Class	Register Number	Name

南洋女子中学校

NANYANG GIRLS' HIGH SCHOOL

End-of-Year Examination 2020
Secondary Three

BIOLOGY
Paper 1 Multiple Choice

45 minutes

Monday **12 October 2020** **0845 – 0930**

Additional materials: OAS

READ THESE INSTRUCTIONS FIRST

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

Write your name, register number and class at the top of this page and on the OAS in the spaces provided.

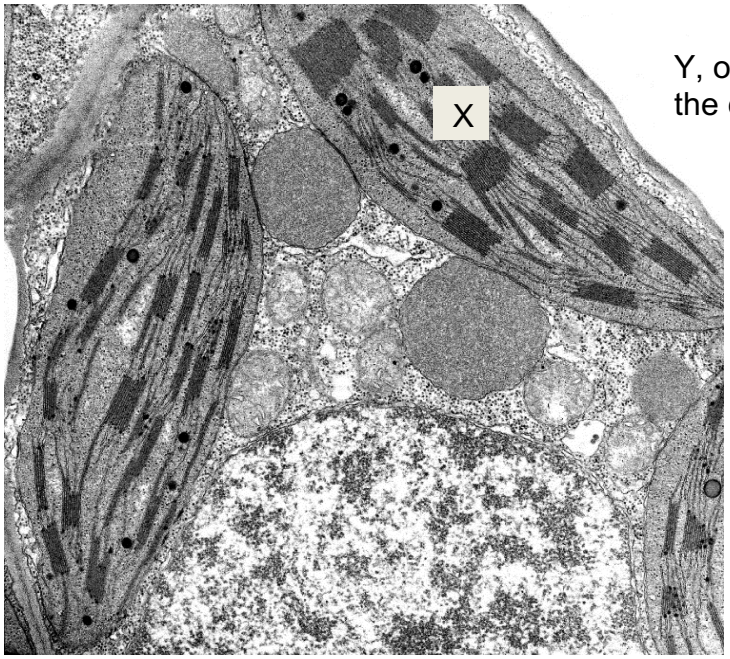
There are **thirty** questions in this paper. Answer **all** questions. For each question there are four possible answers, **A, B, C** and **D.**
Choose the **one** you consider correct and record your choice in **pencil** on the separate OAS provided.

Read the instructions on the OAS 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.
The use of an approved scientific calculator is expected, where appropriate.

1 The diagram shows part of a plant cell.

How many phospholipid bilayers will a molecule of oxygen cross to move from organelle X to Y, the outside of the cell?



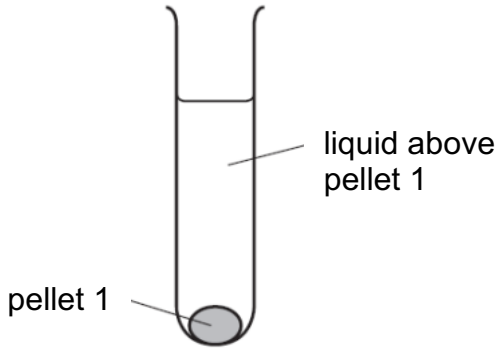
https://www.google.com/imgres?imgurl=http://botit.botany.wisc.edu/Resources/Botany/Plant%2520Cell/Electron%2520Micrographs

A 2
B 3
C 5
D 7

2 Which row identifies the function of the structures listed?

	chloroplast	endoplasmic reticulum	Golgi apparatus	ribosome
A	photosynthesis	protein synthesis	protein modification	protein secretion
B	protein transport	protein synthesis	steroid synthesis	photosynthesis
C	photosynthesis	steroid synthesis	protein modification	protein synthesis
D	energy release	protein synthesis	steroid synthesis	protein secretion

3 A cell extract was obtained by breaking apart cells to release the organelles. This extract was filtered into a centrifuge tube and then spun in a centrifuge. The heaviest organelles sank to the bottom forming pellet 1, as shown in the diagram.



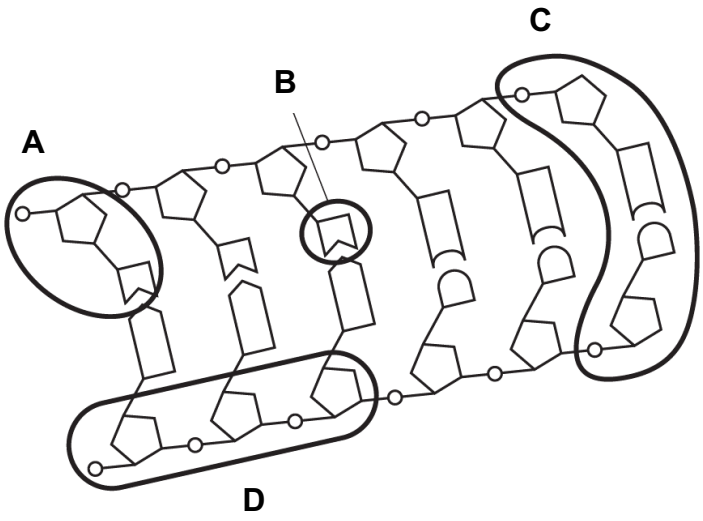
The liquid above pellet 1 was poured into a clean centrifuge tube and spun in the centrifuge at a higher speed to separate the next heaviest organelles. These organelles sank to the bottom, forming pellet 2. This procedure was two more times to obtain pellet 3 and pellet 4.

Which row identifies the organelles in each pellet?

	pellet 1	pellet 2	pellet 3	pellet 4
A	nuclei	mitochondria	ribosomes	lysosomes
B	nuclei	mitochondria	lysosomes	ribosomes
C	lysosomes	mitochondria	ribosomes	nuclei
D	ribosomes	lysosomes	mitochondria	nuclei

4 The following shows part of a DNA molecule.

Which labelled part is the nucleotide?



5 An mRNA codon for the amino acid alanine is GCG.

How many alanine molecules are present in the polypeptide, containing eight amino acids, coded for by the following template strand of DNA?

AGCGCGGCCAGCCGCGCGGCGAAT

A 0

B 1

C 2

D 3

6 A protein molecule is made up two identical α polypeptide chains and a single β polypeptide chain. The α polypeptide chain consists of 147 amino acids and the β polypeptide chain consists of 146 amino acids.

Based on the information, which of the following statement(s) is/are true?

1 There are three genes involved in producing the protein molecule.

2 The synthesis of the protein molecule requires two different mRNAs.

3 The mRNA that codes for the α polypeptide chain is 49 bases long.

4 The gene that codes for the β polypeptide chain is 438 bases long.

A 1 only

B 1 and 4 only

C 2 and 4 only

D 2, 3 and 4 only

7 A short piece of DNA that is 27 base pairs long was analysed to find the number of bases in each nucleotide strand. The results are shown below.

How many bases containing G were present in strand 1?

	number of nitrogenous bases			
	A	G	T	C
strand 1	11			
strand 2	7	3		

A 3
B 5
C 6
D 8

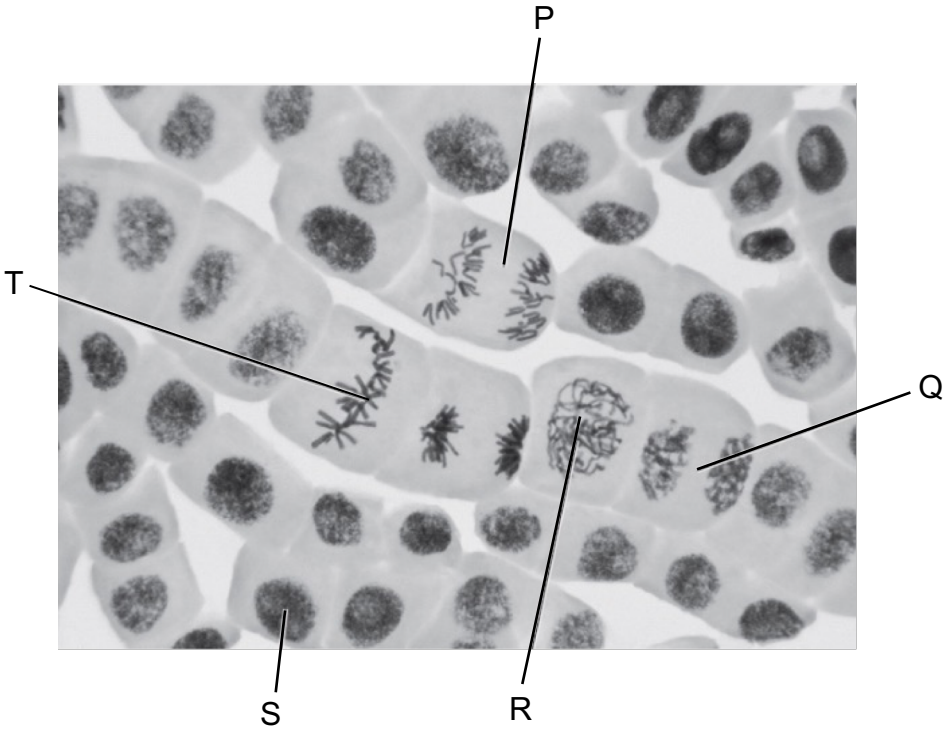
8 Which of the following about homologous chromosomes is correct?

A They are present in all cells.
B They have identical alleles.
C They have identical genes.
D They form pairs during mitosis.

9 Which of the following correctly describes a cell just before mitosis?

	number of chromatids	number of DNA molecules	spindle	nuclear envelope
A	8	4	present	present
B	8	8	absent	present
C	4	4	present	absent
D	4	8	absent	absent

10 The diagram below shows some cells from a plant.



Which of the following statement(s) is/are correct?

1 Anaphase will occur next in cell T.

2 Chromosomes are uncoiling in cell P.

3 Cytokinesis is occurring in cell S.

4 The amount of DNA in cell R is twice that in cell Q.

A 1 only
B 1 and 2 only
C 2 and 4 only
D 2, 3 and 4 only

11 In fruit flies, the allele for long wings, Q, is dominant over the allele, q, for short wings. Flies which are heterozygous for long wings were mated with flies with short wings. 150 short-winged flies were produced.

How many long-winged flies are likely to be produced?

A 75

B 150

C 180

D 210

12 Which of the statements about sickle-cell anaemia are correct?

1 People who are heterozygous for sickle cell anaemia are resistant to malaria.

2 The sickle-cell anaemia allele is common in human populations living in malarial prone areas.

3 Sickle-cell anaemia is caused by a mutation in a gene that codes for haemoglobin.

4 Whether a person has sickle cell anaemia or not is dependent on both his genotype and his diet.

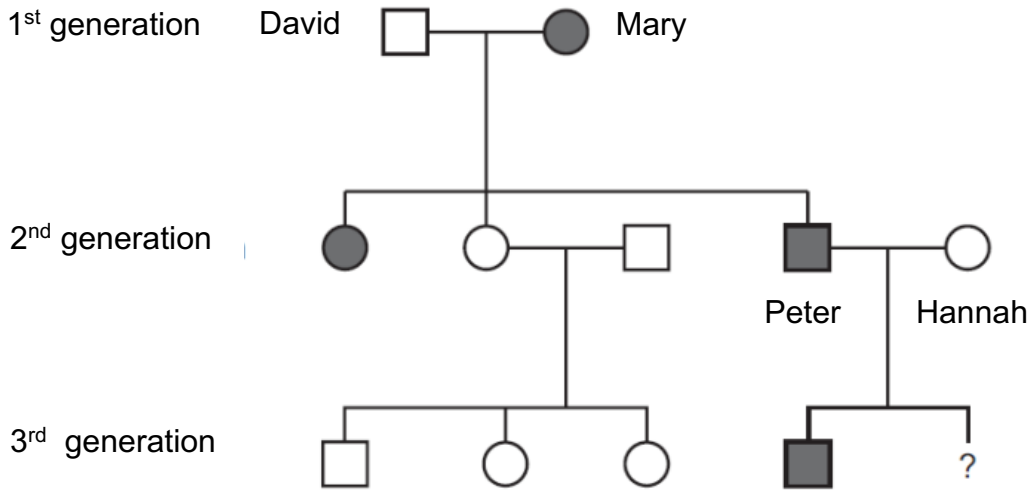
A 1 and 2

B 1 and 3

C 2 and 3

D 3 and 4

13 The pedigree shows the inheritance of the ability to taste a certain chemical. The allele for the ability to taste the chemical is dominant over 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 probability of the second child of Peter and Hannah being a boy and a non-taster?

A 0 %

B 25 %

C 50 %

D 75 %

14 Some characteristics about water are listed.

1 good solvent properties

2 high latent heat of vaporisation

3 strong adhesive forces

4 strong cohesive forces

Which characteristics about water are important for transport in the xylem?

A 1 and 2 only
B 2 and 4 only
C 3 and 4 only
D 1, 3 and 4 only

15 A polypeptide is made up of six amino acids as shown.

arginine – leucine – phenylalanine – leucine – glycine – tyrosine

Which row correctly identifies the synthesis and structure of the polypeptide?

	number of condensation reactions involved to form the polypeptide	type of linkage	number of different R groups in the polypeptide
A	5	ester	6
B	5	peptide	5
C	6	ester	6
D	6	peptide	5

16 A food label printed on the packaging of a bun is shown.

nutrient	mass per serving/ g
protein	4
starch	24
sucrose	15
fat	11

Which row shows the correct results of the various tests conducted?

	alcohol emulsion test	Benedict's test	biuret test	iodine test
A	clear mixture	red precipitate obtained	mixture turned violet	iodine solution remained brown
B	white emulsion	blue mixture obtained	mixture turned violet	iodine solution turned blue-black
C	clear mixture	blue mixture obtained	mixture remained blue	iodine solution remained brown
D	white emulsion	red precipitate obtained	mixture turned violet	iodine solution turned blue-black

17 Which of the following features increases the efficiency of magnesium ion uptake by the root hair cell?

1 has carrier proteins in the cell membrane

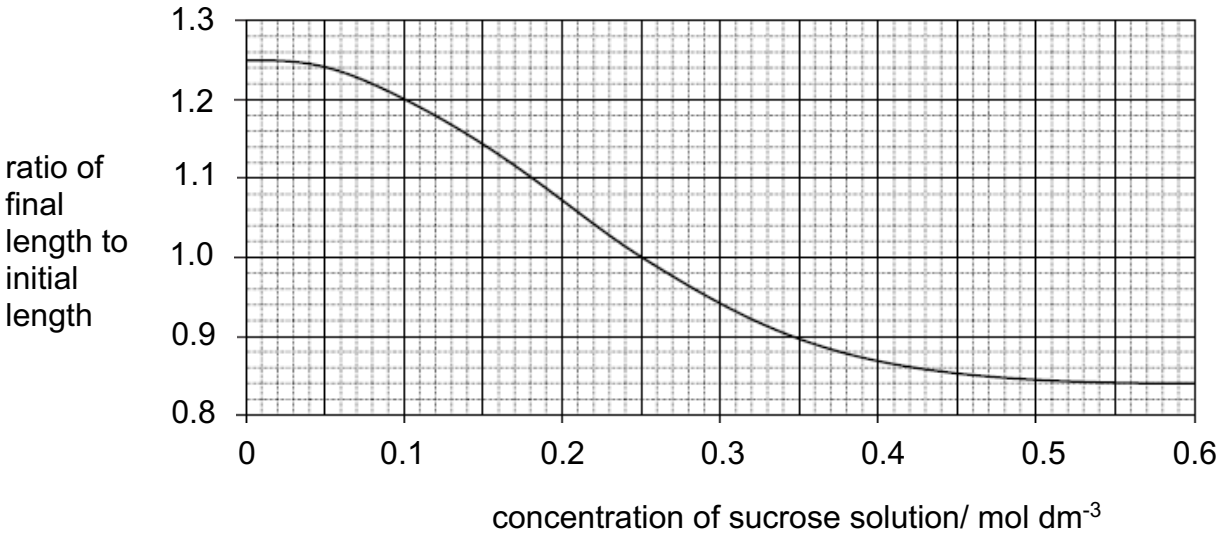
2 has a root hair

3 has a high concentration of magnesium ions in the cell sap

4 has many mitochondria

A 1 only
B 1 and 4 only
C 1, 2 and 4 only
D all of the above

18 Cylinders of potato were cut. Their initial lengths were measured. Each cylinder was then placed in a different concentration of sucrose solution for two hours. The final length of each potato cylinder was measured. The following graph was plotted.



What is the cell sap concentration of the potato cells?

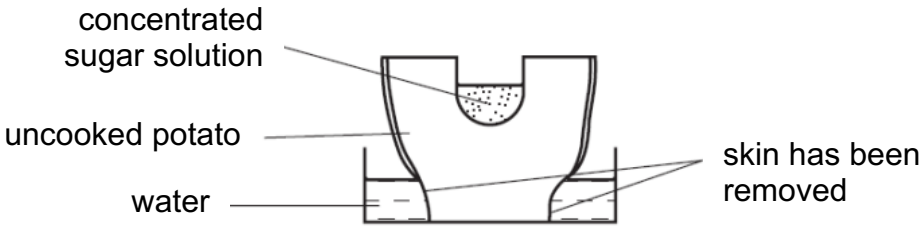
A 0.00 mol dm^{-3}

B 0.25 mol dm^{-3}

C 0.35 mol dm^{-3}

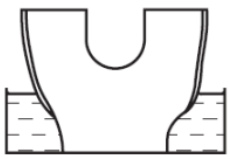
D 0.53 mol dm^{-3}

19 The diagram shows an experiment using an uncooked potato. The skin of the potato was removed as shown.

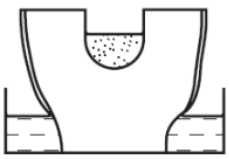


Which diagram shows the results of the experiment after 12 hours?

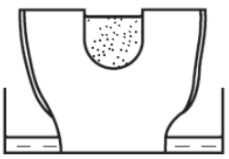
A



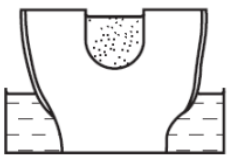
B



C



D



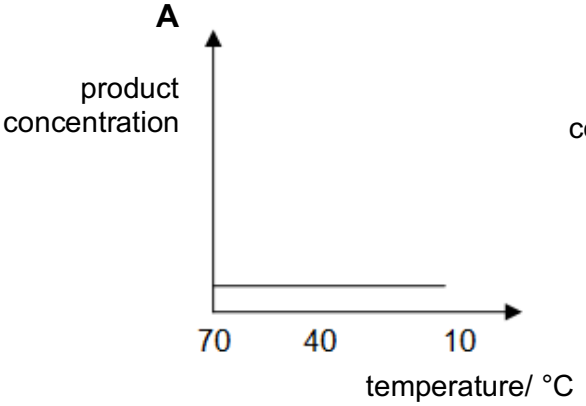
20 Which of the following correctly identifies the "lock" and "key" in an enzyme catalysed reaction?

	lock	key
A	amylase	maltose
B	lactase	lactose
C	peptidase	protein
D	polypeptide	protease

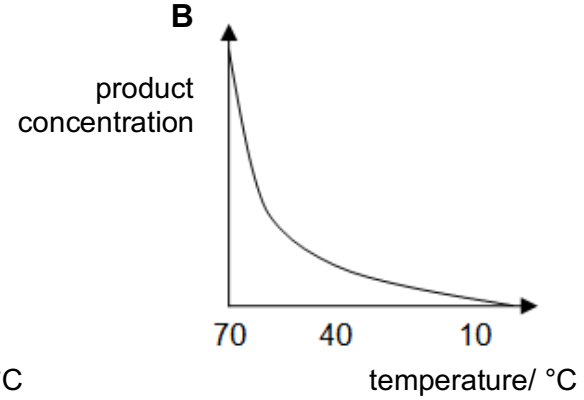
21 An enzyme catalysed reaction was heated to 70 °C and then cooled to 40 °C and finally 10 °C.

Which graph represents the effect of temperature on the concentration of product?

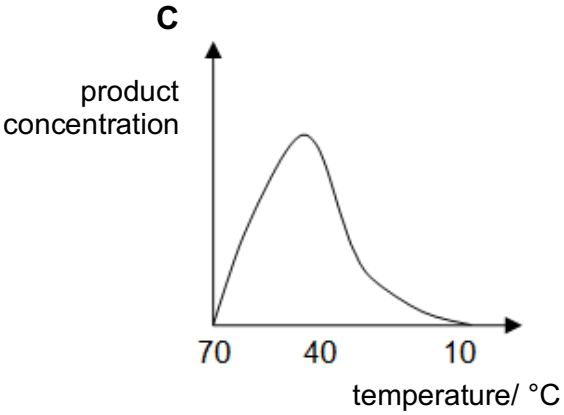
A



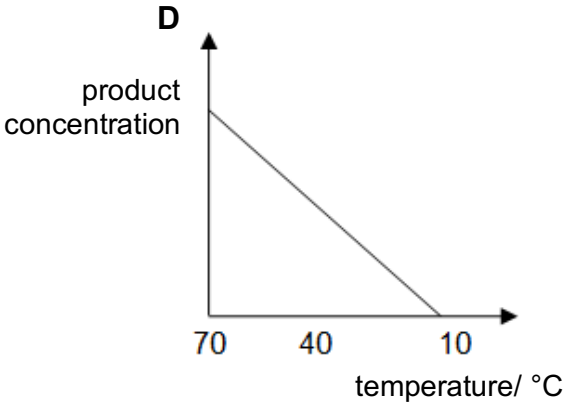
B



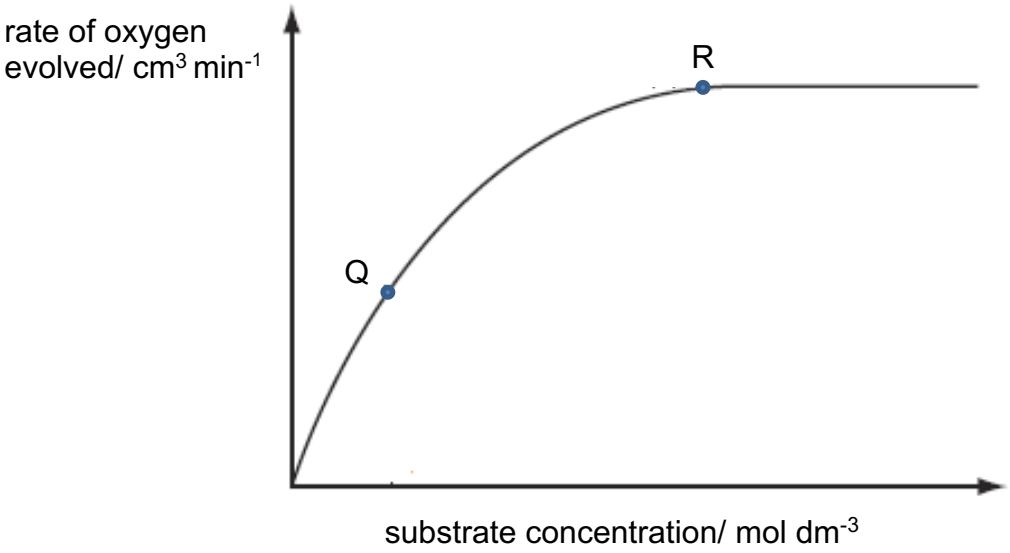
C



D



22 Catalase catalyses the decomposition of hydrogen peroxide into water and oxygen. The effect of hydrogen peroxide concentration on the rate of the enzyme catalysed reaction is shown in the graph.



1 At Q, the rate of reaction is limited by substrate concentration.

2 At R, all substrates are denatured.

3 Beyond R, rate of reaction is limited by enzyme concentration.

4 Q is the highest rate of reaction when substrate concentration is limiting.

Which of the following statements about the diagram is correct?

A 1 and 2
B 1 and 3
C 2 and 4
D 3 and 4

23 Some processes that occur in the body are listed.

1 deamination of amino acids

2 formation of urine

3 storage of iron

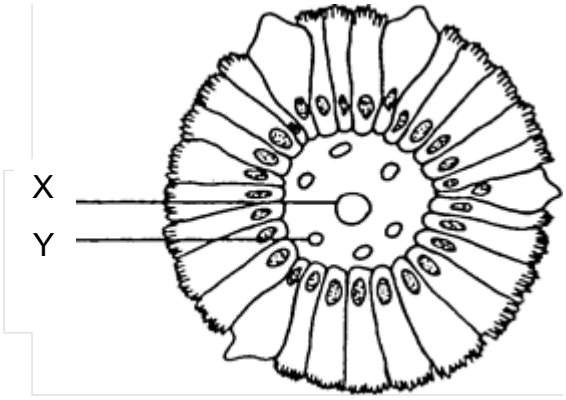
4 synthesis of glycogen

Which processes occur in the liver?

A 1 and 3 only
B 1 and 4 only
C 2 and 3 only
D 1, 3 and 4 only

24 The diagram shows the transverse section of an intestinal villus.

After a meal of French fries, what can be found in X and Y?

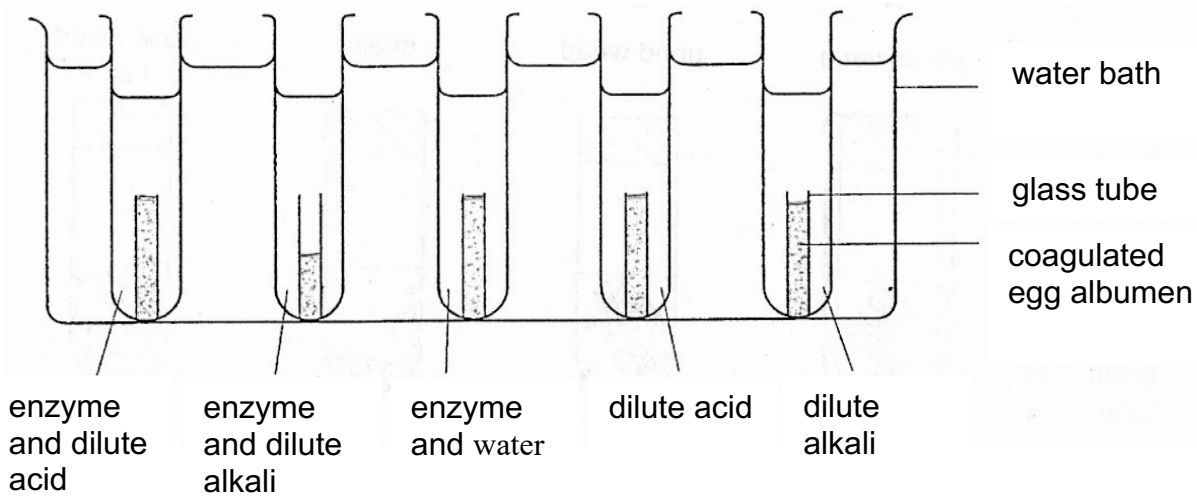


	X	Y
A	glucose	amino acids
B	fats	maltose
C	glucose	fatty acids and glycerol
D	fats	glucose

25 Which row correctly identifies the function of the colon?

	secretes digestive enzymes	absorption of water
A	✓	×
B	✓	✓
C	×	×
D	×	✓

26 An experiment was set up to investigate the effects of an enzyme obtained from the human digestive system, on coagulated egg albumin. The results, after three hours, are shown in the diagram.



Based on the results, where in the digestive system might the enzyme be produced?

A duodenum

B gall bladder

C liver

D stomach

27 Diagram 1a shows a plant cell. Diagram 1b shows a section through the leaf.

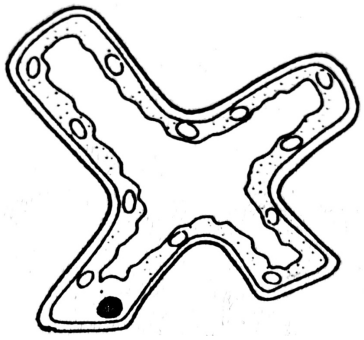


diagram 1a

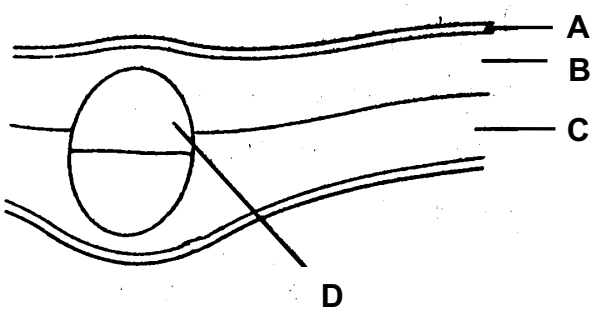
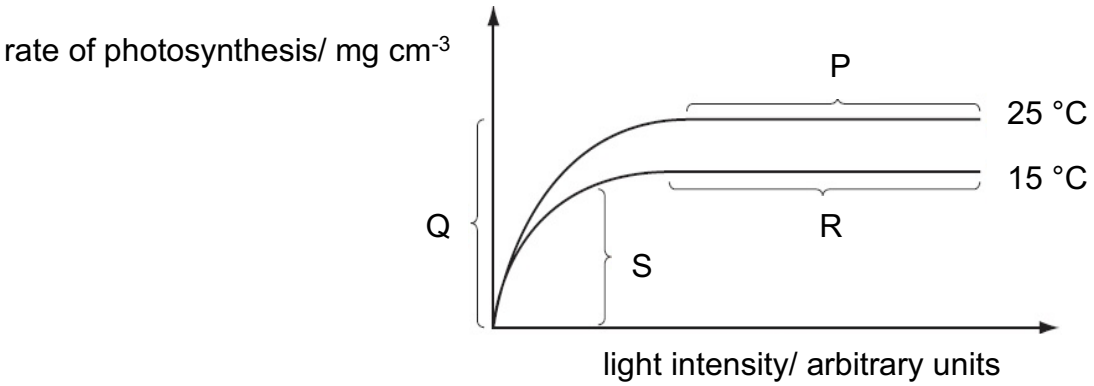


diagram 1b

In which part of the leaf shown in diagram 1b would the cell in diagram 1a be found?

28 The graph shows how the rate of photosynthesis varies with light intensity at two different temperatures. Other variables are kept the same.

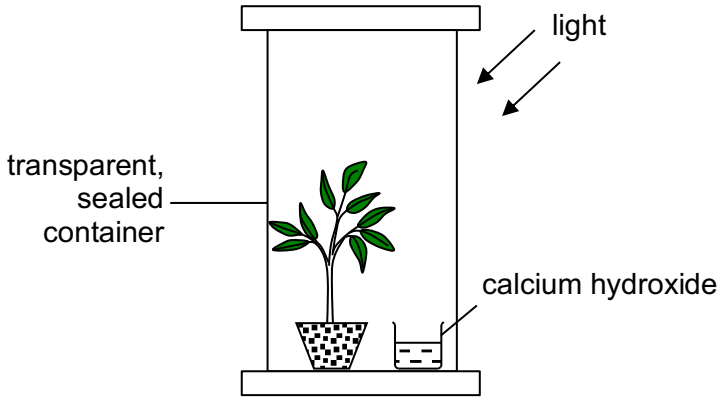


In which sections of the graph is light intensity limiting the rate of photosynthesis?

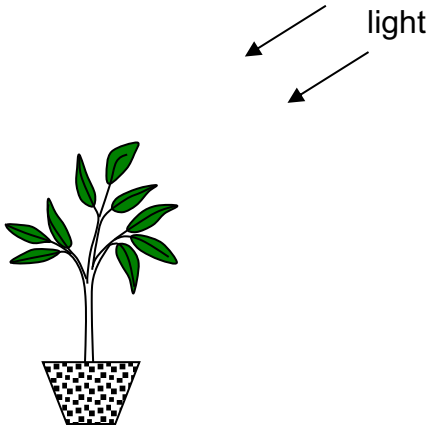
A P and Q
B P and R
C Q and S
D R and S

29 The diagram (not drawn to scale) shows an experiment to investigate if a certain factor is needed for photosynthesis.

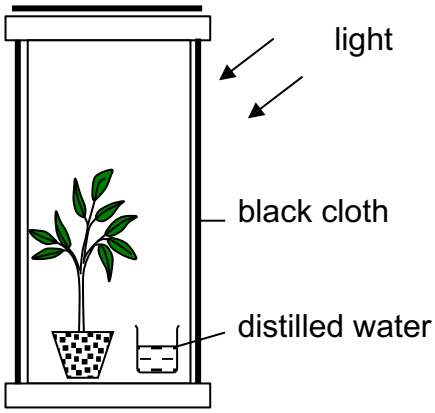
What could be the control for this experiment?



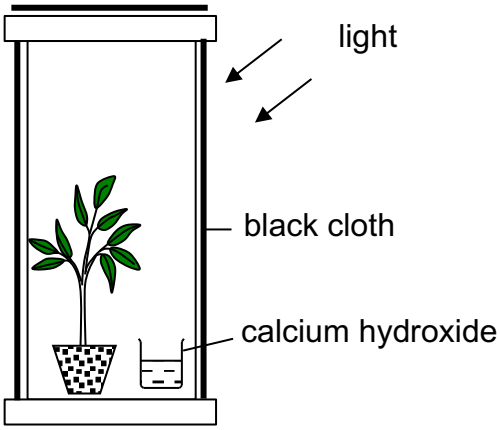
A



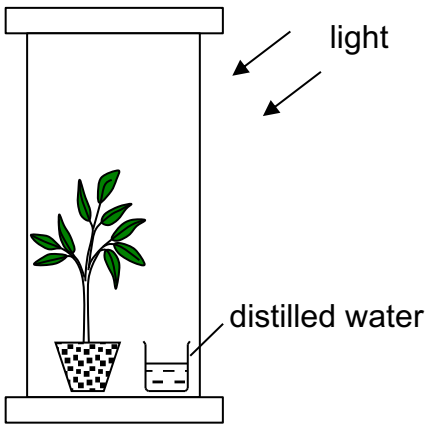
B



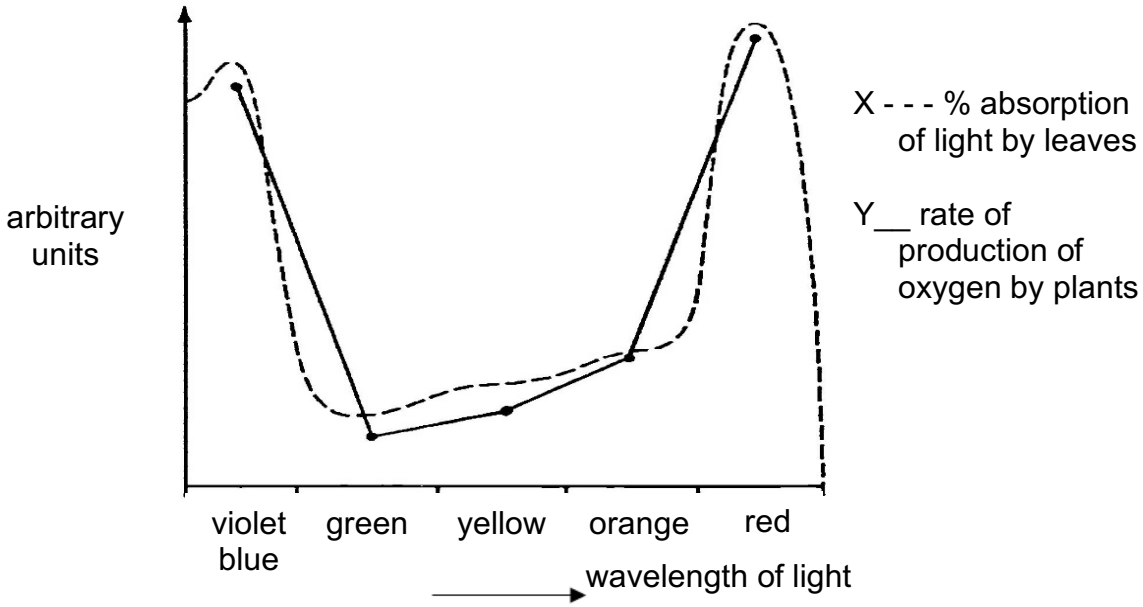
C



D



30 The graph shows the effect of different wavelengths of light on processes taking place in green plants.



What can be concluded from the graph?

A No photosynthesis occurs in yellow light.

B Rate of photosynthesis is highest in violet and red lights but lowest in green light.

C Rate of respiration is higher than rate of photosynthesis in orange light.

D Rate of respiration is highest in green light and lowest in red and violet light.

End of Paper 1