



SUBJECT: **Biology**
 PAPER NUMBER: I
 DATE: 30th August 2018
 TIME: 9:00 a.m. to 11:05 a.m.

ANSWER ALL QUESTIONS IN THIS PAPER IN THE SPACES PROVIDED.

1. Figure 1.1 below shows a diagram of a section of a dicot leaf as seen under a microscope.

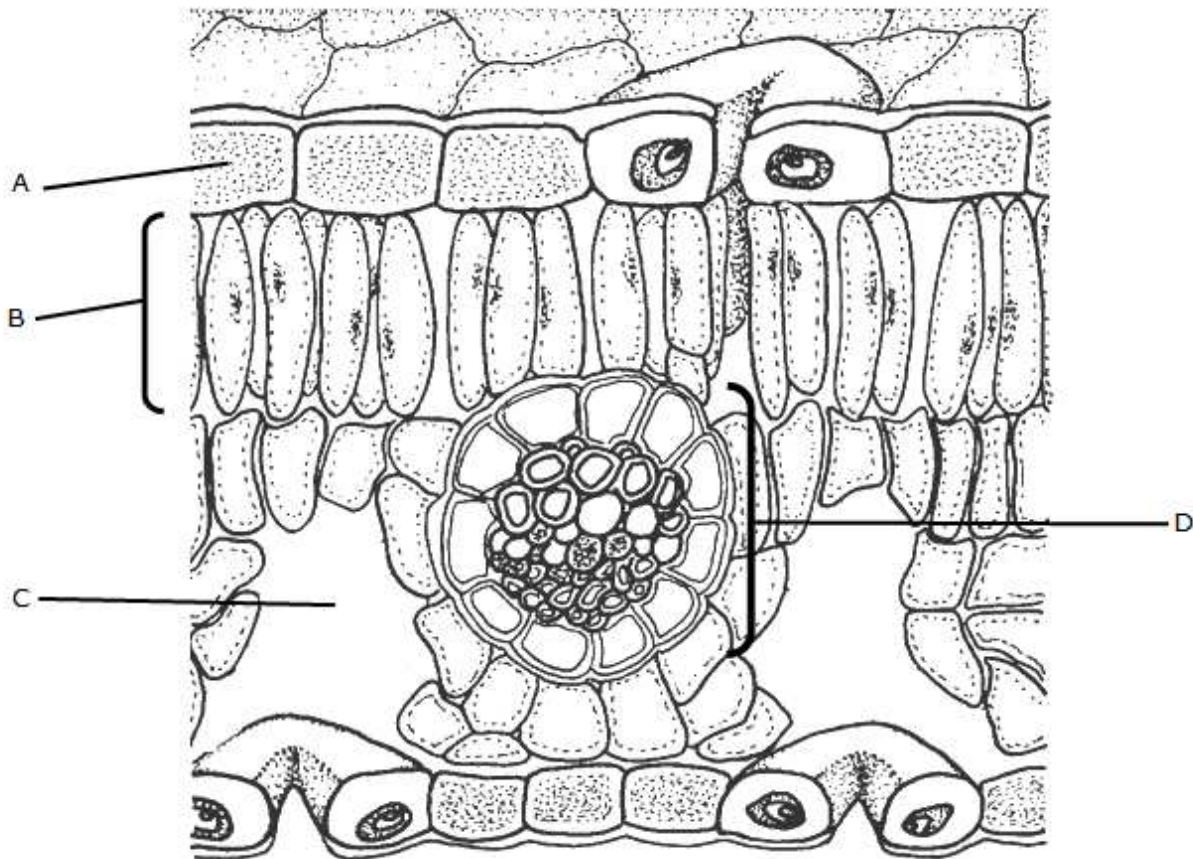


Figure 1.1 Diagram showing a cross-section through a dicot leaf

<http://www.drDiagram.com/dicot-leaf-diagram/>

a. Name the structures labelled A, B, C, D.

A: _____

Layer labelled B: _____

C: _____

D: _____ (4)

b. Describe **ONE** function of structures A, B and D.

A: _____

B: _____

D: _____

_____ (3)

An experiment was carried out to determine the effect of varying the light intensity on the rate of photosynthesis. The results are shown in Figure 1.2 below.

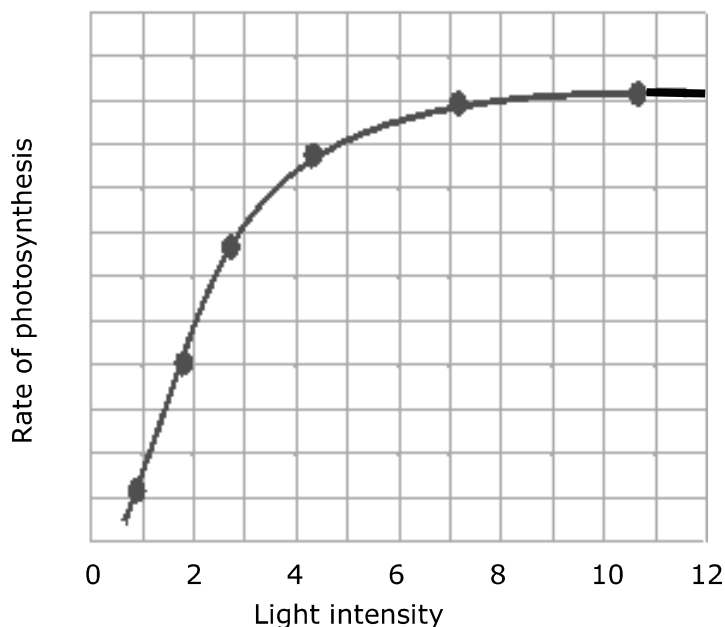


Figure 1.2 Graph showing how rate of photosynthesis varies with light intensity.
<https://13jhavra.files.wordpress.com/2012/01/rspcrve.gif?w=510>

c. Describe how the rate of photosynthesis varies as the light intensity increases.

_____ (2)

d. Give a reason for the pattern observed when the light intensity became higher than 10.

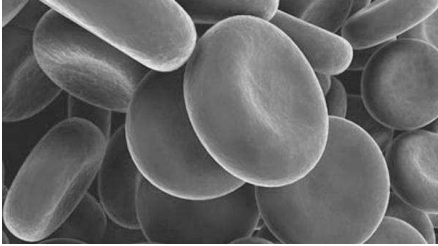
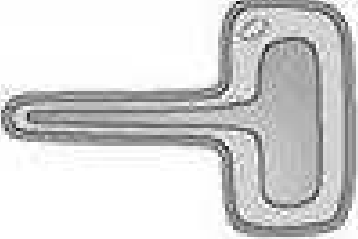
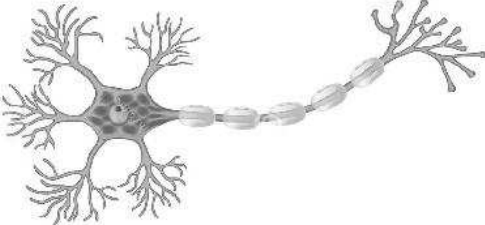
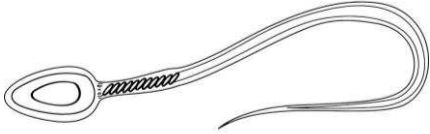

_____ (1)

(Total: 10 marks)

2. Many cells have structures adapted for their function. For example, muscle cells contain protein fibres that can contract when energy is available, making the cells shorter.

Table 2.1 includes examples and figures of some specialised animal and plant cells. For each type of cell listed, state **ONE** function and state how it is adapted to perform this function.

Table 2.1 Types of cells and their structure

Type of cell	Cell structure	Function	Specialisation
Red blood cell			
Root hair cell			
Motor neuron			
Sperm cell			
Xylem vessel			

(Total: 10 marks)

3. This question is about reproduction in flowering plants.

a. State the structure of the plant reproductive system that:

Description	Structure
Receives wind-borne or insect-borne pollen before fertilisation.	
Part of stamen that produces and stores pollen until mature.	
Found inside the ovary, contains the egg cell.	
Carries the male gamete as it grows down the style.	
Develops into the fruit during seed formation.	

(5)

b. Figure 3.1 shows three different types of seeds /fruits.

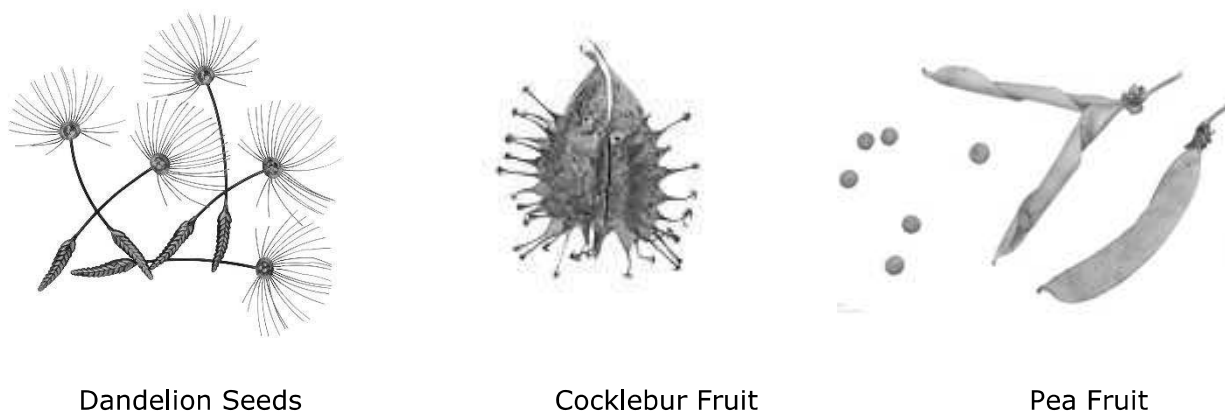


Figure 3.1: Dandelion Seeds, Cocklebur Fruit and Pea Fruit

The graph in Figure 3.2 below shows the number of seeds dispersed at different wind speeds.

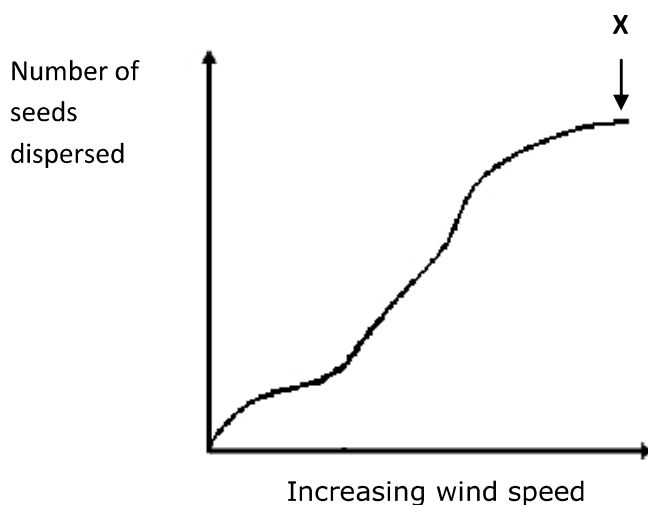


Figure 3.2: Graph showing number of seeds dispersed at different wind speeds

From the graph determine the type of seed shown in Figure 3.1 being dispersed at Point X and give **ONE** reason for your answer.

Seed dispersed at X: _____

Reason: _____

(3)

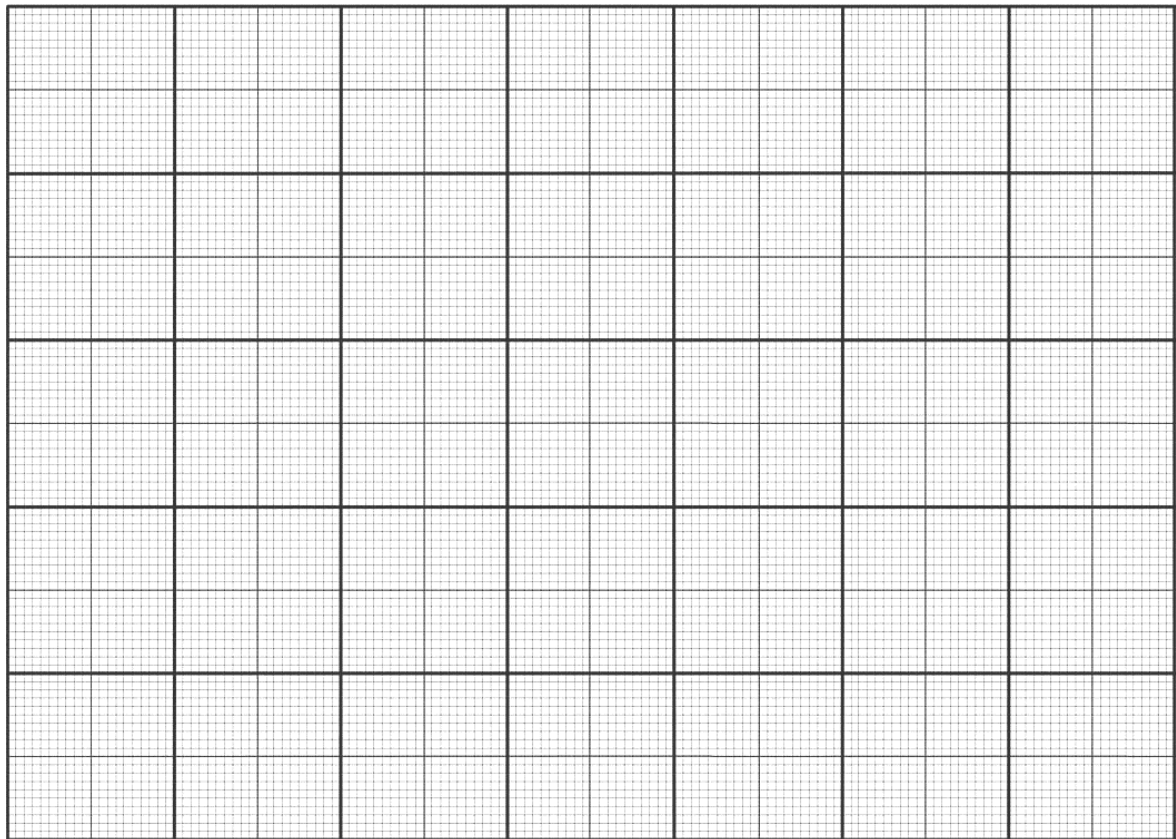
(Total: 8 marks)

4. Table 4.1 shows the energy content found by investigation of five different types of food by a group of students.

Table 4.1 Energy content in five different types of food

Type of Food	Average Energy value in kiloJoules
Peanut	5.8
Cheese cornmeal snacks	3.5
Chocolate cereal	1.2
Candlenut	8.7
Biscuit	2.5

- a. Using the graph paper below, draw a bar chart showing the energy value of the five types of food types listed in Table 4.1. (4)



b. Table 4.2 shows the percentage of macronutrients in peanuts.

Table 4.2 Percentage of macronutrients in peanuts

Macronutrient	Carbohydrate	Fat	Protein
% in peanuts	23	50	27

i) The carbohydrates in peanuts include starch and cellulose. Explain why these substances are insoluble.

_____ (2)

ii) Describe a test to identify if protein is present in peanuts.

_____ (2)

iii) Using the information in Table 4.1 predict the **TWO** macronutrients that are expected to have a higher percentage in candlenut than in peanut. Give **ONE** reason for your answer.

Macronutrient 1: _____

Macronutrient 2: _____

Reason: _____

_____ (4)

(Total: 12 marks)

5. Fat traps are installed in restaurants and hotels to prevent fat, oil and grease discharged from kitchens, from blocking sewer pipes when the fats solidify. Enzymes can be used to break down these fats and greasy wastes into simpler soluble compounds that can be carried along with water.

In an experiment, 100 cm³ of fatty waste were put in each of 6 beakers. 200 cm³ of water were added to all six beakers. 50 cm³ of enzyme solution were added to the first three beakers, labelled A, B and C while 50 mg of powdered enzyme were added to the other three beakers labelled X, Y and Z. The beakers were observed over a number of days to see in which set fats, oils and grease would be broken down most quickly.

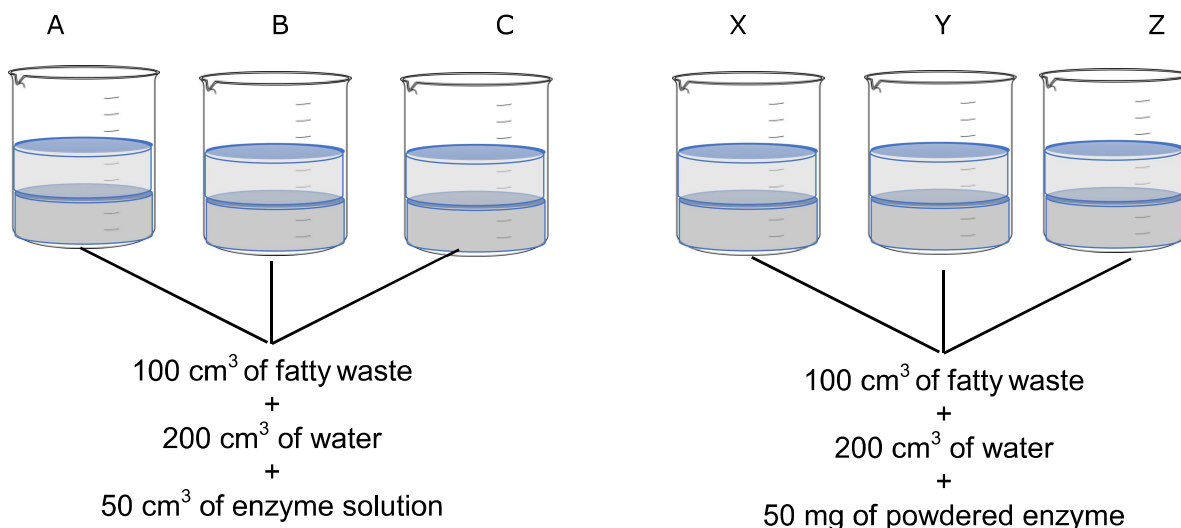


Figure 5.1 Experiment to investigate the effect of enzyme solution and enzyme powder on breakdown of fatty waste.

- a. Name an enzyme that would be able to breakdown the fats and oils present in the waste.

_____ (1)

- b. Complete the following sentence:

A single molecule of fat is broken down into fatty acids and _____. (1)

- c. Point out **ONE** factor that was:

i) kept constant during the experiment;

_____ (1)

ii) varied in this experiment.

_____ (1)

- d. Explain why the experiment included three beakers containing 50 cm³ of enzyme solution and 3 beakers containing 50 mg of enzyme power instead of just one of each.

 _____ (1)

e. Suggest a possible observation you could make to decide when all the fat had been digested.

(2)

Table 5.1 summarises the effect of enzyme solutions A, B and C and enzyme powders X, Y and Z on fatty waste over a period of ten days.

Table 5.1: The effect of enzyme solution and enzyme powder on fatty waste

Beaker	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
A	X	X	X	X	X	X	X	X	✓	✓
B	X	X	X	X	X	X	X	X	X	✓
C	X	X	X	X	X	X	X	X	✓	✓
X	X	X	X	X	X	✓	✓	✓	✓	✓
Y	X	X	X	X	✓	✓	✓	✓	✓	✓
Z	X	X	X	X	X	✓	✓	✓	✓	✓

Key	X	Waste material not completely broken down
	✓	Waste material completely broken down

f. Using the information in the table, write down the conclusion you would come to after carrying out this experiment.





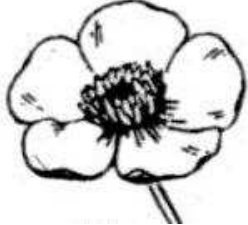
(2)

g. Suggest **ONE** way how the fatty waste could have been digested over a shorter period of time.

(1)

(Total: 10 marks)

6. Photographs A - E show different plant reproductive structures.

<p>A</p>	 <p>http://www.i-flora.com/steckbriefe/stammbaum/art/show/...html</p>
<p>B</p>	 <p>https://i.pinimg.com/originals/9c/15/63/9c156348d0966434ebd2542ba59f941c.jpg</p>
<p>C</p>	 <p>http://www.tela-botanica.org</p>
<p>D</p>	 <p>http://www.tela-botanica.org</p>
<p>E</p>	 <p>http://luirig.altervista.org/cpm/albums/coste4/flora-france1940.jpg</p>

a. Use the following key to identify the names of plants A, D and E in the photographs.

1.	Reproductive structure being a flower	Go to 2
	Reproductive structure being a cone	<i>Pinus halepensis</i>
2.	Stamens visible between petals	Go to 3
	Stamens not visible between petals	<i>Antirrhinum tortuosum</i>
3.	Petals in multiples of 4 or 5	Go to 4
	Petals in multiples of 3	<i>Allium carinatum</i>
4.	4 petals with each petal having a pointed end	<i>Sherardia arvensis</i>
	5 petals with each petal having a rounded end	<i>Ranunculus acris</i>

A _____
 D _____
 E _____ (3)

b. Describe the shape of the leaves of plant B and explain how this shape allows the plant to survive the harsh winters in Northern Europe when soil water is frozen.

Shape: _____
 Explanation: _____
 _____ (2)

c. i) Identify the angiosperm group to which plant C belongs.
 _____ (1)

ii) List **TWO** characteristics other than the one mentioned in the key, of the plant group identified in your answer to part c (i).

 _____ (2)

d. Large spherical cells are found in both the leaves and the roots of a plant. List **ONE** structural similarity and **ONE** structural difference between a spherical cell found in the root and one found in the leaf of a plant.

Similarity: _____
 Difference: _____ (2)

(Total: 10 marks)

7. Figure 7.1 shows transverse sections [T.S.] through an artery, a vein and a capillary.

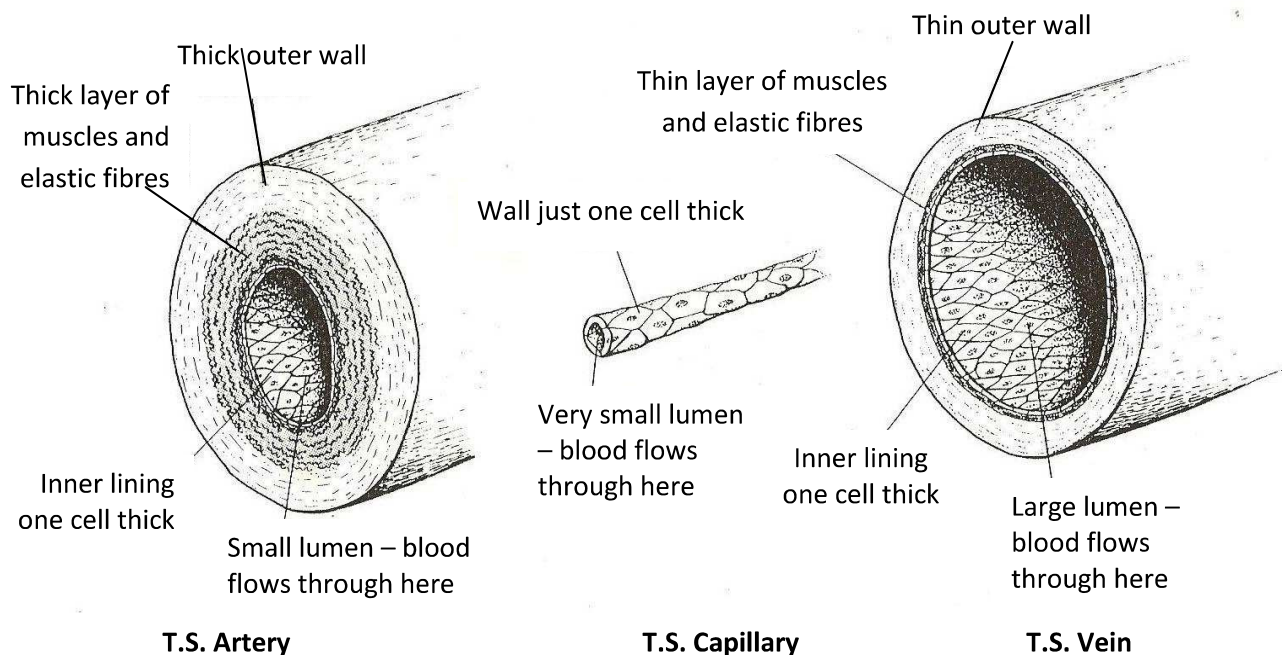


Figure 7.1 Diagram showing a transverse section through an artery, a vein and a capillary

a. For each blood vessel, describe **ONE** way to show how its structure fits its function.

Blood vessel	How structure fits function
Artery	
Vein	
Capillary	

(3)

b. High cholesterol levels are one of the risk factors for heart disease, stroke, and artery disease. Figure 7.2 shows how cholesterol can make an artery wall rough. This causes blood to clot as it flows past.

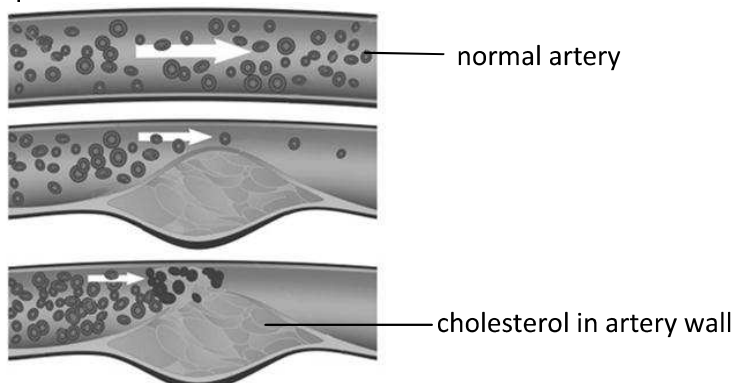


Figure 7.2 Diagram showing the effect of cholesterol deposits inside an artery.

Explain why cholesterol deposits inside arteries are dangerous.

(2)

c. Capillary walls are so thin that they leak. A watery liquid called tissue fluid leaks through them from the blood, into tiny spaces between the body cells, to exchange substances between the blood and cells. Figure 7.3 summarises the process of capillary exchange.

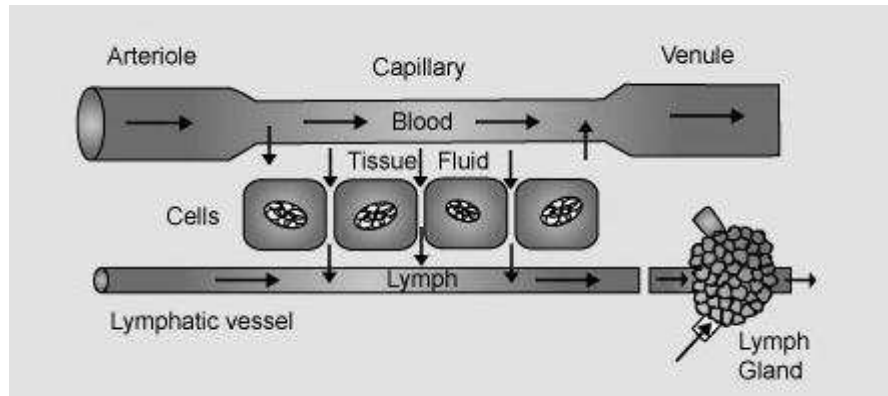


Figure 7.3 Diagram showing the process of capillary exchange.

i) Name **TWO** substances which flow from the blood to the cells and **TWO** substances which flow from the cells back into the blood.

From blood to cells: _____

From cells to blood: _____ (2)

ii) Only some tissue fluid passes back into capillaries. What happens to the rest of the tissue fluid?

_____ (1)

(Total: 8 marks)

8. Figure 8.1 shows the organisms involved in the feeding relationships that support a human when eating a 100 g tuna sandwich. It also shows the mass of each type of organism at each trophic level.

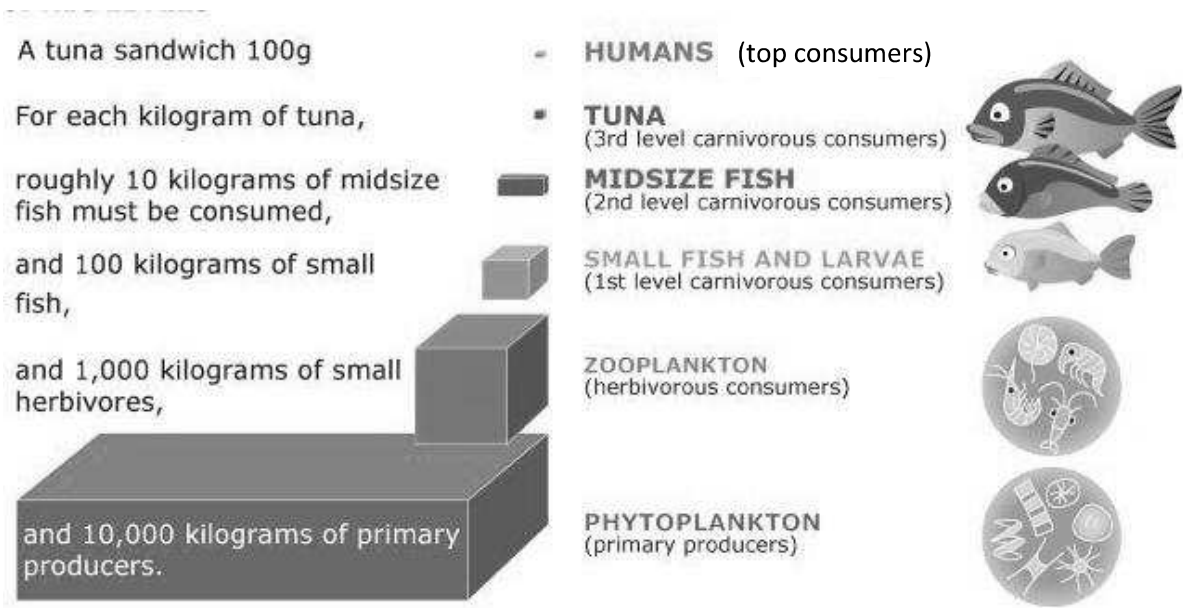


Figure 8.1: Biomass of different organisms at different trophic levels involved in eating a tuna sandwich.
<https://www.sciencelearn.org.nz/system/images/images/000/000/145/full/Tuna-sandwich20150812-31707-1bx99s6.jpg?1522292671>

- a. Use Figure 8.1 to list down the type of organism found at the
- i) first trophic level: _____
 - ii) fourth trophic level.: _____ (2)

- b. Explain why:
- i) phytoplankton are at the base of the food chain;
- _____ (2)

- ii) humans are described as the top consumers in this food chain.
- _____ (2)

- c. Give **TWO** reasons why 100 kg of small fish and larvae are needed to support 10 kg of middle sized fish.
- _____ (2)

c. A scientist wrote that 'it would be more efficient for a person to eat 100 g of phytoplankton than a 100 g tuna sandwich.' Give **ONE** reason why this statement is true.

(2)

(Total: 10 marks)

9. Figure 9.1 shows a photograph of the skull and jaw bone of a cow.

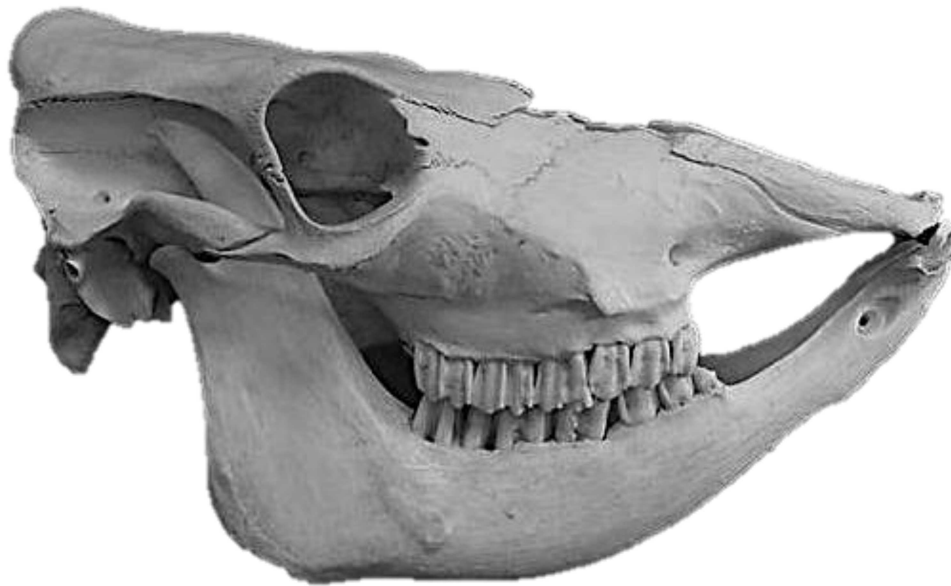


Figure 9.1 A photograph of the skull and jaw bone of a cow
<http://www.d91.k12.id.us/skyline/science/zoology/cow.htm>

a. Point out **THREE** features present in the skull or dentition that are adaptations to a herbivorous diet and explain the significance of the features you select.

Feature 1: _____

Adaptation: _____

Feature 2: _____

Adaptation: _____

Feature 3: _____

Adaptation: _____

(6)

The most abundant organic component of this animal’s food is cellulose.

b. Describe how the cellulose in the cow’s food is broken down into smaller molecules that can be absorbed into the animal’s bloodstream.

(2)

c. Describe **TWO** structural adaptations (excluding the skull and dentition) of the alimentary canal of a cow, that enable it to efficiently digest and absorb the nutrients in its food.

(2)

(Total: 10 marks)

10. This question is about variations in population densities of leaf-eating beetles.

Two species of beetles (species A and species B) have existed on an isolated island for thousands of years. A third species of beetle (species C) was accidentally introduced on the island in 1964. The population size of all three species of beetles has been regularly monitored as shown in the graph below.

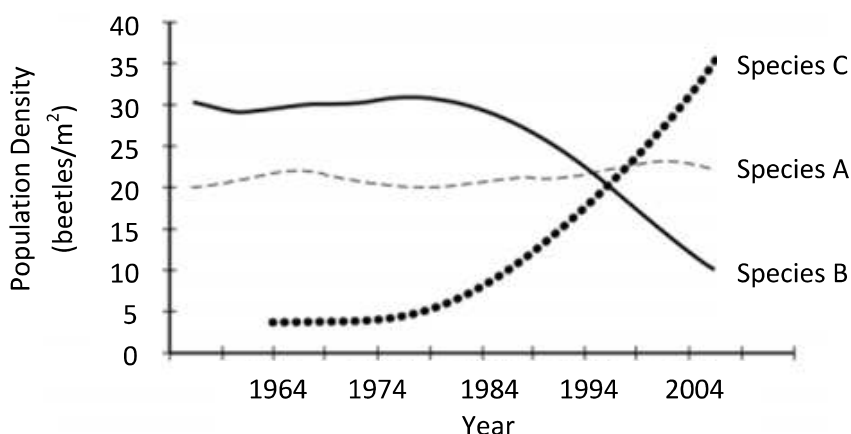


Figure 10.1: Graph showing variation in population densities of beetles

http://mrhalverson.com/apessays_Big_Idea_4.html

a. Give **THREE** possible reasons to account for the pattern of changes in the population density observed in species C from 1974 to 2004.

(3)

b. Describe the effect that the introduction of beetle species C has had on the population of species A and species B respectively. Give **ONE** reason for your answer.

i) species A;

Effect: _____

Reason: _____

(2)

ii) species B.

Effect: _____

Reason: _____

(2)

c. Predict the population density of species C in ten years' time. Give **ONE** reason for your prediction.

Population density: _____ beetles / m²

Reason: _____

(3)

d. Give **TWO** possible reasons why the beetle Species C was successful in colonising its new habitat.

Reason 1: _____

Reason 2: _____

(2)

(Total: 12 marks)



SUBJECT:	Biology
PAPER NUMBER:	IIB
DATE:	30 th August 2018
TIME:	4:00 p.m. to 6:05 p.m.

Write your answers on the booklet provided. Write down the number of the questions you answer, on the front page of your answer booklet. Start a fresh page for each answer.

Answer any FOUR questions.

1. a. Draw a diagram of a typical bacterial cell. On your drawing, label **FOUR** different structures that form part of the bacterial cell. (6)
- b. Point out **TWO** similarities and **TWO** differences between prokaryotic cells and eukaryotic cells. Present your answer in table form. (4)
- c. Viruses are sometimes considered as being borderline between living and non-living organisms. List:
 - i) **ONE** characteristic that viruses share with living organisms; and (1)
 - ii) **ONE** characteristic that distinguishes them from all other living organism. (1)
- d. i) Draw a diagram of an animal-like Protist organism. Label **FOUR** different structures that form part of the cell of the organism you drew. (6)
- ii) Describe how this organism feeds and reproduces. (4)
- e. Describe **THREE** ways how a filamentous fungus differs from the palisade mesophyll cells present in a plant leaf. (3)

(Total: 25 marks)

2. a. The statements below are partially incorrect. Copy each statement and underline the incorrect part in each one. For each statement explain how and why the underlined part is incorrect.
 - i) Nitrogen fixing bacteria are found in stem nodes and have a mutualistic relationship with the plant. (5)
 - ii) Adding manure to soil reduces the nitrogen compounds in the soil. (5)
 - iii) Nitrogen is returned to the atmosphere by a process called nitrification. (5)
 - iv) Burning fossil fuels absorbs carbon compounds in the atmosphere. (4)
- b. The statements below are partially incorrect. The incorrect words or phrases have been underlined. Re-write the statements correctly.
 - i) A jellyfish bloom was observed in May in Maltese coastal waters. These nematodes have antennae with stinging cells. They have a tube-like body plan. (3)
 - ii) Amphibians are covered with thick dry scaly skin. They lay eggs in the water which are surrounded by a hard shell. (3)

(Total: 25 marks)

3. A group of students were asked to investigate if areas in the city that see high levels of activity and traffic have a higher pollution level than areas that have low levels of traffic. The students identified eight different areas around the city. In each area they placed a sticky sheet, 1 m above the ground and left it there for three days. On collecting the sticky sheets, they counted the number of particles on each sheet. Table 3 summarises their results.

Table 3: Number of particles per cm² at various locations in the city

Condition	Number of particles per cm ² at various locations in the city							
	Park	School	Market	Bus station	Local council	Clinic	Building top	Home
Particles	14	28	43	52	33	46	8	18

http://www.all-science-fair-projects.com/project1120_118_3.html

- a. Identify which parts of the city have the highest pollution level and the lowest pollution level respectively. Explain how you reached this conclusion. (4)
- b. Suggest **ONE** way how this experiment can be improved. (2)
- c. Predict how the number of particles per cm² will change:
 - i) during the building of another teaching block at school; (2)
 - ii) if the number of bus trips leaving and arriving at the bus station is decreased by half. (2)
- d. Consider the following practices. For each practice, state whether it is environmentally friendly or not, giving **ONE** reason for your choice.
 - i) Air conditioning systems no longer include CFC's; (3)
 - ii) Printing on both sides of a paper; (3)
 - iii) Leaving hot water tap running whilst brushing one's teeth. (3)
- e. Driving a truck with uncovered debris from a building site spreads dust. This leads to the inhabitants of the area suffering from respiratory diseases.
 - i) Describe **THREE** ways how the respiratory system protects the body against the entry of such dust particles. (3)
 - ii) Dust causes the formation of scar tissue in the lungs decreasing the amount of healthy alveoli. Describe how this affects the amount of oxygen available to the body and give a reason for your answer. (2)
 - ii) Name **ONE** respiratory disease that can be caused due to living in areas with a lot of pollution and debris. (1)

(Total: 25 marks)

4. An experiment was carried out in which potato cylinders were submerged in salt solutions having different concentrations. Each cylinder was 6 cm long before being placed in a particular salt solution. After an hour, the cylinders were removed from the solution and their length was measured once again. The difference in size was then expressed as a percentage of the original length.

The results are shown in the Table 4.

Table 4: % change in length of different potato strips placed in different salt concentrations

Solution	Salt concentration (g/100cm ³)	Initial potato strip length	Final potato strip length	Percentage change in length
A	0	6	6.3	+5%
B	1	6	6.1	+1.67%
C	2	6	5.9	- 1.67%
D	3	6	5.78	
E	4	6	5.6	- 6.67%
F	5	6	5.7	- 6.67%

- a. Calculate the missing value. Show your working. (3)
- b. Why do some of the values have a positive sign while others have a negative sign? (2)
- c. List the solutions that had a higher solute concentration than the potato strips. (2)
- d. Name the process that accounts for these changes in the length of the potato cylinders. Give a definition of this process. (3)
- e. Describe **ONE** biologically important process going on in living plants that relies on this type of water movement into plant cells. (2)
- f. Clearly draw and label cells as seen under a light microscope showing the differences in appearance of the potato cells from:
- Solution A; and (3)
 - Solution F. (3)
- g. State **ONE** change you would make to obtain more accurate and reliable results. (2)
- h. If a solution containing 2.5 g of salt in 100 cm³ of water had been used, there would have been no change in the length of the potato strips. However, if sweet potato cylinders had been used instead of ordinary potato cylinders, in this same solution, there would have been an increase in the length of the potato cylinders.
What does this show about the concentration of solutes inside the cells of sweet potato when compared to ordinary potatoes? (2)
- i. In intestinal epithelial cells, the glucose concentration is much higher in the cell than it is outside. Yet, in spite of this, glucose continues to be absorbed from the ileum into the cells lining the intestine.
Name the process by which glucose is being absorbed from the intestine. (1)
- j. Explain why a constant supply of oxygen is required if glucose uptake is to keep on taking place into the cells of the small intestine. (2)

(Total: 25 marks)

5. DNA of a cell is packaged into thread-like structures called chromosomes. Chromosomes are visible during cell division.
- a. i) Describe a deoxyribonucleic acid (DNA) molecule. (4)
 - ii) List **FOUR** differences between mitosis and meiosis. Present your answer in a table. (4)
 - b. Manx cats are domestic cats with short stubby tails (or no tails), large hind legs and a distinctive gait. The short tail is the result of a mutation of the S gene that controls the development of the cat's embryo spine. The allele coding for normal spine is S^N while the allele coding for an abnormal short spine is S^A . The alleles are codominant. Cats having the genotype $S^A S^A$ fail to develop and die in the womb. Manx cats carry a heterozygous genotype.
 - i) Define the term mutation. (2)
 - ii) Distinguish between gene and allele. (4)
 - iii) Draw a genetic diagram to show the possible outcomes of the kittens born when two Manx cats are crossed. State the phenotype of the young kittens. (5)
 - c. Glow in the dark cats are genetically engineered cats in which a gene from a jellyfish was inserted in the cat's genome. This is then inserted into a female cat's egg cell.
 - i) Name the type of enzyme used to cut the DNA of the cat and the jellyfish. (1)
 - ii) Explain why different molecules are needed to cut different parts of DNA molecules in genetic engineering. (2)
 - iii) In this genetic engineering pathway, the vectors used are viruses. Describe the role of the vector in this genetic engineering pathway to create glow in the dark cats. (3)

(Total: 25 marks)

6. This question is about life in soil.

The soil has a very large population of organisms. Most of which are microscopic and play an important part in maintaining the fertility of the soil. Many however, are larger. Mammals like rabbits, moles and mice, for example, make their home in the soil; various insects, millipedes, threadworms, and earthworms live in and find their food in the soil. Some of these affect the conditions of the soil. There are also nematodes, or roundworms which live in the water around soil particles. There are several different types of nematodes, some of them eat dead materials, others eat living roots, and some eat other living organisms. Some nematodes are bad and can cause severe root damage or deformation. Aside from worms, there are numerous arthropods which include insects, mites, millipedes, centipedes and springtails.

- a. i) Explain why animals living in soil are consumers and decomposers. (2)
- ii) Decomposers are mainly microorganisms such as bacteria and fungi. They decompose dead plants and animals and animal droppings. List **THREE** environmental factors that may affect decomposition (3)
- b. Name **TWO** characteristics shared by:
 - i) insects, mites, millipedes, centipedes and springtails; (2)
 - ii) rabbits, moles and mice. (2)

- c. i) Earthworms live in and find their food in the soil. Explain how they are adapted to live in the soil. (2)
- ii) Earthworms are sometimes known as 'ecosystem engineers' because they significantly improve the soil structure. Give **TWO** ways how earthworms help improve the soil structure. (2)
- d. In the natural state, soil remains fertile, but this is not true if the soil is cultivated. Plants take out of the soil various mineral salts which they use to make their food. If the soil is to be used to grow food crops, it is necessary for farmers to add fertilisers to the soil.
 - i) Explain why natural fertiliser such as manure, is normally added to the soil in autumn while artificial fertiliser is added in spring. (4)
 - ii) Farmers may try to maintain the fertility of the soil by a rotation of crops, usually four-course rotation. Define the term crop rotation and list **TWO** benefits of using this method. (3)
- e. Bogs are habitats that have water-logged soils. As denitrifying bacteria survive well in water-logged soils, bogs typically have a low amount of nitrates. Some plants that live in these conditions are carnivorous, trapping and digesting insects. Explain why carnivorous plants are often found in bogs. (2)
- f. Besides requiring organic nutrients, plants also require water. Draw a cross-section of a dicot root and label the layers of cells that water moves through as it is transported from the root hairs to the main xylem in the root. (3)

(Total: 25 marks)

7. A group of students investigated the relationship between the emission of carbon monoxide and the age of a car. They performed tests in a closed garage and in open space. Table 7.1 shows the results obtained.

Table 7.1: Variation of carbon monoxide emissions with car age in a closed garage and in an open space

Test location	Age of car and carbon monoxide emission measured in parts per million (ppm)			
	New	5 years	10 years	20 years
Closed garage	18	21	112	337
Open space	6	9	38	146

http://www.all-science-fair-projects.com/project1139_118_4.html

- a. Describe how the carbon monoxide emissions vary with:
 - i) increasing car age; (2)
 - ii) the test location. (2)
- b. Carbon monoxide is a greenhouse gas and leads to global warming. Describe the greenhouse effect and explain how it leads to global warming. (4)

- c. Describe **TWO** adverse effects of global warming on planet Earth. (2)

Acid rain is formed when gases such as nitrogen oxide and sulfur dioxide are released into the atmosphere and are dissolve in the water droplets in the clouds. The acid formed returns to the earth in the form of rain. This causes the pH of water to change causing harm to aquatic organisms.

A group of students investigated the effect of acidic pH on guppies (a type of fresh water fish).

The students prepared 5 fish tanks, each having 10 litres of water. The pH of each fish tank varied between 6.5 and 4.5. A pH of 6.5 is least acidic, whilst a pH of 4.5 is most acidic. They counted the number of the surviving fish in each tank every 2 hours for 10 hours. Table 7.2 summarises their results.

Table 7.2: The effect of acidic pH on fresh water guppies

Tank No	pH level of water	Number of guppies surviving					
		Start	2 hours	4 hours	6 hours	8 hours	10 hours
1	6.5	10	10	10	10	10	10
2	6.0	10	10	9	9	8	8
3	5.5	10	9	9	8	8	7
4	5.0	10	3	1	0	0	0
5	4.5	10	1	0	0	0	0

http://www.all-science-fair-projects.com/project1080_119_3.html

- d. Calculate how many guppies died after 10 hours in each of the tanks. (5)
- e. Write a conclusion describing the effect of increasing acidity on:
- i) the number of guppies dying; (1)
 - ii) the rate of death of guppies. (1)
- f. All fish chosen for this experiment belonged to the same species. Explain why this is an important precaution. (2)
- g. i) Name the phylum to which guppies belong. (1)
- ii) List **TWO** external features that show that guppies are fish. (2)
 - iii) Fish are ectotherms. Name the two other groups that belong to the same phylum as fish, that are also ectotherms. (2)
 - iv) Guppies reproduce sexually. Give **ONE** advantage of this type of reproduction over asexual reproduction. (1)

(Total: 25 marks)

8. By referring to the drawings, explain clearly the biological importance of the following observations:

a. On cold days, the hair erector muscles attached to the hair follicles in mammalian skin contract. (6)

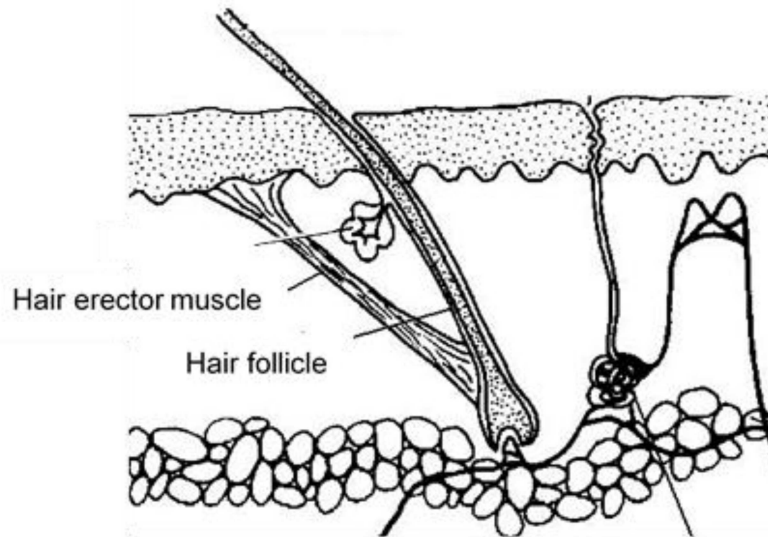


Figure 8.1: Section through mammalian skin showing a hair erector muscle attached to a hair follicle
http://wikieducator.org/File:Skin_labelled.JPG

b. On cold days, the skin on the face looks whitish and feels cold. However, when one starts playing very active games e.g. basketball, the face turns red even though the outside temperature is cold. (8)

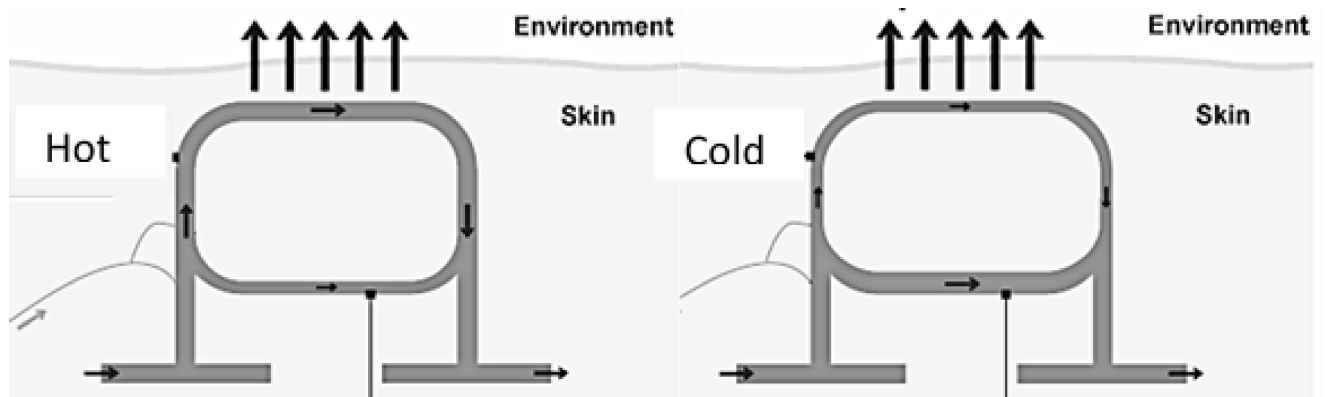


Figure 8.2: Variation of blood flow through blood vessels in the skin
http://www.bbc.co.uk/bitesize/intermediate2/biology/animal_physiology/brain_nervous_system/revision/6/

c. Figures 8.3 below shows a section through the skin of two mammals A and B.

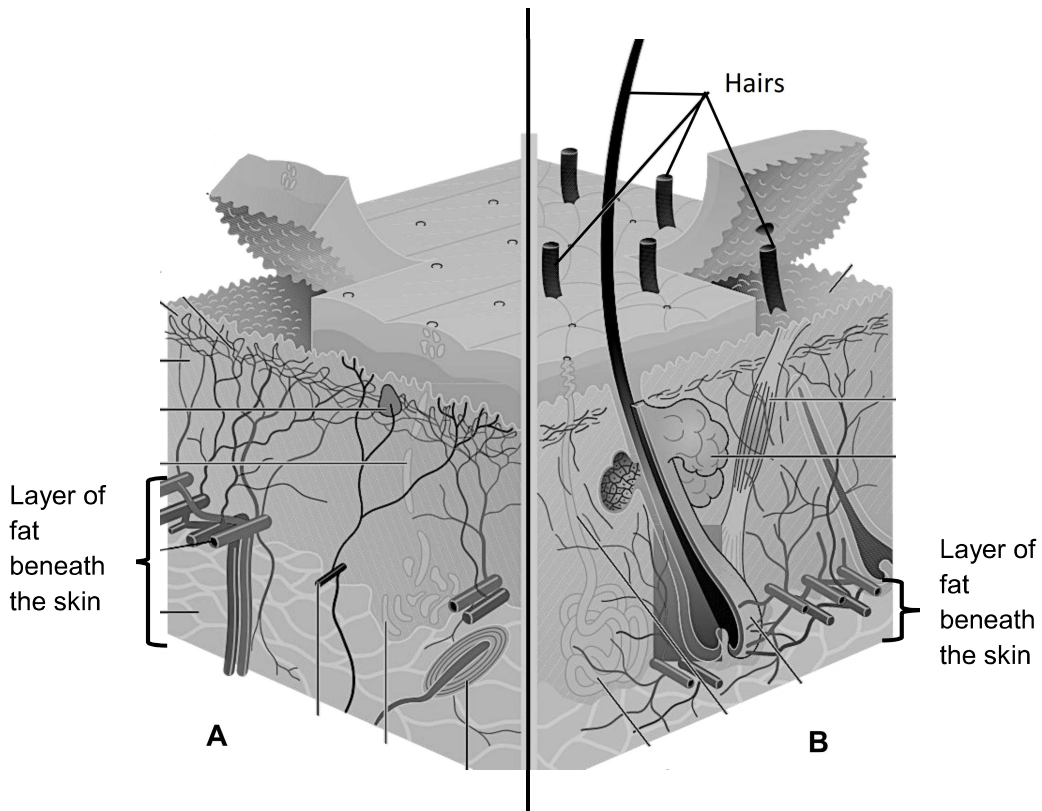


Figure 8.3: Skin structure of two mammals A and B

- i) Point out **TWO** important differences in the skin structure that are visible in the drawings and that help to control heat loss. (2)
- ii) One of the diagrams shows the skin structure of a mammal that lives on land while the other shows the skin structure of a mammal that lives in the sea. State which skin belongs to the mammal that lives on land and which skin belongs to the mammal that lives in the sea. Give **TWO** reasons for your choice. (6)

d. Mammals usually have sweat glands in their skin. Explain how this helps the organism to keep a constant body temperature. (3)

(Total: 25 marks)