1. a. Bar graphs drawn neatly. 6 marks

Correct drawing of bar graphs: including title (1), labelling of axis (1), correct scale (1) correct plotting (3).
Deduct 1 mark if a histogram is presented.
DO NOT AWARD ANY MARK IF 1mm GRAPH PAPER IS NOT USED.

b. South and South East Asia 1 mark
High incidence of promiscuity/casual sexual encounters/multiple sex partners 2 marks
**Do not Accept:** Large dense populations/no use of contraception (unless condom is specified) no good health care/lack of hygiene
**Accept:** Lack of awareness/sexual education
If students mention *no protection* award 1 mark only.

c. Some STDs like syphilis cross the placenta and infect the baby/other STDs can be transmitted from mother to baby during the delivery as the baby passes through the birth canal (Accept during breastfeeding as is the case of HIV). 4 marks

d. Use of latex condoms for vaginal, anal and oral sex during sexual contact/ if you have an STD do not have sex until treated and cured/ avoid multiple sex partners/avoid casual encounters/abstain (do not have sex)/ ask partner about STD/regula r check up
Any TWO or equivalent 4 marks
Do not award any mark if students mention contraception (unless condoms are specifically mentioned)/ more sexual education.
If students mention *protection* award 1 mark only.

e.
   i During ovulation an ovum/egg is released from one of the ovaries. 2 marks
   ii Slight increase in body temperature. 1 mark
   iii Testis produce sperm 1 mark
   Epididymis store sperm 1 mark
   iv In a vasectomy the sperm ducts are cut and tied and so no sperms are carried from the testis to urethra. 2 marks

Total: 25 marks

2a.
   i Animal 1 mark
   ii body covered with feathers, presence of beak, presence of wings. Any TWO
   **Accept** hollow bones/streamlined body
   **Do not accept:** light body 4 marks
   iii **Species name** is changed 1 mark

b. 2 marks
   i endotherms 2 marks
   **Do not accept:** warm blooded
ii Predation, bad weather, collisions with tall buildings/windows/other structures/being shot or trapped by hunters/loss of stopover habitat/exhaustion/oil spills
Any ONE or equivalent
2 marks

Do not accept: air pollution/lack of food/water

c. Rubbish leads to a proliferation of rats these will kill the chicks therefore population in number. Also prevent them from reaching sexual maturity and breeding. 3 marks

ii Noise and light disturbs birds reducing breeding therefore less offspring. 3 marks

iii The cars may close entrances to burrows where the birds nest therefore they do not breed. 3 marks

d. i Extinction: the process by which organisms are lost permanently from the face of the Earth. 2 marks

ii Predator: an animal that preys on other animals for food. 2 marks

Award only 1 mark if students mention: An animal that eats another organism
By eating a variety of prey species (thus reducing risk of starvation), catching young/old/sick prey, catching large prey, migrating to areas where prey are plentiful.
Any TWO (1 mark each) 2 marks

Accept: strength, agility, camouflaged, big teeth, sharp claws, cautious movement during attack.

Do not accept: bigger than prey

Total: 25 marks

3. a. Diagram showing gaseous exchange in the alveoli including epithelium of alveolus, capillary with red blood cells. Arrow showing oxygen diffusion into red blood cells (deduct 0.5 marks if oxygen is to capillary), Carbon dioxide from capillary (plasma) to alveolar space, thin film of moisture. (4 marks)

Allot:
1 mark for correct diagram
0.5 mark for any two labels including epithelium (alveolar wall), capillary, thin film of moisture
1 mark for arrow showing diffusion of oxygen to red blood cell
1 mark for arrow showing diffusion of carbon dioxide to alveolar space

b. Large surface area; thin film of moisture; capillary network; thin surface for diffusion of oxygen. (1 mark each) 4 marks

Do not accept: ventilation

c. i Deterioration of the alveolar wall caused by persistent coughing. 2 marks

Award 1 mark when students mention coughing/smoker’s cough

ii Deterioration of the alveolar wall decreases the surface area of the alveoli. Less surface area results in less diffusion of oxygen from alveolar space to bloodstream. 2 marks

iii Smoking destroys cilia and as a result mucus accumulates in the respiratory tubes. Dust and microbes trapped in the mucus slide down towards the lungs making the
person cough. This coughing inflames the lining of the bronchi causing pulmonary infections such as bronchitis.  

3 marks

d. *autosome*: are chromosomes found in the nucleus of a cell except the sex chromosomes. 
*gene*: a short section of *DNA* carrying genetic information  
*recessive*: the characteristics that will show up in the offspring only if both of the alleles are inherited.  
ei mucus is used as a lubricant for materials that pass over membranes – eg food passing down the oesophagus.  
**Accept**: neutralises acidity  
ii to trap bacteria and dust particles entering with inhaled air  

Total: 25 marks

4.  
a. Test for protein: Add NaOH followed by drops of CuSO₄ (accept Biuret I followed by Biuret II) 
Purple/lilac/violet colour  

Test for lipids: Add ethanol then add water and shake  
An emulsion results. 
If a precipitate is mentioned award 1 mark only.  
**Do not accept**: permanent translucent spot/stain  

b. Digestion of starch starts in mouth by the action of *salivary amylase* produced in saliva by salivary glands.  
It stops in the stomach because in the stomach there is an *acidic pH* in which the enzyme is not activated.  

c. Amylase (pancreatic amylase)  
It changes starch to maltose.  
Maltase  
It changes maltose to glucose.  

3 marks

d.  
i Hepatic artery and hepatic portal vein.  
ii Bile brings about *emulsification*  
– breaking lipids into tiny droplets to increase the surface area for action of enzyme.  

Total: 25 marks
5. 
a. A general decrease of blood donors.  

b. 
i. 5% of 230,000 = 11500 individuals  
ii. 450/5000 = 9% 

c. glucose, proteins, clotting factors, mineral ions/salts, amino acids, fatty acids, urea, lactic acid, carbon dioxide, water, insulin. Any TWO 

Do not accept sugar/s, oxygen, iron, fats, salts 

d. 
i. thick walls withstand the high pressure of blood  
ii. large diameter and thin walls reduce resistance to the flow of blood  
Award 1 mark when students mention blood flows at low pressure. 
iii. valves prevent backflow of blood. 

E. Tissue fluid is formed when blood plasma is squeezed out of capillaries. 

f. 
i. PAUL: Mm  
ANN: Mm  
JAMES: mm  

ii. Mark  
parents mm MM  
gametes m m M M  

F1 Mm Mm Mm Mm  
All children are carriers but not Thalassemic. 
N.B If answers are given in a sex-linked mode DO NOT AWARD ANY MARK 
Accept Punnet square. Award 3 marks only if parents are clearly identified. 

Total: 25 marks 

6a. Habitat: the place where an organism lives.  
If students mention an animal award 0.5 marks only. 
Ecosystem: a community of different species interdependent on each other together with their non-living environment. 

b. Absorb water from the soil surface even if amount is low.  
Accept: firmly anchor the plant in the relatively loose soil. 
Award 0.5 mark only if students mention helps absorb water.
c.
   i absence of vertebral column/backbone  
   ii segmented body/presence of segments in annelids  
   presence of jointed limbs/exoskeleton  
   **Do not accept** hard shell  
   iii Presence of waxy cuticle that serves to reduce water loss.  
   Spiracles can open and close.  
   **Do not accept** impermeable skin.

d.
   i Reptiles  
   dry skin covered with scales; lay leathery egg; ectotherms  
   Any TWO  
   **Award 0.5 mark if students mention:** scaly skin  
   **Do not accept** cold-blooded
   ii Environmental temperature is too low in winter therefore body temperature would not be high enough for lizard to survive.  

e.
   i a supply of water/moisture, oxygen; suitable temperature.  
   **Do not accept** sun/heat/soil  
   3 marks
   ii generally small; petals green or dull coloured; no production of nectar; flower hangs down; stamens/stigma hang out; large number of pollen grains; pollen grains very light with smooth surface; stigma with feathery branches.  
   Any TWO  
   4 marks

Total: 25 marks

7a. The flattened shape of leaves increases the surface area for diffusion.  
Most plants have thin leaves – this means that the distance for the carbon dioxide to diffuse from the outside air to the photosynthesising cells is kept as short as possible.  
The many air spaces inside the leaf allow carbon dioxide to come into contact with lots of cells – this provides lots of surface area for diffusion.

b. Paramecium and other single-celled freshwater organisms have a problem because the concentration of solutes in their cells is greater than the concentration in the water they live in.  
So water tends to flow into the cells by osmosis which would make the organism swell up and burst.  
These freshwater organisms deal with the problem using a contractile vacuole.  
Excess waste entering the organism is collected in the contractile vacuole.  
Once the vacuole gets full, it moves to the surface of the cell where the water is released to the exterior/outside.

c. The front incisors are chisel-shaped and adapted for gnawing and scraping  
Award 1 mark if students mention lack of canines.  
The molars and premolars have flat grinding surfaces that continue to grow throughout life as they are worn away by grinding.  
The upper and lower jaw fit together very loosely to allow side-to-side movement during chewing.

d. The surface area of the thin skinned areas of their bodies (eg ears) is usually very small to reduce heat loss.
Many arctic animals have plenty of insulation (both inside and out). Blubber/a thick layer of fat builds up under the skin; a thick fur coat on the outside to insulate the animal very effectively. 2 marks
The arctic animals are also relatively large – this keeps the surface area to volume ratio as small as possible and so helps them hold on to their body heat. 1 mark

e. Certain bacteria are involved in making yoghurt. Certain bacteria make milk go sour. 1 mark
They convert lactose (milk sugar) into lactic acid. 2 marks
The lactic acid makes the milk curdle and go lumpy. 1 mark
To make yoghurt a flavour is added to solidified milk. 1 mark

Total: 25 marks

8.
a. i symbiotic relationship/mutualistic relationship 1 mark
Plants gain from increased soil fertility 2 marks
Bacteria gain protection and nutrients (e.g. carbohydrates) by plants. 2 marks

ii are absorbed by the root hairs of roots. 1 mark
by the process of active transport. 1 mark

b. Nitrifying bacteria change ammonium ions to nitrates and nitrates 2 marks
Nitrate are used by plants to make amino acids/proteins. 2 marks

c. the distance between soil particles/the amount of air between soil crumbs/drainage
Any TWO 4 marks

d. i absorbing large amounts of water or reducing evaporation from the soil 2 marks
ii humus helps soil particles stick together into larger crumbs. 2 marks

e. i Hedges act as windbreakers/provide nesting sites/fallen leaves enrich soil/roots improve soil stability/limit wind/water erosion/hedges provide feeding and breeding opportunities for pollinating flowers. Any TWO 4 marks
Accept: prevents entry of animals that may trample over crops.
ii Less light available for photosynthesis so crops grow slowly/smaller. (Low crop yield.) 2 marks

Total: 25 marks