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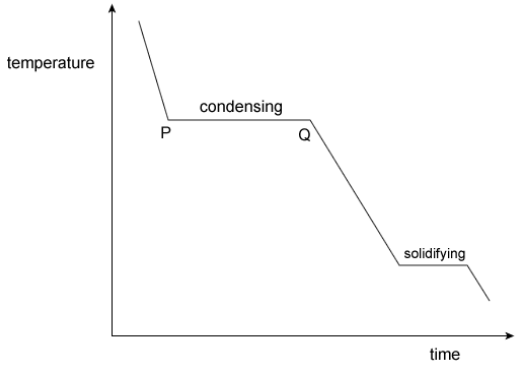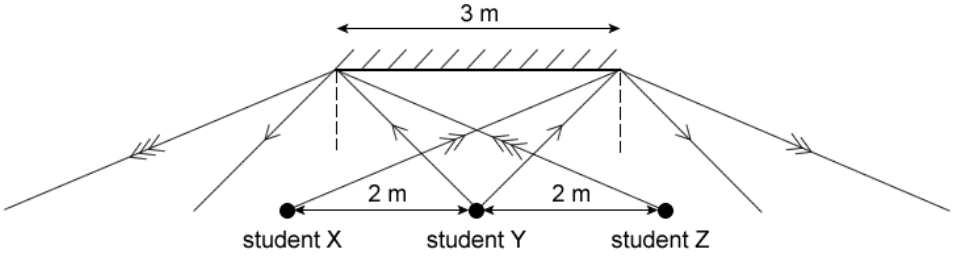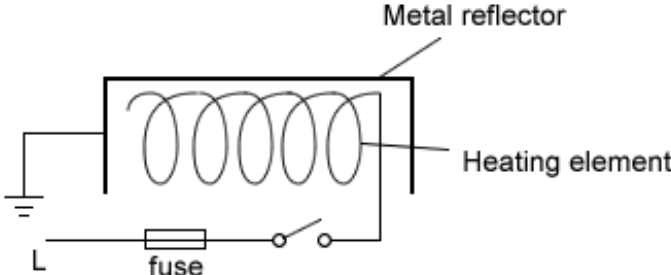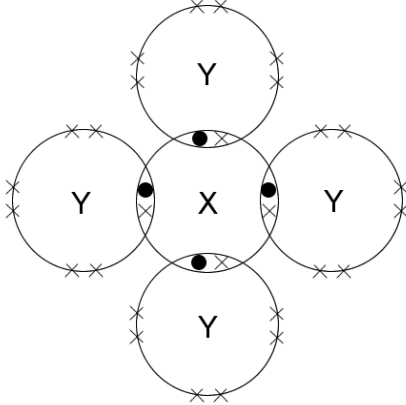| #	Ans	Workings/Remarks
PHYSICS		
1	B	Physical quantities are made up of scalars (magnitude) and vectors (magnitude + direction). Therefore, all physical quantities consist of magnitude. A SI unit is assigned to each physical quantity.
2	D	Period is the time taken for one oscillation (N.B. Starting point and finishing point must be the same)
3	C	Uniform acceleration occurs at the linear part of the speed-time graph. $\Rightarrow$ Gradient of speed-time graph = acceleration = $\frac{(20-10)}{(3-2)}$ = 10 m/s^2
4	B	On Earth, Weight = mg Mass = 50 / 10 = 5kg On the Moon, Weight = mg = 5×1.6 = 8N Mass is constant and therefore has the same value on Earth and on the Moon.
5	A	Pressure $= \frac{\text{Force}}{\text{Area}} = \frac{40}{0.001 \times 4}$ = 10000 N/m^2
6	A	<u>Major</u> functions (and corresponding energy <u>produced</u> by the appliance): Hair dryer – heating (heat energy), blowing (kinetic energy) and some noise (sound energy) Loudspeaker – sound energy Electric iron – heating (heat energy) Electric heater – heating (heat energy)
7	B	Power $= \frac{\text{Work done}}{\text{time}} = \frac{\text{Gain in potential energy}}{\text{time}} = \frac{mgh}{t} = \frac{2000 \times 10}{20}$ = 1000 W
8	D	In a convection process where the liquid is heated from below, the region X (which is close to the heat source) expands, leading to a reduction in its density. Mass doesn't change under any circumstances.
9	B	The graph has two parts that leveled off, indicating a change in state. The gas first changed into liquid (condensation) and then into solid (solidifying).
10	C	**Looking at the diagram,** there are 5 wavelengths per 20 cm (1 × wavelength = distance between two consecutive wavefronts) Velocity = frequency × wavelength = $4 \times \frac{20}{5}$ = 16 cm/s

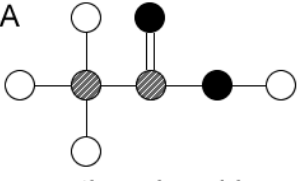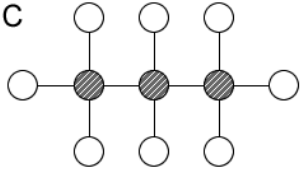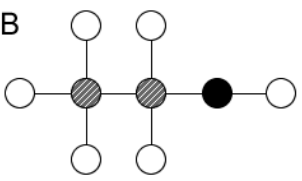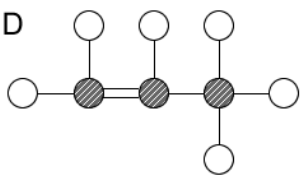| 11	D	
		Note: Diagram drawn to scale in question paper
		From the diagram above, all students are within their fields of vision of each other.
12	C	Refractive index is the ratio of speed of light in vacuum to the speed of light in the medium.
13	C	Time taken for sound to travel from origin to building = Time taken for echo to travel from building back to origin = 4/2 = 2s Distance between origin and building = speed × time = 320 × 2 = 640m
14	C	
15	D	Potential difference $V = \dfrac{\text{Work done } (W)}{\text{charge } (Q)}$
16	A	The two identical resistors connected in parallel results in an *effective* resistance of half the value of one resistor, thereby increasing the total current drawn by the circuit (by two times). The potential difference across the battery remains unchanged (same points in the parallel circuit).
17	A	In a series circuit, current is constant and the voltage is split among the loads according to their respective resistances. Since both resistors are identical, they share the same potential difference across each of them i.e. 2V. Therefore, p.d. across lamp = 9 – 2 – 2 = 5V
18	C	Number of kWh = $\dfrac{1200}{1000} \times 10 = 12$ kWh Cost = 12 × 7 = 84 cents
19	B	 In an electrical heater, the live wire supplies the current directly to its heating element. Hence its switch must be connected along the live wire for proper on/off operation.
20	D	

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CHEMISTRY		
21	A	The gas which turns red litmus blue is ammonia gas. Sodium hydroxide reacts with ammonium compound to give ammonia gas. Aluminium foil is used to test for the presence of nitrate ions, as indicated by the production of ammonia gas.
22	C	
23	C	Filtration is used to separate solid from liquid. A Separating funnel is used to separate immiscible liquids with different densities. A pure compound has a fixed melting and boiling point. An impure compound has a variable range of melting and boiling points.
24	A	Refer to periodic table
25	B	YCl is formed when a Y^+ ion bond with a Cl^- ion. A chloride ion (Cl^-) is formed when a chlorine atom gains an additional electron. This electron is 'donated' by atom Y (in its process of becoming a Y^+ ion) in order to achieve a stable electronic configuration.
26	B	Electronic configuration of X = 2.4 Electronic configuration of Y = 2.7 X and Y require 4 bonds and 1 bond respectively in order to achieve a stable electron configuration i.e. 2.8.
27	C	No of mole of HCL $= \frac{25}{1000} \times 0.1 = 0.0025$ No of mole of NaOH = 0.0025 Concentration of NaOH $= \frac{0.0025}{\frac{20}{1000}} = 0.125$ mol/dm^3
28	D	Percentage of nitrogen in $\mathbf{NH_4NO_3}$ = total mass of nitrogen atoms / molecular mass × 100% $= \frac{14 \times 2}{80} \times 100\%$ = 35%
29	C	In an exothermic reaction, energy is released at the end of the reaction, regardless of the number of bonds made or broken. Besides, bonds between different elements contain different amount of bond energy, therefore the <u>number of bonds made or broken</u> is not used as an indication of whether a reaction is endothermic or exothermic. Instead, <u>the amount of energy</u> absorbed during bond-breaking and energy released during bond forming should be taken into consideration.

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30	B	Iron (III) ion is reduced because its oxidation state decreases from +3 to +2 in iron (II) ion, by gaining one electron from the iodide ion, which is oxidized at the same time because its oxidation state increases from −1 to 0 in the iodine molecule.
31	B	Acids don't typically react with nitrate, sulfate or chloride salts.
32	C	For an element in A: Electronic configuration of atom : 2.4 (Group IV) B: Electronic configuration of atom : 2.6 (Group VI). It needs to receive 2 electrons to become an ion (and be stable). Total number of electrons in ion therefore should be 8 + 2 = 10. C: Electronic configuration of atom : 2.8.6 (Group VI). It needs to receive 2 electrons to become an ion (and be stable). Total number of electrons in ion therefore is 16 + 2 = 18. D: Electronic configuration of atom : 2.8.8.2 (Group II)
33	A	According to the metal reactivity series, magnesium is more reactive than iron, which in turn is more reactive than copper. Therefore, the strongest reaction will occur between magnesium and hydrochloric acid, giving off the most number of bubbles of hydrogen gas.
34	A	Conditions for rusting: Air & water B: drying agent removes air in the tube C: boiling the water removes air in water D: grease prevents water from coming into contact with nail
35	D	Iron fillings react with oxygen (30%) in the planet's atmospheric 'air'. The rest of the un-reacted (70%) gases would remain.
36	C	Crude oil is first cracked to give numerous fractions (e.g. kerosene, naptha, lubricating oil etc.) which are then fractionally distilled to obtain individual fractions.
37	B	As the relative molecular mass increases, the size of the molecule increases too. It is harder to burn the molecule due to the increased number of bonds that needs to be broken. Thus, the molecule is said to be less flammable.
38	B	
39	B	
40	C	Acidified potassium dichromate (VI) is an oxidizing agent. It oxidizes alcohol to become carboxylic acid, with itself changing from orange (Cr^{6+}) to green (Cr^{3+}) as it is being reduced simultaneously.