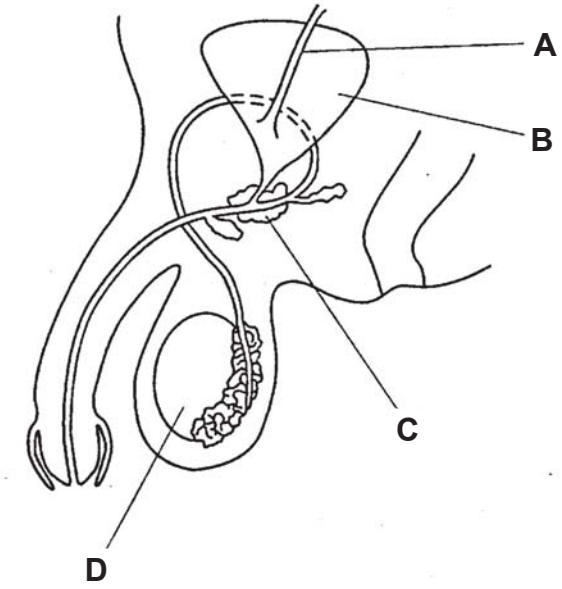
30 The diagram below shows the relationship between the blood systems of the foetus and that of the mother. The arrows indicate the direction of blood flow.



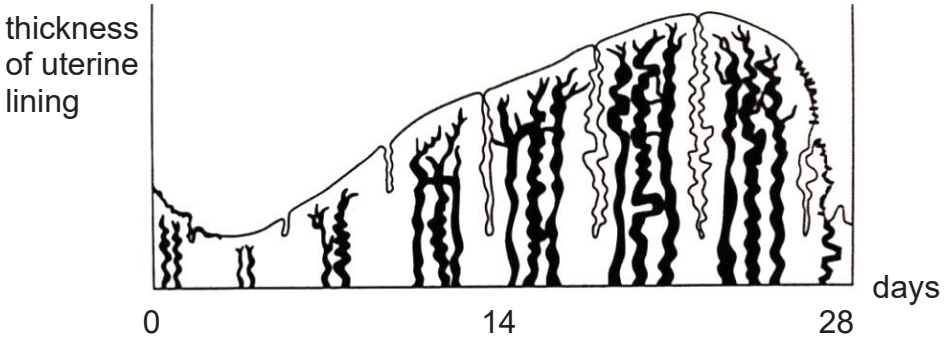
What are the identities of **S** and **T** and the nature of their contents?

	umbilical artery	umbilical vein	higher percentage of nutrients	higher percentage of waste
A	**S**	**T**	**S**	**T**
B	**S**	**T**	**T**	**S**
C	**T**	**S**	**S**	**T**
D	**T**	**S**	**T**	**S**

31 The diagram shows the male reproductive and urinary systems. Which structure produces the fluid part of semen?



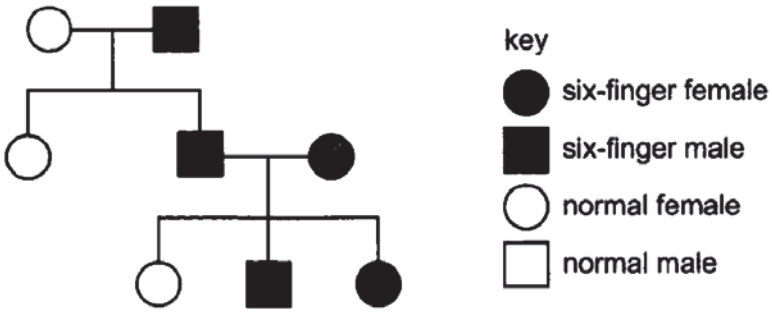
32 The diagram shows the variation in thickness of the uterine lining throughout a menstrual cycle of a healthy female.



During which days of the menstrual cycle does the level of oestrogen and progesterone rise?

	oestrogen	progesterone
A	1 to 5	15 to 20
B	5 to 10	15 to 25
C	15 to 20	5 to 10
D	20 to 25	1 to 10

33 A mutation sometimes occur in humans which causes each hand to have six fingers. The diagram shows how this condition is inherited in a family.



What does the family tree show about the mutated allele?

A It could be dominant or recessive.

B It is co-dominant.

C It is dominant.

D It is recessive.

34 Which fertilisation would result in a male child with Down syndrome?

	chromosomes in ovum	chromosomes in sperm
A	22 + 1 X	22 + 1 Y
B	22 + 1 X	23 + 1 Y
C	23 + 1 Y	22 + 1 X
D	23 + 1 Y	23 + 1 X

35 Which phrase describes a gene?

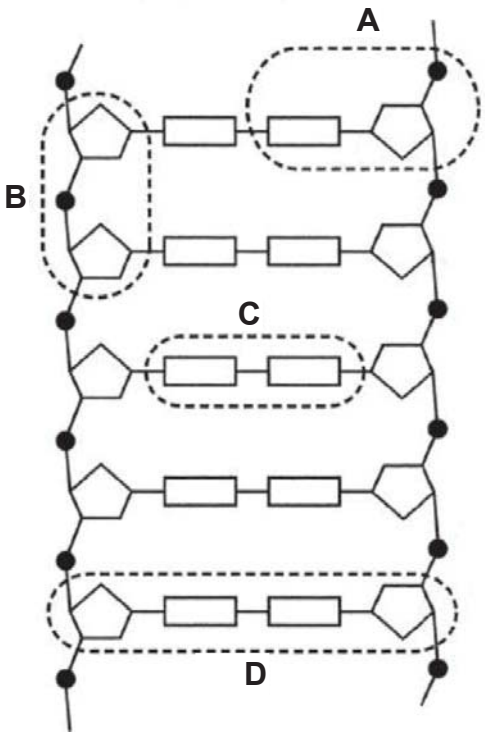
A a pair of alleles

B a sequence of nucleotides

C a whole DNA molecule

D the chain of alleles on a chromosome

36 The diagram shows a section of a DNA molecule. Which segment is part of the sugar-phosphate backbone?



37 What happens to energy after it has flowed through a food chain?

A It is lost as heat.

B It is recycled.

C It is stored as carbohydrate.

D It is used in respiration.

38 Which substance is produced by anaerobic bacteria during sewage treatment?

A carbon monoxide

B carbon dioxide

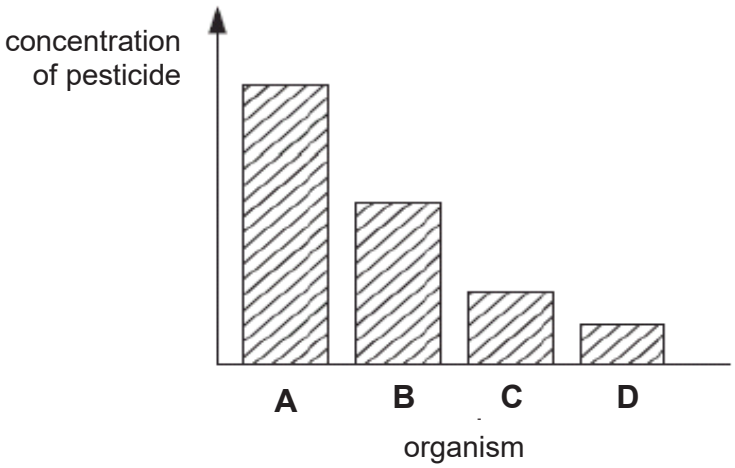
C lactic acid

D methane

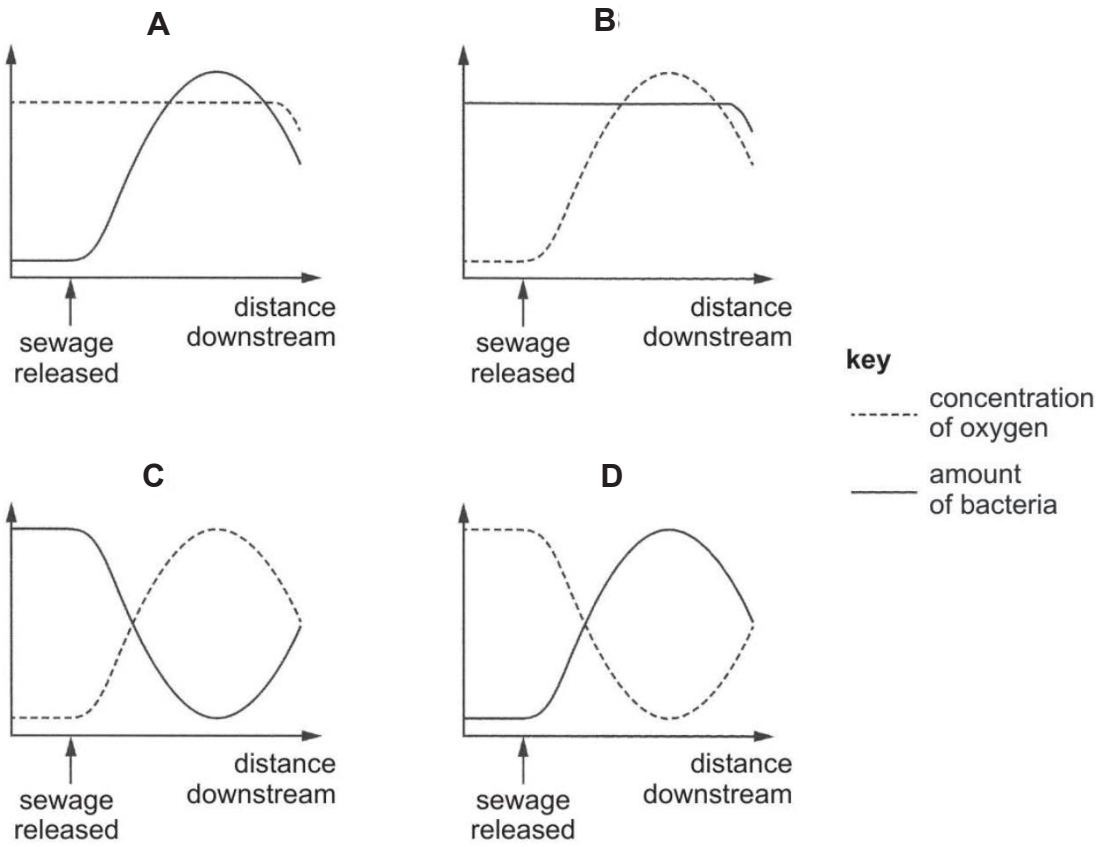
39 A food chain is listed as shown.

phytoplankton → small crustacean → frog → carnivorous bird

The chart below shows the concentration of pesticide in the bodies of the different organisms in the food chain. Which organism represents the small crustacean?



40 Untreated sewage is released into a river. This causes the amount of bacteria and the concentration of oxygen in the river water downstream to change. Which graph shows these changes?



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