1.(a) Is when the rate of water loss is more than the rate of absorption and the plant droops;  
(b) The rate of active transport increases with increase in temperature up to the optimum temperature;  
Further increase in temperature slows down the rate of active transport until it stops because it denatures enzymes;  

2.(a) Animal cell;  
(b) - Has cell membrane only/has no cell wall;  
- Has numerous small vacuoles;  
- Has central nucleus;  
(c) Consists of many similar cells performing the same function;  

3.(a) Have mammary glands; have external ears/pinna;  
Body covered with fur/hair;  
(b) Class;  

4.(a) Lubrication; Protection;  
(b) Young people are more active; requiring more energy;/  
Older people are less active; requiring less energy;  

5. As the cell gains water by osmosis; the sap/cell vacuole enlarges; pushing the cytoplasm outwards; exerting pressure on the cell wall;  

6. 6000(μm)  
55 (cells) ; 109μm;  

7.(a) Water molecules cling to each other maintaining a continuous column of water/preventing the break of water column;  
(b) Water molecules cling to the sides of the xylem vessel walls;  

8. 1(a) - Leaf with serrated margin -- go to 2;  
(b) - Leaf with smooth margin -- go to --;  

9. Presence of myelin sheath for insulation/increases transmission;  
Axon for transmission of impulses;  
Large cell body controls activities of cell; Nerve endings/dendrites receives impulses from
10. (b) Inner membrane highly folded/cristae to increase S A for attachment of (respiratory) enzymes. 4 marks

11. Cells loosely arranged; to facilitate air circulation; Cells have moist surfaces; to dissolve respiratory gases; 2 marks

11. Can receive blood from any donor/universal recipient; 1 mark

12. (a) (i) Arachnida; 1 mark
(ii) Spider/scorpion/tickmite; 1 mark
(b) Protoctista/protista; 1 mark

13. Autotrophic nutrition; show alternation of generation; Limited movement; Limited excretory products/unspecialized respiratory structures; Localised growth; 2 marks

14. Alcohol/ethanol; Carbon (IV) oxide; Energy/Adenosine Triphosphate; 3 marks

15. - To increase supply of oxygen to the tissues;
- The oxygen is used to oxidize lactic acid (to carbon (IV) oxide, water and energy); 2 marks

16. Protogyny; protandry; Dioecious; Dichogamy; Self sterility/incompatibility; Heterostyly; Presence of structures/substances to attract agents of pollination; Max. 3 marks

17. Ovary/Anther; 1 mark

18. - Acrosome/Lysosome contain enzyme to digest membrane of the ovum;
- Numerous mitochondria to provide energy for movement;
- Long tail for faster movement; Max. 2 marks

19. - Embryo not fully developed;
- Chemical inhibitors/presence of abscisic acid;
- Hard/impermeable testa/seed coat;
- Low hormones/low enzymes concentration; Max. 3 marks

20. Genetically acquired beneficial characteristics which occur spontaneously; are perpetuated through reproduction; 2 marks

21. (a) Continents existed as one large Landmass/Pangea/Laurasian and Gondwana Land; Present continents drifted from it leading to isolation of organisms; organisms in each continent evolved along different lines hence emergence of new species; 3 marks
Emergence of new life/species/organisms from pre-existing simple forms, gradually over a long period of time, to present complex forms; 1 mark

22. (a) Thigmotropism/Haptotropism; 1 mark

(b) Part of the tendril in contact with support causes migration of auxins to the opposite side; leading to faster cell division/growth on the side not in contact with the support; This causes the tendril to curl around the support; 3 marks

23. Use of biconcave/concave lens/divergent lens; to diverge the rays and make image be focussed on the retina; 2 marks

24. - Contains antibodies that defend the body from foreign antigens;
   - Has white blood cells that produce antibodies/while blood cells engulf antigens;
   - Has platelets that initiate blood clotting to prevent excessive bleeding at an open wound/prevent entry of pathogens; 3 marks

25. - Thin and long to allow for capillarity;
   - Walls lignified to strengthen the stem/to prevent collapse of vessels;
   - Have bordered pits to allow for exchange of materials; Max. 2 marks

26. (a) Genes inherited along with the sex chromosomes; 1 mark

(b) Haemophilia; hairy ears/pinna/nose; colour blindness/red green; blue-green colour blindness; Muscular diastrophy; baldness 2 marks

27. (a) Complete metamorphosis - eggs hatch into larvae while in incomplete metamorphosis hatch into nymphs which resemble the adult;

Complete metamorphosis has four stages; egg, larvae, pupa and adult while an incomplete metamorphosis has three stages; egg, nymph and adult. 2 marks

(b) To allow for growth of the insect; 1 mark

28. (a) Ligaments; synovial fluid; synovial membrane; articular cartilage; synovial capsule; a bone with rounded head fitting into a cavity of another bone; Max. 2 marks

(b) (i) Atlas; (ii) Axis allows movement in all planes; 2 marks

29. - Form joints with the legs to make walking possible; 1 mark
   - Provide large surface area for attachment of muscles; 1 mark
   - Offers support (to the body weight)

30. Absorption of water; support;
   Opening and closing of stomata;
   Feeding in insectivorous/plants; 2 marks
1. (a) (i) B Seta/stalk;  
    d Rhizoid; 
  
    (ii) A Production of spores/sporulation;  
    C Photosynthesis; 
  
(b) (i) Arthropoda;  
  
(ii) - Segmented body;  
    - Jointed appendages;  
    - Presence of exoskeleton  

2. (a) E Semi circular canals;  
    F Oval window/Fenestra ovalis/Fenestra vestibuli;  
    G Cochlea; 

(b) (i) Lined with hair/secretion of wax/(has glands that secrete wax) to trap foreign bodies;  
    Hollow/tubular/tube; to direct sound waves to the ear drum/tympanum/tympanic membrane; 

  (max) (2 marks) 

(ii) Small/form a lever system/solid; to amplify (sound) vibrations; 

  (2 marks) 

(c) Deafness/ absence of pinna/ vertigo/tinnitus; 

  (max) (1 mark) 

3. (a) (i) Provides energy needed to split water molecules into oxygen and hydrogen/photolysis;  
    Provides energy for formation of ATP molecules (which is used in dark stage) 

  (1 mark) 

(ii) Combines with hydrogen ions to make glucose; 

  (1 mark) 

(iii) Used to trap light energy; 

  (1 mark) 

(b) (i) Starch; 

 (ii) Protein; 

  (2 marks) 

(c) (i) Lack of vitamin B1/thiamine; 

(ii) - Stunted growth;  
    - Paralysis of legs/arms/limbs/damage to peripheral nerves;  
    - Heart failure  
    - Swelling of feet/oedema  
    - Gastrointestinal disturbances/loss of appetite/sotstipation/diarrhoea/vomiting;  
    - Weight loss/muscle wasting  
    - Pale skin 

  (2 marks)
4. (a) Parental phenotypes

Smooth    Wrinkled

Meiosis
Gametes
Fertilization
First filial (F1) generation

RR
Rr
Rr
Rr
Rr

(b) Parental genotypes

Meiosis
Gametes
Fertilization
F₂ Genotypes

Rr
Rr

(i) Genotypic ratio
1 : 2 : 1 ;

(ii) Phenotypic ratio
3 smooth coats : 1 wrinkled coat;

(c) The total number of wrinkled seeds.

\[ \frac{1}{4} \times 14,640 = 3660 ; \]
5. (a) H  Has long/wide/broad/flat; to provide a large surface area for attachment of muscles;
- Has facets; for articulation with sacrum;  

(ii)  J  Has flexible cartilage; which allows for widening of the (female) pelvic girdle when giving birth/to absorb shock.  

(b) Allows passage of blood vessels/nerves/ and muscles;  

(c) (i) Femur;  
(ii) Ball and socket;  

(d) Coccyx;  

6. (a) See graph on page 5.  

(b) (i) No change in population/population is constant; mice still maturing/have not given birth;  

(ii) Slow/gradual population growth; few mice have reached sexual maturity;  

(iii) Faster/rapid rate of population growth/exponential; Many mice sexually matured/reproducing/enough food/space/no competition/birth rate higher than death/no diseases:  

(iv) Population decline; Competition is high / food is limiting / space is limiting/accumulation of toxic waste/disease (outbreak) deathrate higher than birth rate.  

(c) (i) 6 and 8 ;  

(ii) 310 - 115 = 195 mice per month;  

(d) Population would increase;  

(e) Food; space ; cage size; water;  

(max)
7. (a) When a blood vessel is cut/injured platelets/thrombocytes/damaged tissue/wound is exposed to the air; they release thrombokinase/thromboplastin; an enzyme that activates the conversion of prothrombin; to thrombin; in the presence of calcium ions; vitamin K/phylloquinone; is needed for the formation of prothrombin; Thrombin converts (soluble blood protein) fibrinogen; into (the fibrous form) fibrin; which forms a mesh/network across the wound; The clot so formed prevents excessive bleeding; and entry of disease agents/pathogens/micro-organisms/microbes;

Max 10 marks

(b) Many to provide a large surface area; across which large amounts of gases diffuse; moist surfaces; to dissolve respiratory gases; so as to diffuse. Made of a thin membrane/epithelium/one cell thick wall; to reduce diffusion distance; Highly vascularized; to carry away oxygen; and bring in carbon (IV) oxide; creating a steep diffusion gradients. (10 marks)

8. (a) Regulation of blood sugar; when blood sugar is below normal/90 mg/100 cm$^3$ glucagon; triggers the conversion of glycogen to glucose in the liver; the glucose is released into the blood stream. When blood sugar is in excess above normal/10 mg/100 cm$^3$, insulin; causes the liver to convert glucose excess to glycogen; which is stored.

Production of heat energy; by increasing the rate of metabolic activities;

Excretion of bile pigments; produced due to breakdown of worn out red blood cells;
Deamination/removal of amino group of excess amino acids to form urea; and detoxication/poisonous/toxic substances;

(Max 10 marks)

(b) Sweat glands excrete urea; excess water; and salts; hence maintaining salt & water balance in the blood. Evaporation of sweat; cools the body due to loss of latent heat of vaporization; when the body temperature rises; blood vessels in the skin vasodilate; allowing more blood to flow near the skin surface; thus heat is lost to the environment by radiation/convection. The erctor pili muscle relaxes hair flattens; in a hot environment reducing insulation; hence heat is lost from the body by radiation/convection; to the environment.

(max 10 marks)
1. (a) (i) Sternum;  
   (ii) The internal intercostal muscles relax; pulling the ribs upwards; and outwards;  
   This increases the volume of the rib cage while pressure decreases;  
   Forcing air into the lungs;  
   (1 mark)  
   (5 marks)

   (b) (i) Anterior/dorsal view;  
   (ii) Name - Neural canal;  
   Function - Passage of the spinal cord.  
   (1 mark)  
   (1 mark)

   (iii) V : It is thick and solid; for bearing the weight of the body (back)  
   S : It is long; to provide a large surface area for attachment of muscles;  
   (2 marks)

(c) (i) Image width = 9.8 cm;  
(ii) Magnification = \( \frac{\text{Image length} \times \text{image width}}{\text{Actual length} \times \text{image width}} \);  
   \[ = \frac{9.8 \pm 0.1}{4.6 \pm 0.1} \]  
   \[ = (2.13) \]  
   \( \text{Mg} = x 2.13 \);  

(iii) Actual length AB = \( \frac{10.4 \pm 0.1}{2.13} \);  
   \[ = 4.8826 \text{ cm} \];  
   (5 marks)
<table>
<thead>
<tr>
<th>Food Substance Tested</th>
<th>Procedure</th>
<th>Observation</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Reducing sugars</td>
<td>Put 2 cm$^3$ of C in a test tube; • Add equal volume of Benedict's Solution. • Put in a hot water bath/heat/warm/boil;</td>
<td>No colour change/colour remains/colour of Benedict's solution remains/persists;</td>
<td>Reducing sugars absent;</td>
</tr>
<tr>
<td>2. Reducing sugars</td>
<td>Put 2 cm$^3$ of C in a test tube; • Add a few drops of dilute hydrochloric acid. • Place the test tube in a hot water bath for 3 minutes; • Remove the test tube and cool in cold water. • Add (NaH)$_2$CO$_3$ drop by drop until fizzing stops • Add 2 cm$^3$ of Benedict's Solution. • Place the test tube in a hot water bath/heat/warm/boil;</td>
<td>Colour changes to green/yellow/orange/brown;</td>
<td>Reducing sugars present;</td>
</tr>
<tr>
<td>3. Proteins</td>
<td>Put 2 cm$^3$ of C in a test tube; • Add an equal amount of sodium hydroxide solution and shake. • Add copper sulphate drop by drop, shaking well after each addition;</td>
<td>Colour changes to purple/violet/mauve;</td>
<td>Proteins present;</td>
</tr>
</tbody>
</table>

3.

1. (a) Simple leaves ......................................................... go to 2;
   (b) Compound leaves ......................................................... go to 4;

2. (a) Leaves net-veined/reticulate ........................................ go to 3;
   (b) Leaves parallel veined ................................................ Commelinaceae;

3. (a) Leaves with serrated margins ...................................... Malvaceae;
   (b) Leaves with smooth (entire) margins .............................. Nystaginaceae;

4. (a) Leaves opposite ........................................................ go to 5;
   (b) Leaves alternate ......................................................... Bignoniceae;

5. (a) Leaves pinnate ........................................................... Papilionaceae;
   (b) Leaves trifoliate ........................................................ Compositae;

(10 marks)