



#	Ans	Workings/Remarks
CHEMISTRY		
1	D	A: To measure rate of reaction, time taken is required. B: Amount of CO ₂ produced is required to follow the reaction. C: Measuring cylinder is needed to measure a fixed volume of hydrochloric acid D: Overall, there is no change in heat energy.
2	D	Al ³⁺ and Zn ²⁺ react with NaOH to form Al(OH) ₃ and Zn(OH) ₂ (white ppt), which are soluble in excess of NaOH. However, to be able to react with an acid (HNO ₃), X has to be a carbonate, but not a sulphate.
3	B	Ions are formed by atom losing or gaining electrons to achieve the stable noble gas electronic configuration.
4	D	Metallic bonding is found in metal. Transfer of electrons occurs in ionic bonding.
5	B	Mg + 2HCl → MgCl ₂ + H ₂ No. of mole of Mg = $\frac{6}{24}$ = 0.25 No. of mole of H ₂ = 0.25 Volume of H ₂ = 0.25 × 24 = 6 dm ³
6	A	No. of mole of Li ⁺ = $\frac{20}{1000} \times 1.0 = 0.02$ No. of mole of SO ₄ ²⁻ = $\frac{40}{1000} \times 0.25 = 0.01$ Ratio of Li ⁺ : SO ₄ ²⁻ = 0.02 : 0.01 = 2 : 1
7	A	B: Breaking of C-H bond requires energy C: Changing of liquid into gas requires energy D: Combustion releases energy
8	D	Largest concentration and highest temperature results in fastest rate of reaction.
9	C	Potassium iodide is a reducing agent because oxidation state of I increases from -1 in iodide ion to 0 in iodine molecule. 2I ⁻ → I ₂ + 2e ⁻ [oxidation] Potassium dichromate (VI) is an oxidizing agent because oxidation state of Cr decreases from +6 (orange) in Cr ₂ O ₇ ²⁻ to +3 (green) in Cr ₂ O ₃ . [Reduction]
10	A	Carbon dioxide is an acidic oxide, which dissolves in water to give carbonic acid.
11	C	3 chemical reactions characteristic of acid are: Acid + metal (e.g. magnesium) Acid + base (e.g. magnesium oxide) Acid + carbonate (e.g. magnesium carbonate)
12	D	Refer to periodic table Group V
13	A	Reactivity of Group I elements increases down the group. Group I elements react by losing their valence electron. As the size of atom increases, valence electron is getting further away from nucleus, diminishing the attractive force of nucleus on valence electron. Therefore, going down Group I, ease of losing the valence electron increases and reactivity increases.





14	A	Copper does not react with acid because it is below hydrogen in the metal reactivity series. Magnesium is above zinc in the metal reactivity series. Therefore, Mg produces more bubbles than Zn in the reaction with acid.
15	D	
16	C	Nitrogen ~ 79% Oxygen ~ 20% Noble Gases ~ 1%
17	D	
18	B	Addition reaction of alkene (vegetable oils) with hydrogen gives alkane (margarine).
19	D	Oxidation of alcohol (e.g. propanol) gives carboxylic acid (e.g. propanoic acid)
20	B	

BIOLOGY

21	B	Cell wall is a characteristic structure of plant cell.
22	D	Xylem is a hollow tube, with absence of protoplasm, to allow unobstructed flow of water. Xylem has thick lignified cell wall to provide mechanical strength.
23	A	
24	C	
25	C	Light intensity decreases in the evening, reducing the amount of light needed for photosynthesis.
26	B	Chlorophyll traps sunlight.
27	A	Digested product of starch is glucose, which is small enough to pass through the blood capillary wall in intestinal villi.
28	C	Amino acid contains amine (NH ₂) side group.
29	C	Water moves via osmosis across cell membrane in X, evaporated off cell surface and moves out of stomata via diffusion.
30	C	2 is the pulmonary artery which carries blood to the lung. A tell-tale sign is that 2 joins to right ventricle of heart, having thinner muscle, which pumps blood to lung that is just a small distance away. Tricuspid valve closes to prevent backflow of blood into right atrium when right ventricle contracts.
31	C	1 – Artery carries blood to body parts; therefore the blood must flow sufficiently fast to reach those parts. High speed flow gives rise to high pressure. 2 – Vein has the largest cross-sectional area and therefore lowest resistance to blood flow. (Pressure is inversely proportional to cross-sectional area) 3 – Capillary is one-cell thick, allowing efficient exchange of substances with tissue fluid.
32	C	Anaerobic respiration takes place during vigorous exercise in respond to the insufficient supply of oxygen. This results in the production of lactic acid, which was then carried to the liver to be converted into carbon dioxide and water after exercise has stopped.
33	D	Aerobic respiration requires oxygen to be taken in.





34	A	Impulses travels from sensory neuron to motor neuron via relay neuron in spinal cord.
35	A	Principle of conservation of energy: Energy can neither be created nor destroyed; it is converted from one form into another. Therefore, total energy output must add up to be 100%.
36	D	Plant could be eaten up by herbivores, which were in turn eaten up by carnivores.
37	A	Decomposition of organic matter in sewage requires oxygen. Highest intensity of decomposition occurs in area of sewage outfall.
38	D	Pollination allows pollen to land on stigma. Growth of pollen tube allows male gametes to meet female gametes.
39	A	At day 7, menstruation has ended and unfertilized egg has been removed. New egg has not been released yet. At day 14, ovulation occurs, allowing high chance for a sperm to meet an egg.
40	A	Blood group is predetermined by the allele present in chromosome; it is not influenced by change in surrounding factors. Body mass is determined by change in surrounding factors such as food intake.

