ZIMBABWE SCHOOLS EXAMINATION COUNCIL

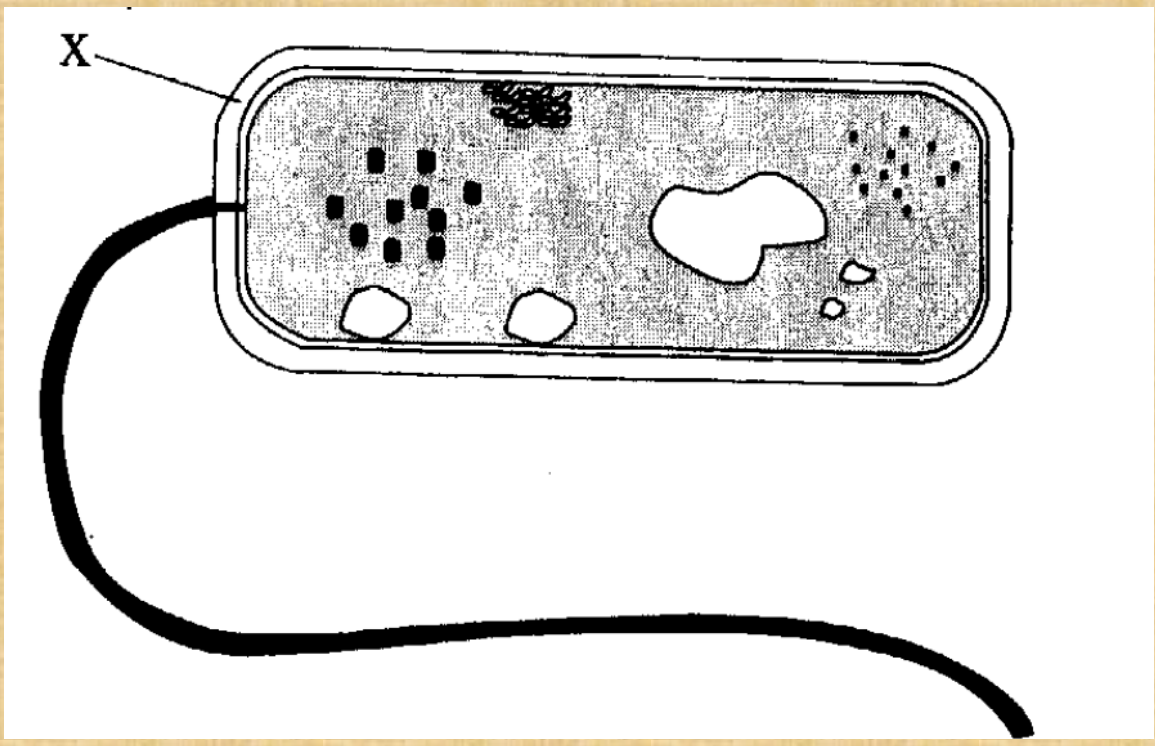
A' LEVEL BIOLOGY PAPER 1

NOVEMBER 2009

1. Which molecule acts as receptor sites on cell surface membranes?

a. cholesterol
b. glycoproteins
c. phospholipids
d. channel proteins

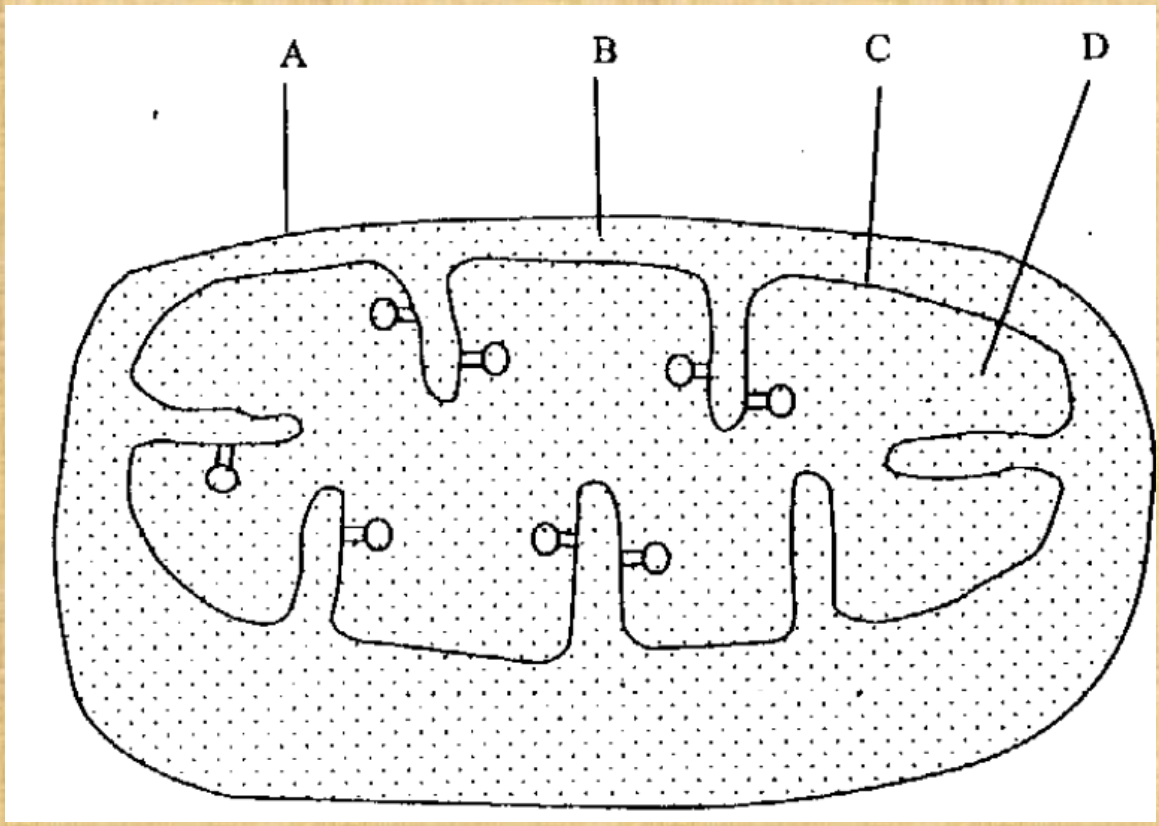
2. The diagram shows an organism



What is the main strengthening material in structure X?

a. cellulose
b. chitin
c. lignin
d. murein

3. The diagram shows the structure of a mitochondrion.



Which labeled part is more selectively permeable?

4. Which statement correctly describes why water molecules have high heat capacity?

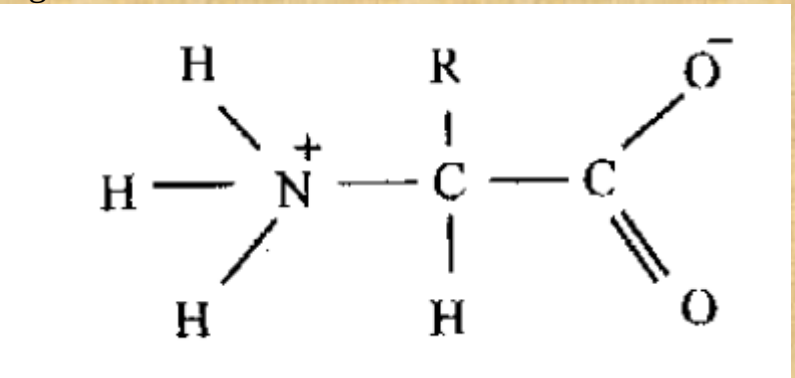
a. The H- bonds in water do not break easily.

b. Ionic bonds attract water molecules more strongly

c. The surface tension of water molecules is very high.

d. Water becomes more dense as its temperature approaches 40C.

5. The diagram shows the structure of an amino acid.



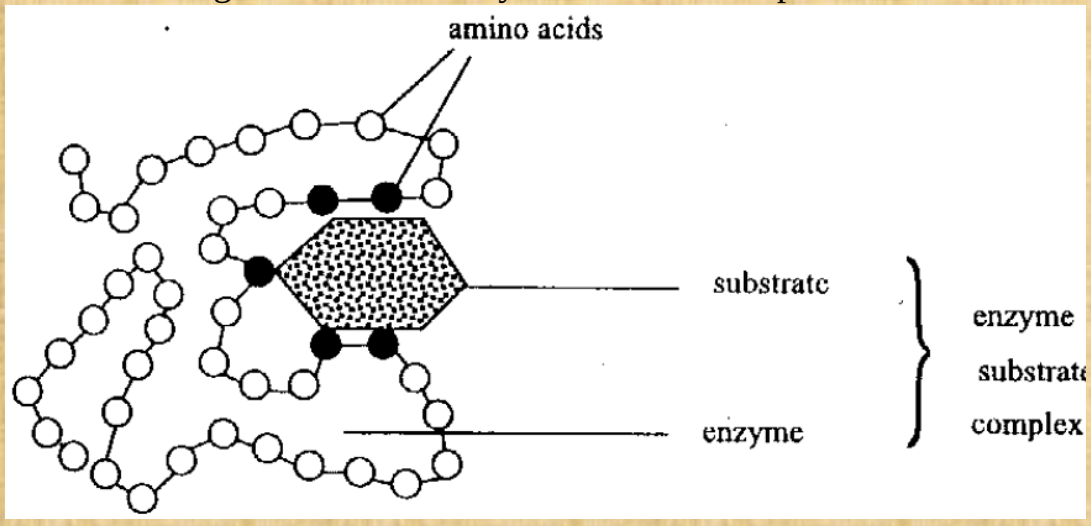
Which properties are shown by this amino acid?

a. zwitterions and acidic
b. amphoteric and electrically neutral
c. acidic and electrically neutral
d. zwitterions and basic

6. What is the correct number of carbon, hydrogen and oxygen atoms in the sugar maltose?

	Carbon	Hydrogen	Oxygen
a.	6	12	6
b.	6	12	5
c.	12	22	11
d.	12	24	12

7. The diagram shows an enzyme substrate complex.



What are the roles played by the amino acids within the enzyme?

	Shaded amino acids	unshaded amino acids
a.	form active sites	form allosteric sites
b.	maintain enzyme globular shape	form allosteric sites
c.	form active sites	maintain enzyme globular shape
d.	form allosteric sites	maintain enzyme globular shape

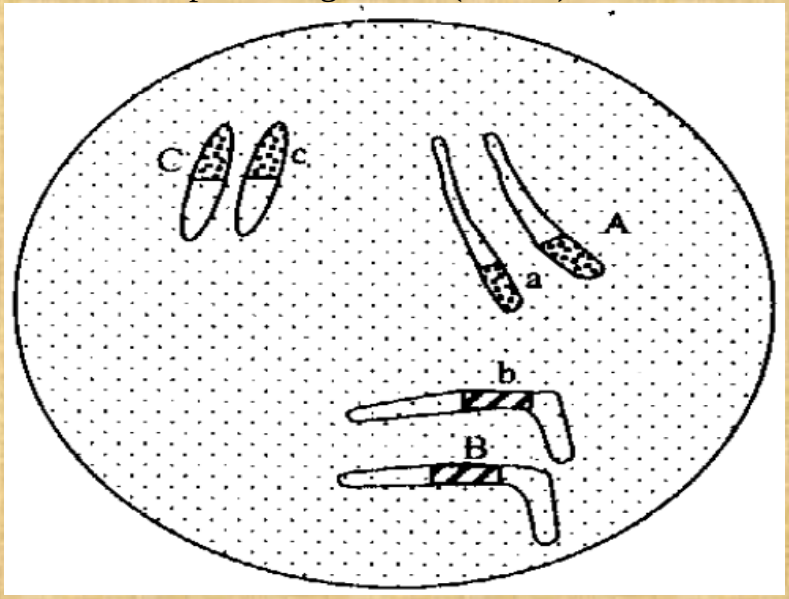
8. Which of the following is true of enzyme reactions?

a. The enzymes increase the activation energy required and therefore the faster the rate of reaction.
b. The enzymes decrease the activation energy required and therefore the faster the rate of reaction.
c. The enzymes decrease the kinetic energy of the reactants and hence speed up rate of reaction.
d. The enzymes increase the kinetic energy of the reactants and hence speed the rate of reaction.

9. During which phase of meiosis are chiasmata formed?

a. anaphase I
b. prophase I
c. metaphase I
d. metaphase II

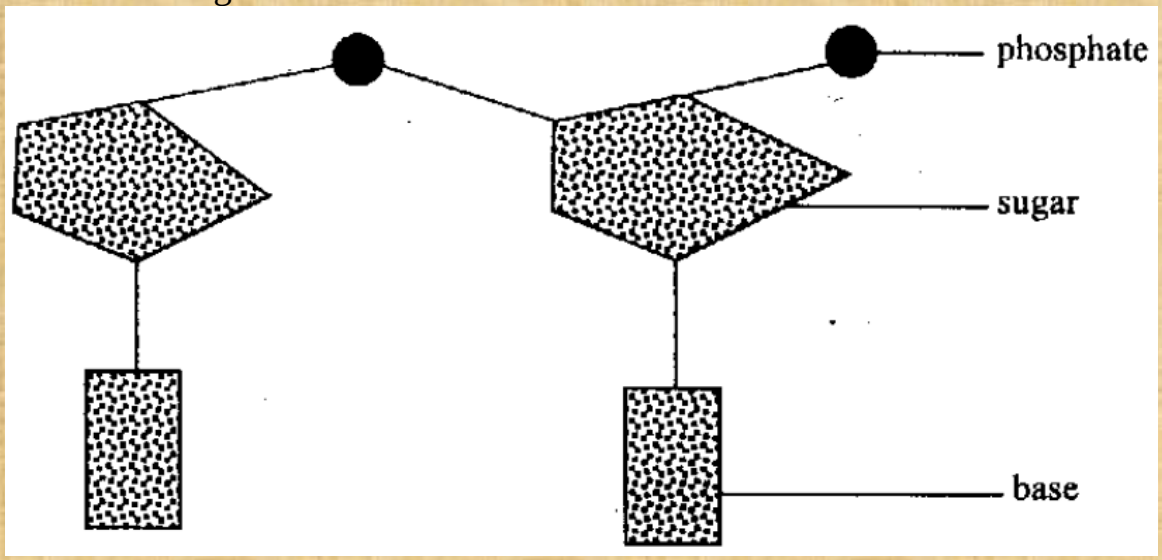
10. The diagram shows a diploid cell. The cell is at early interphase and undergoes meiosis to produce gametes (2n = 6)



How many different genotypes may be present in the haploid gametes?

a. 3
b. 6
c. 8
d. 12

11. The diagram shows the structure of a dinucleotide



What is the maximum number of water molecules that are released when all the individual components join together to form the dinucleotide?

a. 1
b. 2
c. 4
d. 5

12. Which statement best describes a codon?
a. It is a section of a DNA molecule which can undergo a mutation.
b. It is a section of a DNA molecule which codes for an amino acid
c. It is a section of a mRNA molecule which codes for an amino acid.
d. It is a section of a tRNA molecule which recognizes the triplet code on mRNA.

13. Which type of enzyme is used to join short segments of DNA during replication on the 3' to 5' strand?
a. helicase
b. hydrolase
c. ligase
d. polymerase

14. Which term describes a genetic condition in which a gene has the same type of allele at its locus on the homologous chromosomes?
a. codominant
b. heterozygous
c. homozygous
d. dominant

15. A girl with blood group O is born to parents of blood group A.

What is the probability that their next child is a boy of blood group O?
a. 0, 125
b. 0, 25
c. 0, 50
d. 0, 75

16. In tobacco plants, white flowers and hairy seeds are recessive to yellow flowers and smooth seeds. Cross pollinating two plants both heterozygous for both features produced 400 seeds of which 256 were successfully germinated and grown to adult plants.

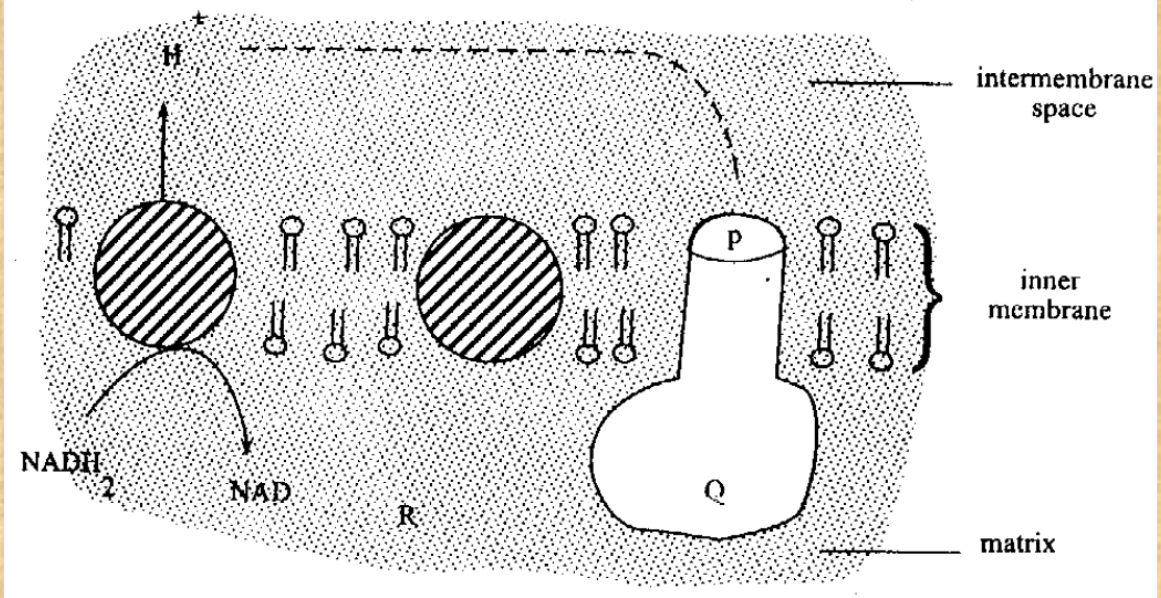
How many of the young plants would be expected to grow and produce white flowers and smooth seeds?

a. 16
b. 48
c. 96
d. 120

17. Which metal, present in its ion state is found in the pophyrin ring of the chlorophyll molecule?

a. copper
b. iron
c. magnesium
d. zinc

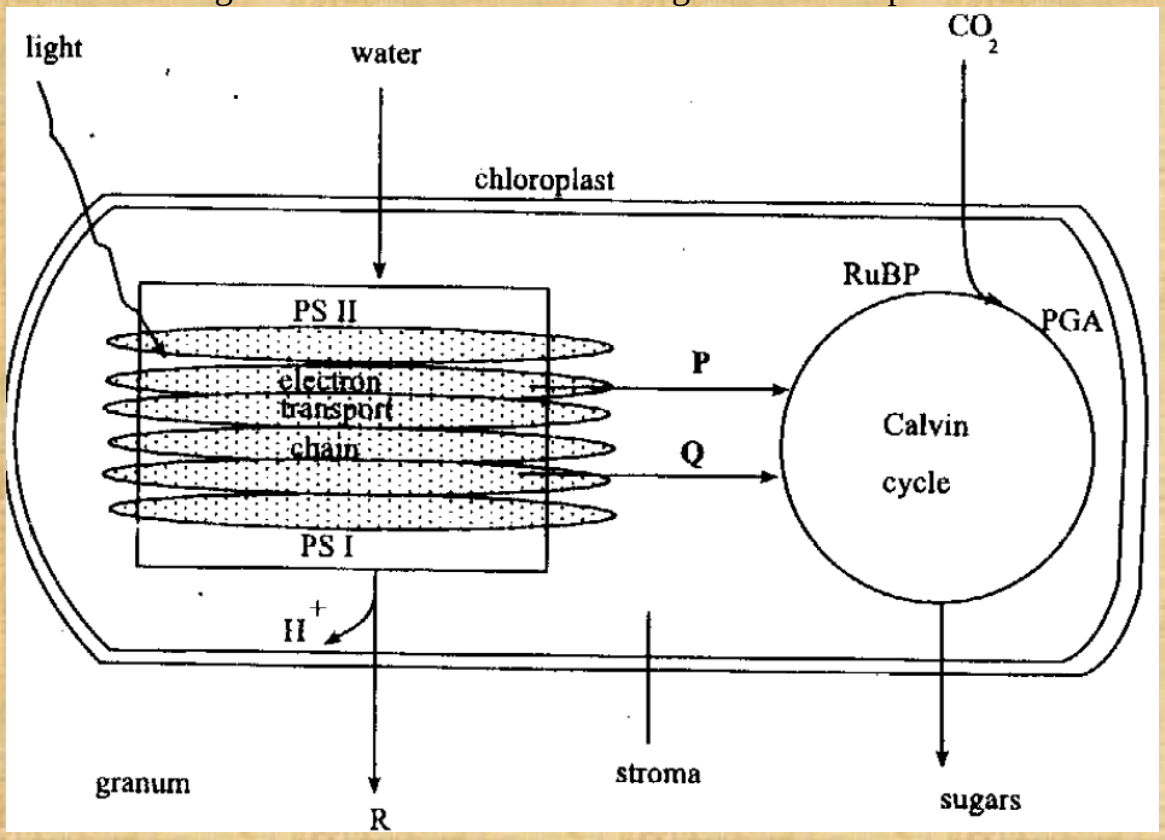
18. The diagram shows the inner membrane of the mitochondrion.



What reactions occur at P, Q and R?

	P	Q	R
a.	phosphorylation	Krebs cycle	electron transport
b.	electron transport	phosphorylation	Krebs cycle
c.	phosphorylation	electron transport	Krebs cycle
d.	electron transport	Krebs cycle	phosphorylation

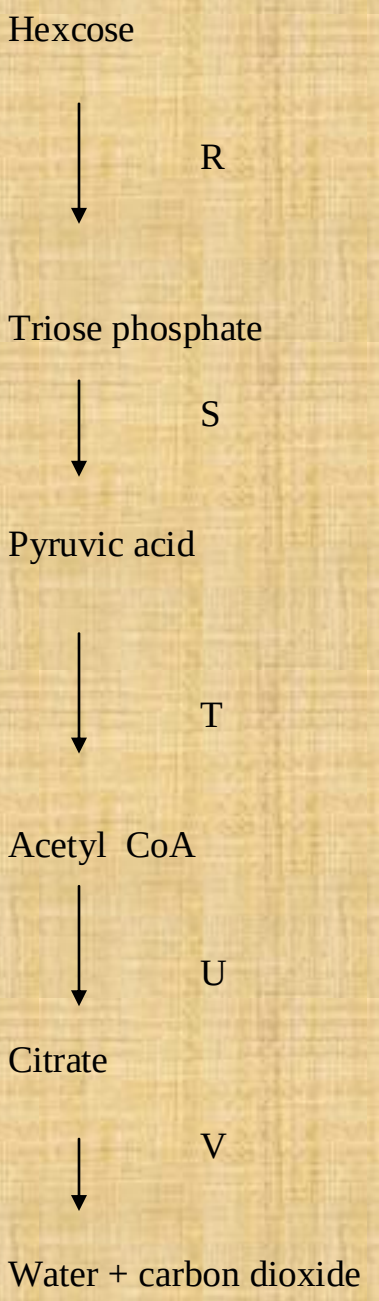
19. The diagram shows reactions occurring in the chloroplast.



What are the products P, Q and R?

	P	Q	R
a.	NADPH2	water	ATP
b.	ATP	Oxygen	NADPH2
c.	NADPH2	ATP	oxygen
d.	ATP	NADPH2	Oxygen

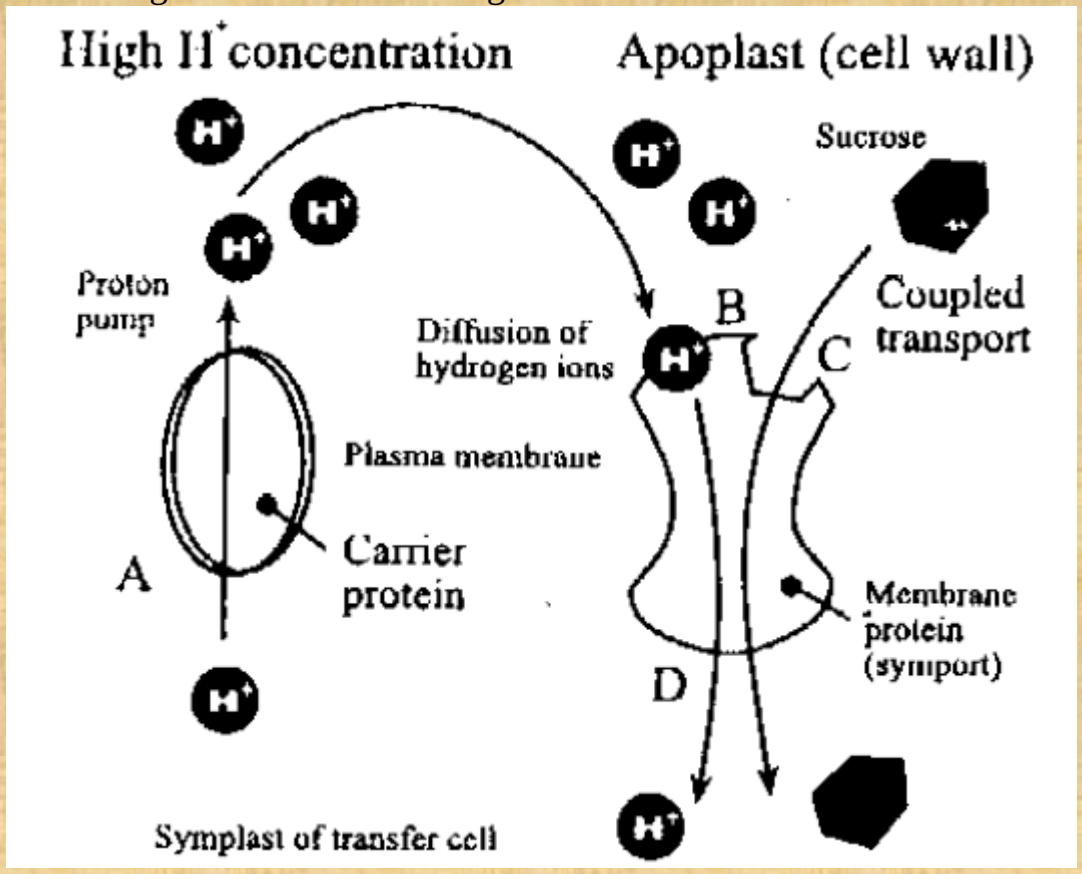
20. The diagram shows a summarised respiratory pathway.



Which stages produce ATP molecules directly?

a. S and V
b. R and U
c. S and U
d. R and S

21. The diagram shows the loading of sucrose into a transfer cell.



At which stages labeled A, B, C and D are ATP molecules hydrolysed?

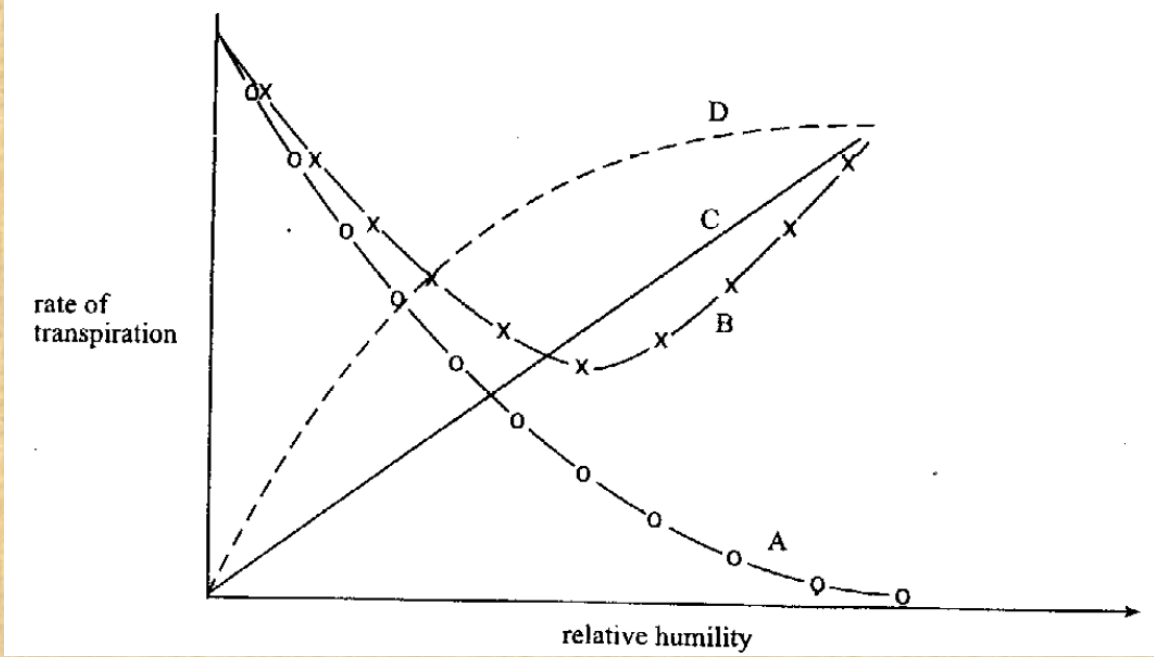
22. Below are important properties of water molecules.

1 high heat capacity
2 high latent heat of vaporization
3 strong cohesive forces
4 strong adhesive forces
5 low viscosity
6 universal solvent

Which set of properties are important in movement of water within a plant?

a.	1	2	3
b.	2	3	4
c.	3	4	5
d.	4	5	6

23. Which graph shows the effect of humidity on transpiration?



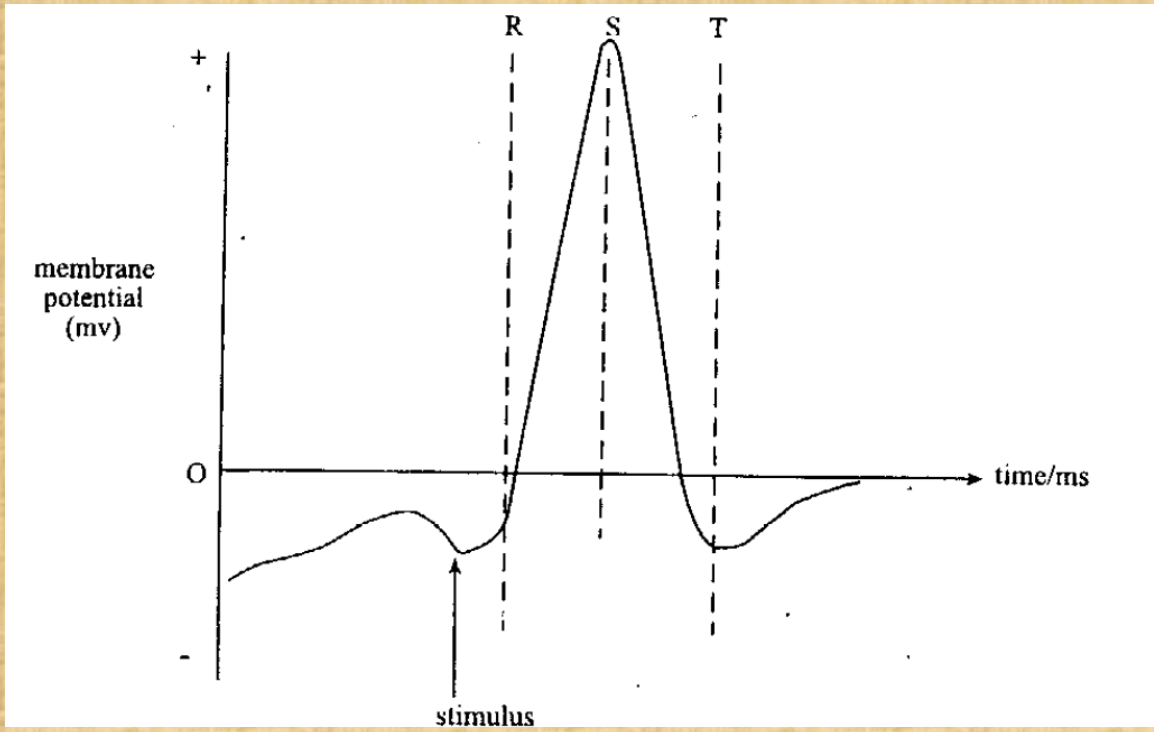
24. Which substance is mainly translocated by the phloem sieve elements?

a. amino acid
b. fructose
c. glucose
d. sucrose

25. Which membrane can become hyperpolarized due to overstimulation in a cholinergic synapse?

a. mitochondrial envelope membrane
b. post synaptic membrane
c. presynaptic membrane
d. transmitter vesicle membrane

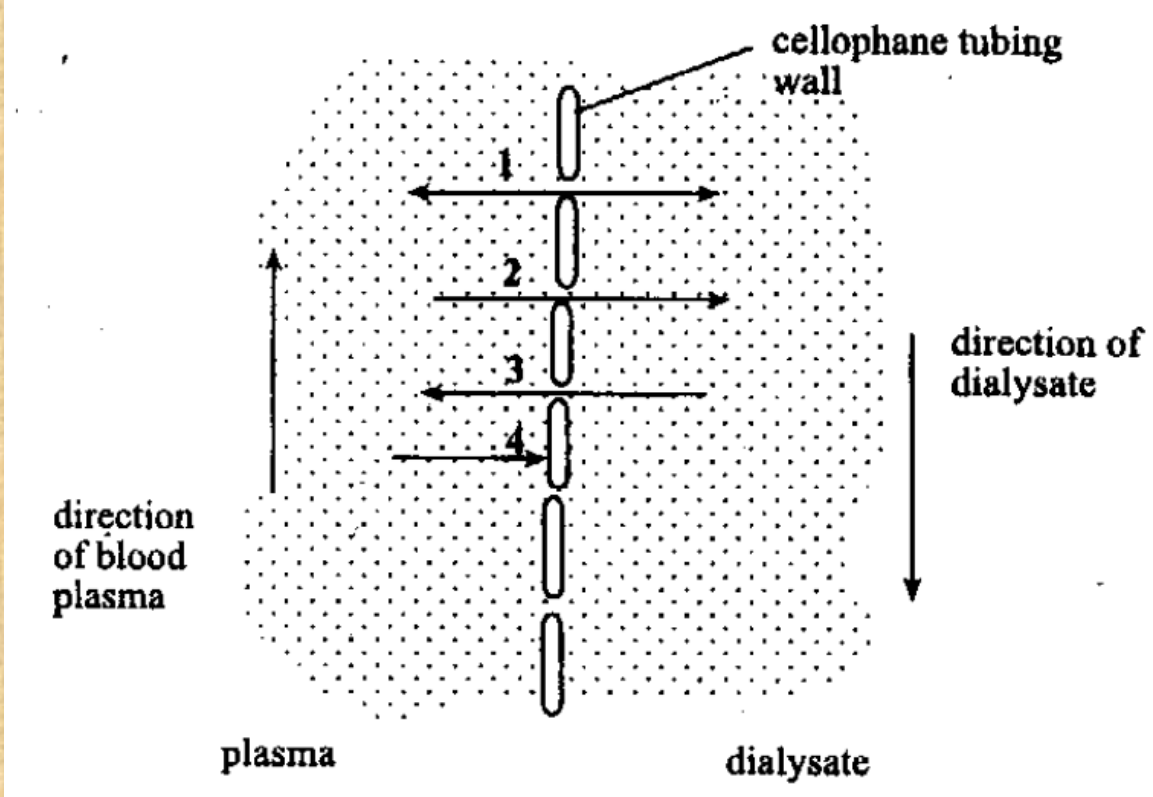
26. The diagram shows an action potential in the neurone of a squid.



Which processes are occurring within the neurone?

	Stages	
	R & S	S & T
A	Inflow of Na+	Outflow
B	Outflow of K+	Inflow of Na+
C	Outflow of Na+	Inflow of K+
D	Inflow of K+	Outflow of Na

27. The diagram shows the relationship between the cellphone tubing, dialysate and blood plasma in a kidney machine.



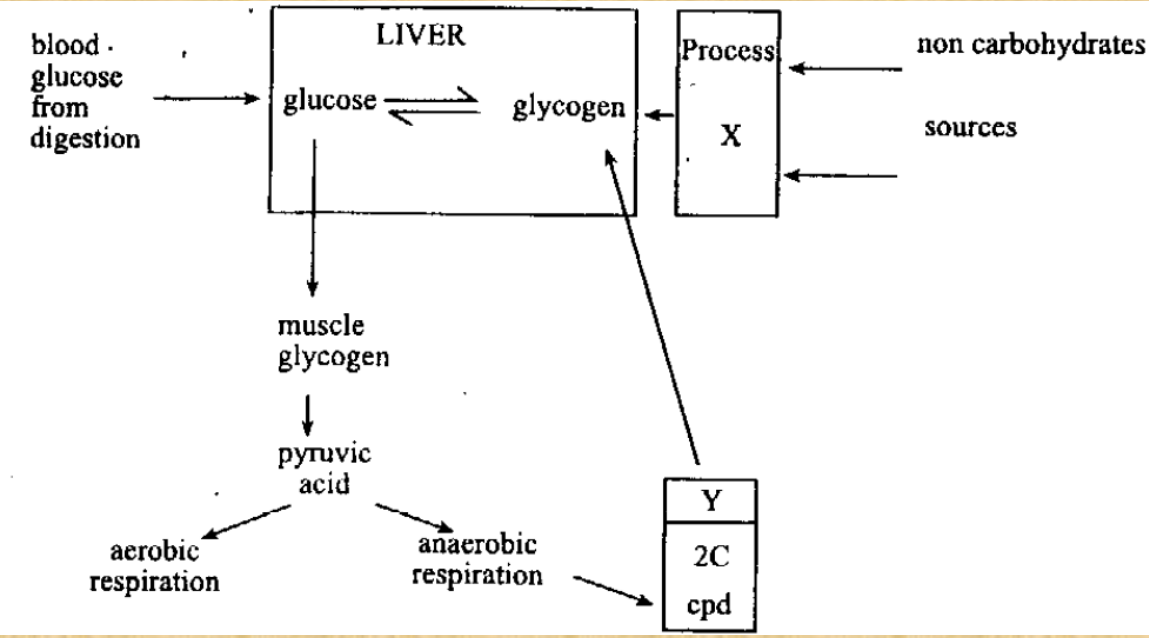
Which numbers represent the direction of movement of glucose and dissolved protein?

	Glucose	dissolved protein
a.	1	2
b.	1	4
c.	2	3
d.	3	2

28. In which part of the kidney tubules does ADH regulate the water content of the blood?

a. proximal convoluted tubes
b. ascending limb of loop of Henle
c. descending limb of loop of Henle
d. collecting duct

29. The diagram shows part of carbohydrate metabolism in the liver.



What is the process X and compound Y?

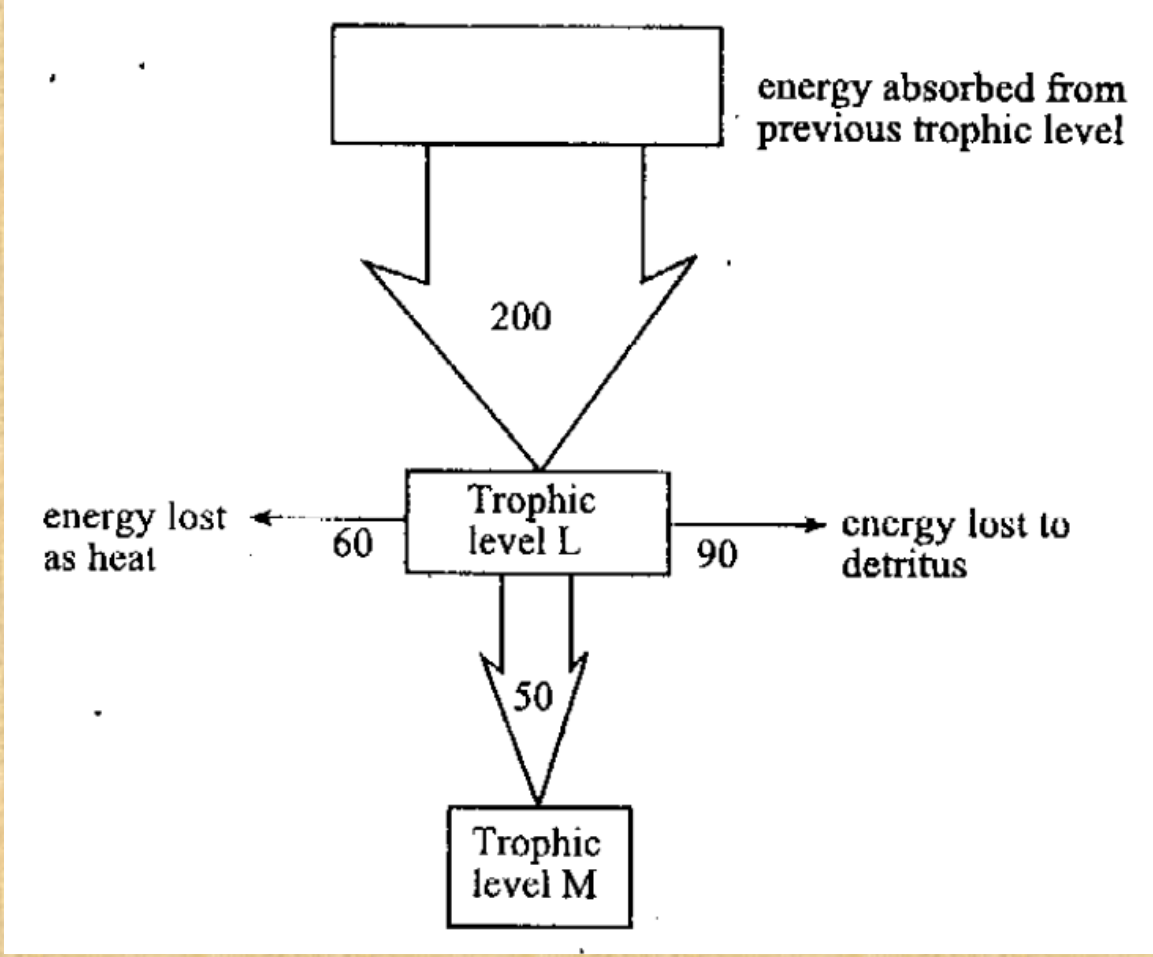
	X	Y
a.	glycogenesis	lactic acid
b.	glycogenolysis	alcohol
c.	gluconeogenesis	lactic acid
d.	glycolysis	alcohol

30. Sulphur dioxide gas from combustion of fossil fuels oxidizes in the air to form sulphur trioxide. Sulphur trioxide then dissolves in the atmosphere to form sulphurous acid in acid rain.

Which statement describes the effects of the acid rain on land ecosystems?

a. leads to increased leaching of mineral ions
b. aluminium ions in the soil become more stable.
c. Depletes oxygen from air in the soil
d. Leads to death offish and soil bacteria.

31. The diagram shows energy transfer between 3 trophic levels in KJm-2yr-1



What is the efficiency of energy transfer between trophic levels L and M?

a. 10%
b. 25%
c. 50%
d. 75%

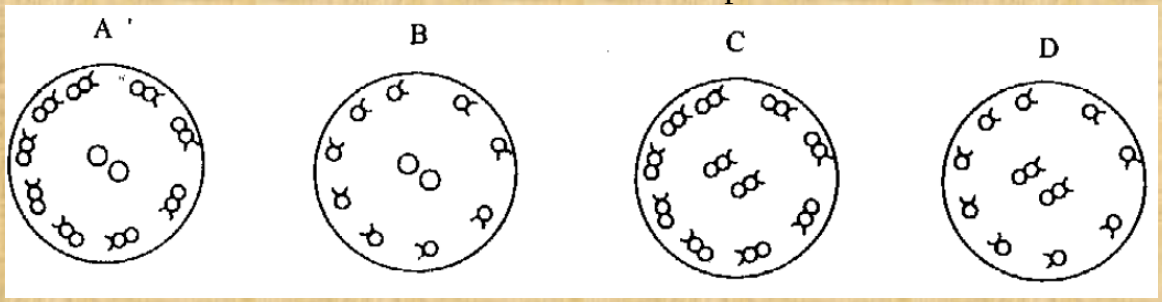
32. Which of the following correctly shows the role of nitrifying bacteria?

a. ammonium compounds nitrites nitrogen
b. ammonium compounds nitrites nitrate
c. nitrites ammonium compounds nitrates
d. nitrates ammonium compounds nitrites

33. Which of the following is a function of both oestrogen and progesterone during pregnancy?

a. increase ATP and creative phosphate formation
b. maintain the size of uterus muscles
c. prevent infection in the uterus
d. promote growth of mammary glands

34. Which cross sectional diagrams correctly shows 9 + 2 arrangement of microtubules in the axial filament of the sperm cell?



35. The picture shows grass plants which colonized an area by reproducing through rhizomes.

What is the major disadvantage of this type of reproduction?

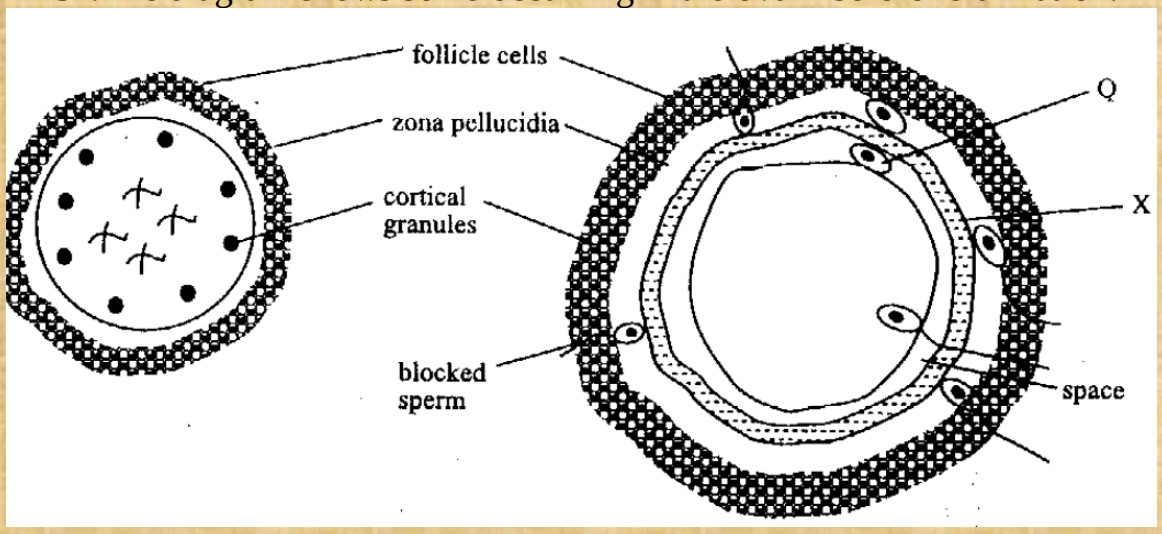
a. wastage of gametes as the pollen is blown away by the wind
b. no generic variation and is susceptible to diseases
c. overcrowding leading to exhausting of resources e.g nutrients
d. young plants quickly become independent from the parental plants.

36. Some indigenous seeds germinate more easily when the testa has been scratched or when partially burnt.

Which statements explain how breaking the testa directly breaks dormacy in these seeds?

a. removes growth inhibitors in outer layers
b. water and oxygen can enter the seeds
c. activates enzymes to start germination
d. raises the level of gibberrellic acid

37. The diagram shows some occurring in the ovum before fertilization.



What is structure Q and the reaction producing structure X?

	Structure Q	reaction leading to structure X
a.	first polar body	capacitation
b.	second polar body	cortal reaction
c.	first polar body	cortial reaction
d.	second polar body	acrosome reaction

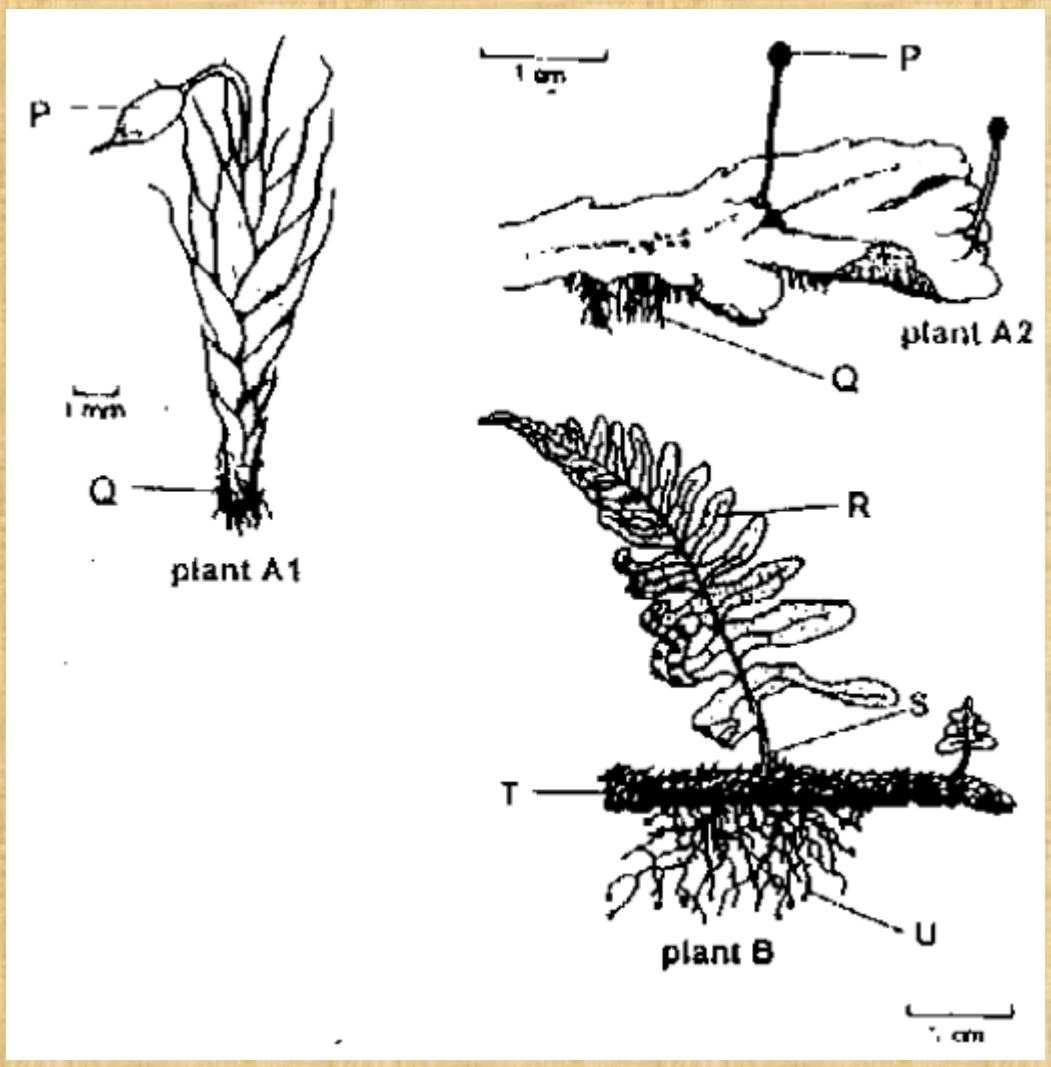
38. The following processes are phases of growth

1 replication in cells
2 mitosis
3 cell expansion
4 cell differentiation
5 senescence

Which set of processes contribute to positive growth?

a. 1 3 4
b. 2 3 5
c. 1 2 4
d. 3 4 5

39. The diagram shows three plants which normally grow in damp shaddy habitats.



What are the structures P, Q and R?

	P	Q	R
a.	capsule	rhizoids	adventitious roots
b.	sporophyte	root hairs	adventitious roots
c.	sporophyte	rhizoids	root hairs
d.	capsule	root hairs	rhizoids

40. Which contains the largest number of organisms?
    a. genus
    b. family
    c. order
    d. class