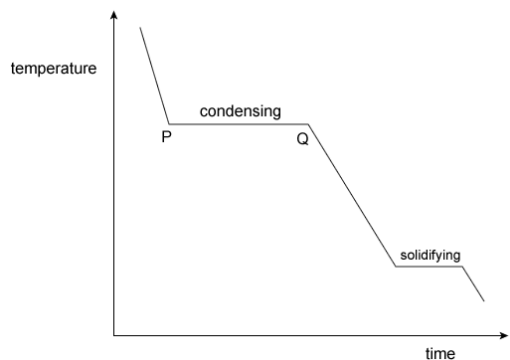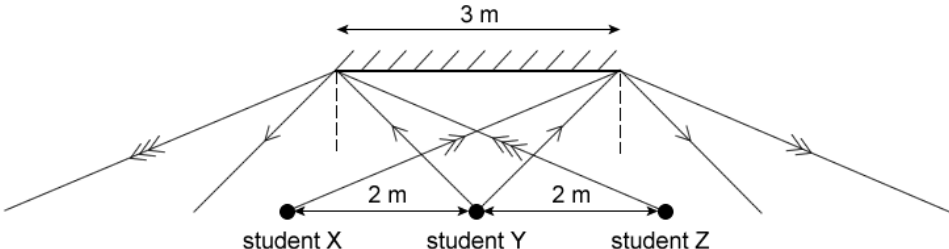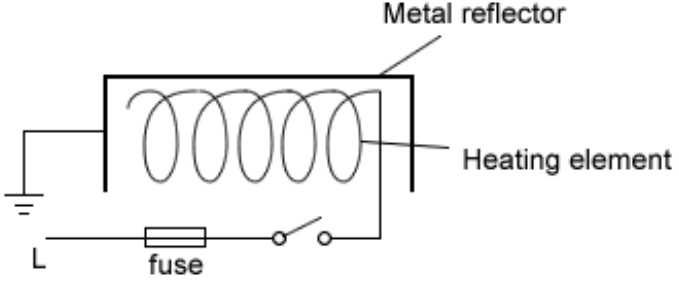| #	Ans	Workings/Remarks
PHYSICS		
1	B	Physical quantities are made up of scalars (magnitude) and vectors (magnitude + direction). Therefore, all physical quantities consist of magnitude. A SI unit is assigned to each physical quantity.
2	D	Period is the time taken for one oscillation (N.B. Starting 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 = 5 kg On the Moon, Weight = mg = 5×1.6 = 8 N 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	
		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 = 2 s
		Distance between origin and building = speed × time = 320 × 2 = 640 m
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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BIOLOGY

21	B	The nucleus stores genetic material DNA.
22	D	Water moves from a region of higher water potential (soil) to a region of lower water potential (root hairs).
23	C	The enzyme (amylase) with a fixed 3D configuration and shape is the lock into which the substrate (starch), or key, is fitted.
24	D	X is a chloroplast, which traps light energy and changes it into chemical energy (stored in glucose) via photosynthetic reaction.
25	B	Carbon dioxide is needed for photosynthesis to occur and therefore could be a limiting factor. 25°C is closer to the optimum temperature for enzymatic action.
26	A	Protein digestion first begins in the stomach. No digestion occurs in B (pancreas) and D (gall bladder).
27	C	
28	D	A lower oil level and a smaller mass reading indicate that the amount of water <u>in the flask and in the plant</u> has decreased. The water couldn't have evaporated directly from the flask because the oil layer prevents that from happening. Higher temperature in the surrounding due to warm sunshine causes water vapour in leaves to diffuse through the stomata and into the air down a concentration gradient (= transpiration). This draws water up from the stem and roots in the xylem vessels to replace the water that has lost in the leaves, resulting in the diffusion of water from the flask into the root hairs.
29	D	1. Pulmonary artery carries deoxygenated blood to the lung. 2. Pulmonary vein carries oxygenated back to the heart from lung. 3. Aortic artery carries oxygenated blood from heart to the rest of body. 4. Vena cava carries deoxygenated blood from rest of body back to the heart.
30	D	
31	A	
32	C	Gaseous exchange takes place at alveolus. Oxygen diffuses from alveolar space (Y) into the blood capillary down a concentration gradient, thus replenishing the deoxygenated blood (X) in the pulmonary artery from the heart. Oxygenated blood (Y) will then return back to the heart via pulmonary vein.
33	C	The diameter of pupil increases gradually, allowing sufficient light to enter the eye for clear vision. This indicates that the intensity of light in surrounding is decreasing gradually.
34	D	
35	A	Producers occupy the first trophic level in the pyramid of energy, and thus possess the largest amount of energy available to the next trophic level.
36	C	Sewage is a source of nutrients for bacteria and algae growth in river water. As sewage enters river, the level of nitrates in the river increases and promotes abundant algae growth, which in turn depletes the level of oxygen in the river. Sewage encourages bacteria to grow, and thus depleting oxygen level too as they are used by bacteria for respiration.

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37	A	Asexual reproduction results in production of genetically identical offspring from one parent.
		Sexual reproduction results in the production of genetically dissimilar offspring from the random fusion of nuclei with varied DNA.
		Genetic variability increases the chance of survival of species during changes in the environment.
38	D	The best way is abstinence. In the absence of this option, however, the next best option is fidelity (having one sexual partner in a lifetime), which can vastly stifle its <u>spread</u> among the human population. The use of condoms (provided it's used correctly) will largely reduce the risk of infection but the risk will increase if the one has multiple sexual partners (HIV can still be transmitted via other means i.e. through contact with blood, bodily fluids etc.)
39	B	
40	D	

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