



| #  | Ans | Workings/Remarks  |
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| 1  | A   | Xylem vessel is a hollow tube (absence of protoplasm) to allow for ease of transport of water and dissolved mineral salts.  |
| 2  | A   | 4 – ribosome on rough endoplasmic reticulum is the site for protein synthesis<br>1 – protein products (such as enzyme) released from secretory vesicle (2), which pinches off from membrane of golgi bodies (3) whose purpose are to modify and store chemical products produced in the cell, and to secrete these outside the cell.  |
| 3  | D   | Active transport is a process by which substances are transported from a region of lower concentration to a region of higher concentration, with the expenditure of energy.<br>Therefore, to absorb substance by active transport, concentration inside cell has to be greater than that outside cell.<br>The greatest difference in concentration would require the most energy. |
| 4  | D   | For blood to be pumped by the heart, water must be incompressible so that it could circulate around the body.   |
| 5  | B   | Fat (lipid) is made up of one glycerol and three fatty acids molecules.   |
| 6  | C   | Digestion of protein (e.g. egg-white) takes place in the stomach, an acidic environment due to presence of HCl, by the action of enzyme protease. Therefore, this implies that optimum working pH of protease is about that of HCl.   |
| 7  | C   | Lacteal absorbs fatty acids and glycerol.   |
| 8  | C   | Hepatic portal vein is the blood vessel that drains blood from digestive system. It therefore contains all the nutrients (such as glucose) that have been absorbed from the small intestine.<br>Hepatic vein is the blood vessel that drains blood from liver, which would have taken up glucose from the blood supply for its cellular energy production.                        |
| 9  | B   | Palisade mesophyll (B) layer contains the most number of chloroplast because it is the layer of cell in the leaf that is closest to the sunlight. Phloem (D) transports sugar in the form of sucrose, but not starch.   |
| 10 | D   | Enzyme works best at optimum temperature. Low temperature inactivates enzyme while high temperature denatures enzyme. Therefore, rate of reaction is low at low temperature, highest at optimum temperature, and zero at high temperature.  |
| 11 | B   | Transpiration is the loss of water vapour from the internal tissues in plant through the stomata (in leaves) and lenticels (in stem).<br>Water vapour moves through stomata via diffusion.  |
| 12 | A   | Companion cells functioned to produce ATP (by having a large number of mitochondria) to provide energy for active transport of food substances in phloem sieve tube cells.  |
| 13 | B   | As temperature increases, rate of water vapour loss increase, carrying latent heat away to cool plant down.<br>As air gets drier (lower water potential), water vapour in the leaves (higher water potential) diffuses out at a faster rate.  |
| 14 | C   | Coronary arteries carry blood to cardiac (heart) muscle, supplying cardiac cells with oxygen and dissolved nutrients. If blood flow is partially blocked, the cells could not produce sufficient ATPs (due to the lack of oxygen and dissolved nutrients) and therefore the heart muscle could not work properly (coronary heart disease).  |

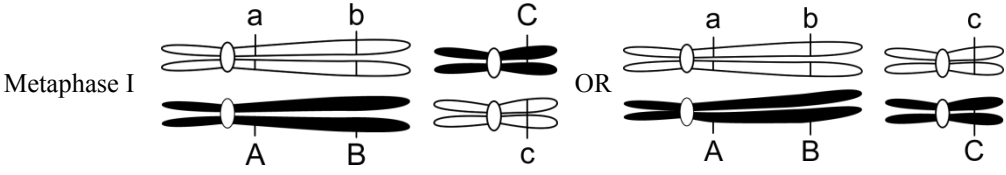




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| 15 | C | Group B contains anti-A antibody, which would attack type A antigen as a foreign substance in the body.<br>Group O contains anti-A and anti-B antibodies, which would attack type A and B antigens as foreign substances in the body.<br>*Antigen maybe protein, carbohydrate etc molecule found on the surface of red blood cell, characterizing the blood type. (i.e. Group B contains type B antigen)   |
| 16 | D | At W, as pressure in left ventricle increases due to contraction of left ventricle, bicuspid valve closes to prevent backflow of blood into left atrium from left ventricle.<br>At X, semi-lunar valve opens as blood flows into aorta from left ventricle, increasing pressure in aorta.<br>At Y, semi-lunar valve closes as left ventricle starts to relax (as indicated by decreasing pressure in left ventricle) to prevent backflow of blood into left ventricle from aorta.<br>At Z, left ventricle is relaxed (low pressure), causing the blood to flow from left atrium through the opened bicuspid valve. |
| 17 | C | Z: Enzyme carbonic anhydrase catalyses this reaction.  |
| 18 | B | Cell X contains cilia, which sweep dust particles trapped in the mucus up the trachea into the pharynx.  |
| 19 | A | Diaphragm muscle contracts causing the diaphragm to flatten and move downwards. This increases volume of thoracic cavity and decreases the pressure in the lungs. Air flows into the lungs.  |
| 20 | C | Excretion is the removal of metabolic waste products from the body. Carbon dioxide is the metabolic waste produced by respiration reaction in cells.   |
| 21 | C | Dialysis fluid flowing in should not contain urea so that urea from patient's blood would diffuse out down the concentration gradient, thus removing waste product from patient's blood.   |
| 22 | C | Homeostatic control involves a receptor which detects the change against the norm and an effector which brings about a corrective measure, ensuring the conditions remain favourable.<br>Water content in ileum is dependent on the volume of water intake.<br>pH in duodenum is kept relatively constant by mixture of acidic chyme from stomach and alkaline intestinal juice.   |
| 23 | A |  |
| 24 | B | Ciliary muscles contract, reducing the tension in the suspensory ligament and causing the lens to become more convex.<br>Iris radial muscles relax and circular muscles contract, reducing the size of pupil. This prevents too much light from entering the eyes in very bright light condition, protecting the light-sensitive retina from damage by strong light.   |
| 25 | D | Dorsal root ganglion is characterized structure of sensory neurons. Relay neuron is found in grey matter of spinal cord.   |
| 26 | C | Kidney is an osmoregulatory and excretory organ.   |
| 27 | B | Pollen grains (male gametes) are found in anther (1) and eggs (female gametes) are found in ovule (4).   |
| 28 | C | Anthers must be held outside of flower so that pollen grains could be easily carried away in the air when wind blows.<br>Light pollen grains could be easily blown away and travelled a further distance away.   |





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| 29 | B | Gaseous exchange takes place in placenta.  |
| 30 | C | One sperm and one egg fuse together to form a zygote. Cell division that occurs in growth is mitosis, which produces genetically identical cells.  |
| 31 | A | <p>Homologous chromosomes are a pair of chromosomes, one from each parent, that have relatively similar structures.</p> <p>Prophase: Chromatin condenses and becomes visible as chromosomes under the light microscope.</p> <p>Telophase: Chromatids arrive at opposite poles of cell and new membranes form around the daughter nuclei. The chromosomes disperse and are no longer visible under the light microscope.</p>  |
| 32 | B | Gamete contains a haploid set of chromosomes.  |
| 33 | B |  <p>Metaphase I</p> <p>Prophase I of meiotic division –</p> <ol style="list-style-type: none"> <li>Bivalent formation – two homologous chromosomes paired up</li> <li>Chiasmata formation – non-sister chromatids of homologous chromosomes twist around each other making contact at several points (chiasmata) along their length.</li> <li>Genetic crossing over – the breakage and rejoining between the two non-sister chromatids at the chiasmata, resulting in exchange of genetic material</li> </ol> <p>Metaphase I of meiotic division – orientation of each homologous pair of chromosomes on the equatorial plate of spindle is independent of other pairs. (i.e. there is independent assortment of maternal and paternal chromosomes into daughter cells)</p> <p>Fertilization – fusion of sperm and egg is a random process</p> |
| 34 | B |  |
| 35 | B | Restriction enzyme cuts DNA molecule at the restriction site into fragments.   |
| 36 | C | <p>Dominant allele only means the trait it encodes is expressed in phenotype when two different alleles are present in the same cell.</p> <p>Recessive allele only means the trait it encodes is not expressed in the phenotype when two different alleles are present in the same cell.</p> <p>There is only one type of allele (IA) present in blood group A homozygote. This will be passed on to the offspring.</p> <p>IA and IB are co-dominant, while IO is recessive.</p>   |
| 37 | A | Blood group and gender are fixed at birth. They do not change over time due to variation in environmental factors.   |
| 38 | C | <p>Natural selection: Nature selects those organisms, which are better adapted to the environment to continue in its survival and reproduction.</p> <p>2- Those organisms that could not adapt to changing environment died before they reach maturity.</p> <p>3- Organisms that survived reproduce and pass on the favorable genes to their offspring. 4- Different organisms possess different genes, and therefore different adaptations. 6- Survival of the fittest.</p>   |





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| 39 | B | If flowers were not pollinated, fertilization would not take place. Therefore, ovary would not be developed into fruit.<br>Bats would be most affected as fruit is its only food source.   |
| 40 | C | The transfer of energy from one trophic level to the next decreases due to the loss in energy as heat, waste etc.<br>Therefore, an organism from successive trophic level has to feed on a large number of organisms from previous trophic level to achieve sufficient energy. |

