SECTION A (40 MARKS)
Answer ALL the questions in this section in the spaces provided.

1. a) Define the following:
i) Photosynthesis (1 mark)

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ii) Chemosynthesis (1 mark)

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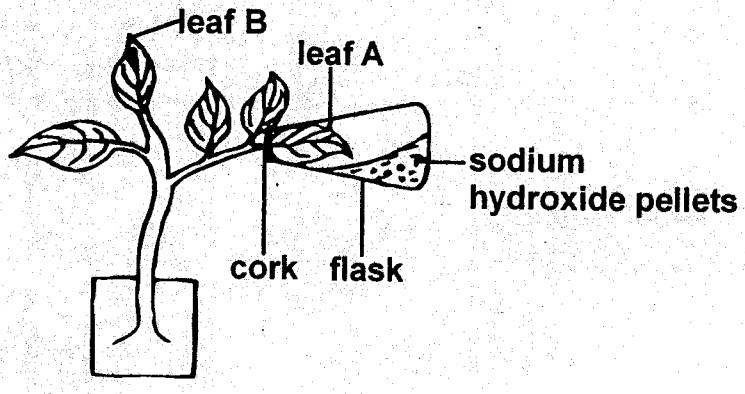
b) Study the diagram below and answer the questions that follow.



i) What is destarching? (1 mark)

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ii) Giving reasons state the expected results when leaf A and leaf B are tested for starch.
Leaf A (1 mark)

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Reason (1 mark)

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Leaf B (1 mark)

.....

Reason (1 mark)

.....

iii) In test for starch, why should methylated spirit be boiled indirectly? (1 mark)

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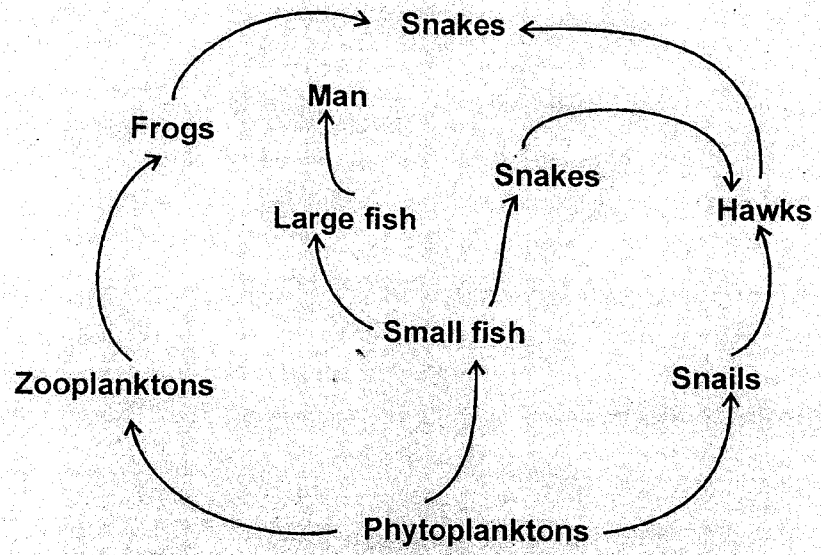
2. The diagram below represents a feeding relationship in an ecosystem.



a) Distinguish between a food chain and a food web. (1 mark)

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b) Name the type of ecosystem represented by the above food web. (1 mark)

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c) Name the organisms in the food web that are producers. (1 mark)

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d) i) Write food chain that ends with the hawk as a tertiary consumer. (1 mark)

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ii) State two short term effects on the above ecosystem if all the small fish were killed. (2 marks)

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e) How does oil spills lead to death of fish. (1 mark)

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f) Name the method you would use to estimate the population of small fish in the ecosystem. (1 mark)

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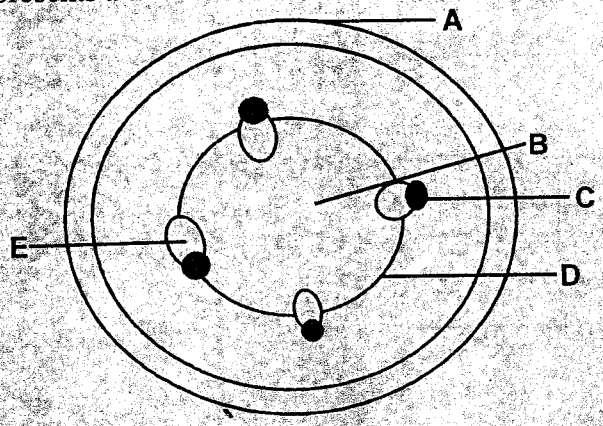
3. The diagram below represents a transverse section of a young stem.



a) Name the parts labelled **A** and **B**. (2 marks)

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.....

b) State the functions of the parts labelled **C** and **D**. (2 marks)

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c) Name the compound that dissociates to release oxygen in humans. (1 mark)

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d) What is tissue fluid? (1 mark)

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e) Name the process that leads to formation of tissue fluid. (1 mark)

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f) Name the blood vessels that nourishes the heart. (1 mark)

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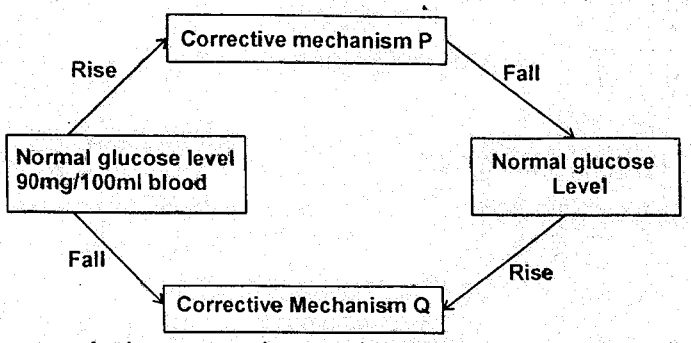
4. The diagram below shows how blood glucose in mammalian body is regulated.



a) Explain what happens during corrective mechanism **P**. (3 marks)

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b) Name **two** organs involved in corrective mechanisms **P** and **Q**. (2 marks)

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c) Why should glucose level be maintained constant? (2 marks)

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d) What is osmoregulation? (1 mark)

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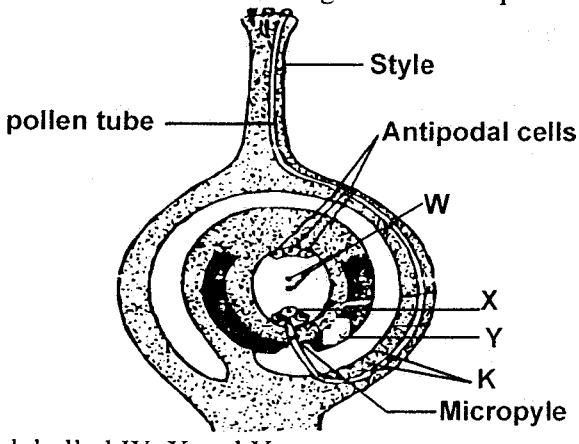
5. The diagram below shows a cross section through the female part of a flower.



a) Name the structures labelled W, X and Y. (3 marks)

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.....

b) State **two** functions of the pollen tube. (1 mark)

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c) What happens to antipodal cells after fertilization? (1 mark)

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.....

d) What does the term double fertilisation mean in flowering plants? (1 mark)

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e) Name the structure labelled K and state their role. (2 marks)

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SECTION B

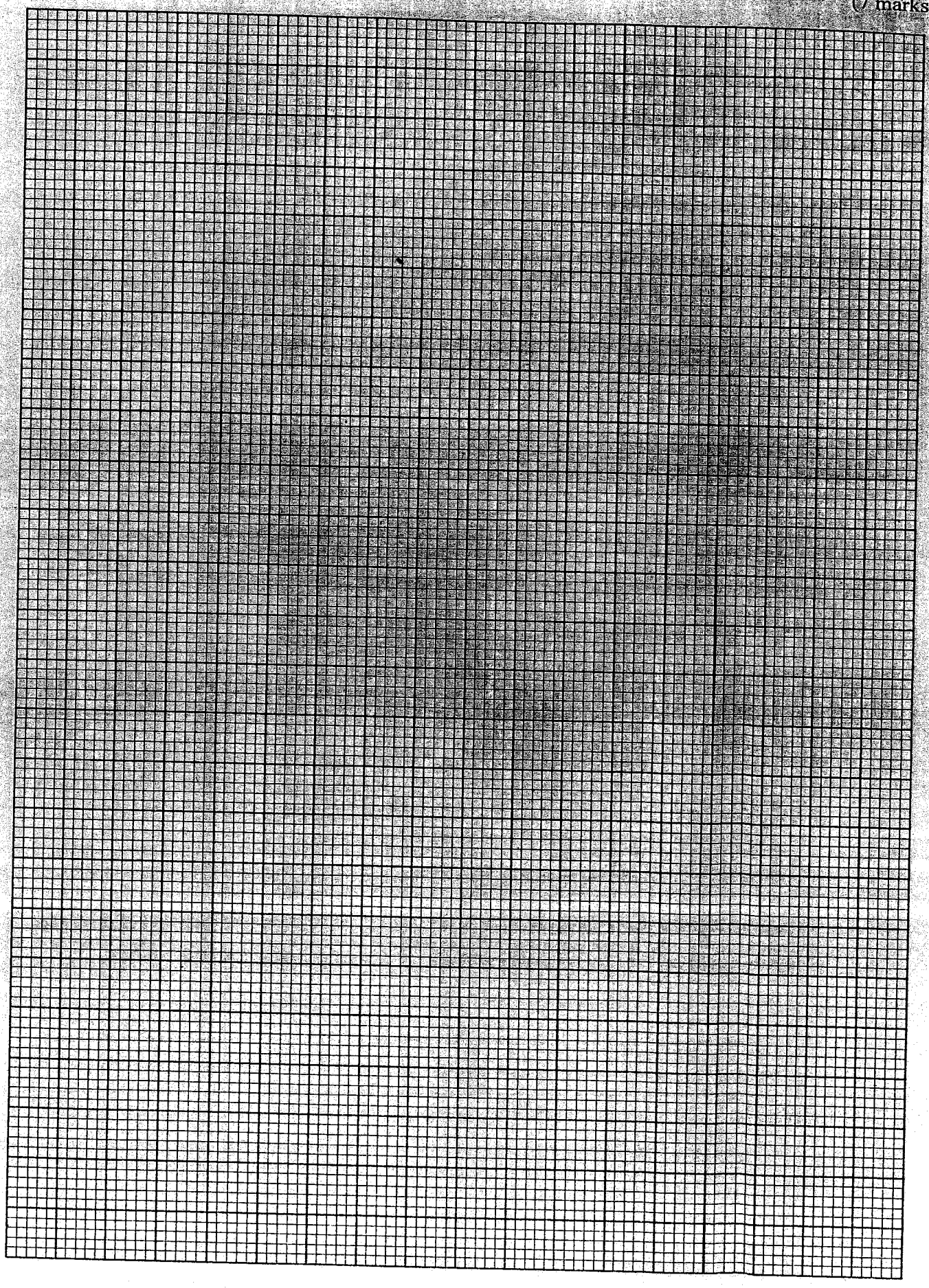
Answer question 6 (compulsory) and any other question from this section.

6. During germination and growth of a cereal the dry weight of endosperm, the embryo and total dry weight were determined at two day intervals for fourteen days. The results are as tabulated below.

Time in days	**Dry weight (mg)**		
	Endosperm	**Embryo**	**Total**
0	47	5	52
2	44	5	49
4	39	8	47
6	22	17	39
8	10	28	38
10	4	35	39
12	2	42	44
14	2	44	46

a) Using the same axis, draw graphs for dry weight of endosperm, embryo, and total dry weight against time.

(7 marks)



b) What was the average dry weight of embryo on day 2? (1 mark)

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c) Account for the shape of the curve for
i) Embryo from day 2 to day 12. (2 marks)

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ii) Total dry weight (gm) from day 0 to day 14. (3 marks)

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d) After how long was the dry weight of;
i) Endopserm 30mg. (1 mark)

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ii) Emryo 35mg (1 mark)

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e) Explain the role of water in seed germination. (3 marks)

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f) Other than water what other **two** environmental factors are required for seed germination? (2 marks)

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7. a) What is the significance of transpiration to plants. (3 marks)
b) Describe how urea is formed. (5 marks)
c) Outline four characteristics of class arachnida. (4 marks)
d) Explain four factors determine energy requirements in human beings. (8 marks)

8. a) Apart from the stomata, name **two** other sites where gaseous exchange takes place in terrestrial plants. (2 marks)
b) Describe the mechanism of opening and closing of the stomata in reference to photosynthetic theory. (18 marks)

KANDARA SUB-COUNTY SECONDARY SCHOOLS FORM 3
2015 JOINT EXAMINATION
KENYA CERTIFICATE OF SECONDARY EDUCATION (K.C.S.E)

BIOLOGY (231/2)
October/November 2015
MARKING SCHEME

1. a) i) Photosynthesis - the process by which green plants manufacture/synthesis/make their own food using raw materials of CO_2 and water in the presence of sunlight (energy) **(1mk)**

ii) Chemosythesis - the process by which the non-green plants obtain energy for making food from oxidation of certain chemicals. **(1mk)**

b) i) Keeping the plant in the dark; (for about 48hrs) to ensure the starch in it is used up; **(2mks)**

ii) Leaf a - Absence of starch; **(1mk)**
Reason - Sodium hydroxide pellets in the flask absorbs carbon (IV) oxide hence no photosynthesis took place of starch) **(1mk)**

Leaf B - Presence of starch; **(1mk)**
Reason - Leaf is exposed to the atmospheric air, hence photosynthesis took place; (leading to formation of starch) **(1mk)**
iii) Its highly flammable

2. a) Food chain - series of organisms through which carbon compounds fixed by plants are transferred /Linear representation showing energy flow from one feeding level to subsequent trophic level. Food web-Complex feeding interrelationship ,in an ecosystem in which one organism has many sources of food and in turn is fed by many organisms; (both must be correct to earn a mark)
b) Aquatic;
c) Phytoplankton's
d) i) Phytoplankton's → Small fish→ Snakes →Hawks
(Reject if arrow is not indicated)
ii) Snakes would decrease due to less food;
Zooplanktons would increase due to less predators;
Large fish would reduce due to less food.
e) Oil clogs fish gills;
Oil cuts off dissolved oxygen in water leading to suffocation;
(Accept any one right)
f) Capture recapture method

3. a) A - Epidermis **(1mk)**
Pith **(1mk)**

b) C - Transports (manufactured) food / translocation rej nutrients alone/digested food acc; photosynthetic product;
D - Produce new cells/divide to give new cells /secondary thickening/growth;
Acc; Produces new xylem and phloem, deny if new is missing;
Rej: Increase in girth/diameter

c) Oxyhaemoglobin

d) Blood plasma except blood cells and proteins that has filtered out of blood capillaries. OWTTE

e) Ultrafiltration

f) Coronary artery

4. a)
- Excess glucose converted to glycogen and stored in liver/muscle cells;
- Glucose .oxidised to release energy;
- Some glucose converted to fats and stored in adispose tissue;

b) Pancrease; Liver;

c) To avoid fluctuation in osmotic pressure; affecting normal functioning of the cells;
- For glucose to be enough for respiration;

d) Maintenance of constant internal osmotic pressure.

5. a) W - Polar nuclei
X - Egg cell /ovum
Y - integuments

b) Dissolves the tissues of the stigma, style and ovary;
Forms pathway for the male nuclei to reach

the embryo sac;
c) They disintegrate;
d) One male nucleus fuses with egg cell to form zygote while the other male nucleus fuses with polar nuclei to form triploid primary endosperm; **(mark as a whole)**
e) Male nuclei
One fertilizes the egg cell and the other fertilizes the polar nuclei.

6. a) **On the graph**
b) 38.5g **Acc** $\pm$ 0.5;
c) i) hydrolysis of starch into simple sugars; which are translated to the embryo;
(respiration to give energy). Accept simple sugars oxidized **rej.** oxidation of starch.
ii) New materials are synthesised from protein, bringing about growth of embryo;
- The rate of respiration is faster; than that of synthesis of materials for growth;
- First leaf carried out photosynthesis leading to growth;
d) i) 4 days
ii) 11 days
e) Role of water in seed germination
- Activates enzymes in the seed which convert stored food into simple substances/ hydrolysis.
- Transports soluble food from cotyledons to growing points
- Softens the seed coat.
- Presence of absiscic acid/Germination inhibitors
- Embryo not fully developed;
- Absence of hormones/enzymes to stimulate germination;
- Impermeable seed coat; rej hard seed coat;
- Unsuitable/unfavourable temperature;
- Absence of light;
- Lack of water;
- Lack of oxygen;
any one

7. a) Significance of transpiration to plants
- Support; (because of turgor pressure)
- Removal of excess water in plants;
- Cooling of the plants;
- Maintenance of a continuous transpiration stream;
- Transportation of water and dissolved minerals salts;

b) Formation of urea
- Excess amino acids are carried to the liver through hepatic portal vein;
- In the liver, excess amino acids are deaminated to form an amino group and an organic compound;
- The amino group reacts with free hydrogen ions; to form toxic ammonia; which in turn reacts with carbon (IV) oxide in the ornithine cycle to form harmless urea;
Urea is eliminated from the body with urine;

c) Characteristics of class arachnida
- Two body parts; (cephalothoraxes and abdomen)
- Compound eyes;
- Four pairs of legs; (joined)

d) Factors that determine energy requirement in humans.
i) Body size; small people require more energy per unit body weight because they have a larger surface area to volume ratio hence loose more energy;
ii) Occupation; Men who work vigorously require more energy than those who do light duties because of the amount of work done per unit time.
iii) Body weight;
The heavier the person the more energy required to carry the weight around the higher the respiratory rate;
iv) Sex; Males are more muscular and have more energy requirements than females since respiring muscles require more energy.
v) Age: Children require more energy than older people because they are more vigorous in their activities, have faster growth and loose more energy due to their body size.

8. a) -Lenticels
- Cuticle
b) Mechanism of opening and closing of stomata in reference to photosynthetic theory;
Opening of stomata;
-In the guard cells; there are chloroplasts; which carry out photosynthesis during the day;
- Glucose; is produced in the guard cells and this increases the osmotic pressure; In the guard cells compared to the neighbouring cells; Water then enters into the guard cells by osmosis; Increasing turgidity; of the guard cells. The inner walls of the guard cell are thicker; than the outer walls.
- Outer walls stretch more than inner walls; causing the guard cell to bulge outwards and inner walls to curve; away from each other hence opening the stomata;