

Question	Answer	Marks	AO Element	Notes	Guidance
1(a)	evaporation	1			
1(b)	any three from the following: at the surface (1) more energetic molecules escape (from liquid) out (1) (as they) overcome / break forces / bonds (between molecules) (1) (liquid (molecules) →) gas / vapour (molecules) (1)	3			
2	smaller / lower pressure (on cylinder) (1) (because) reduced rate of collisions / fewer collisions AND with cylinder / wall (of cylinder) / piston (per unit area) (1)	2			
3	(as the volume decreases) the particles collide more often (1) (as the temperature decreases) the particles collide less violently (1) two effects cancel (to leave the pressure unchanged) OR particles collide with walls / piston / cylinder (1)	3			

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4(a)	$(p_2 =) p_1 V_1 / V_2$ ALLOW 1 mark for $p_1 V_1 = p_2 V_2$	2			
4(b)	greater molecules move faster / have greater KE / molecules have greater momentum (leads to) more frequent / harder collisions (with walls) / great rate of change of momentum	3			
5	molecules (in liquid) move faster OR molecules gain energy (1) molecules move apart (on average) (1)	2			
6(a)	$E = mc (\Delta)T$ in any form words, symbols or numbers OR $(E =) mc (\Delta)T$ OR $0.23 \times 0.72 \times 550$ (1) 91 J (1)	2			

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6(b)	$t = E / P$ in any form words, symbols or numbers OR $(t =) E / P$ OR 91 / 2.4 (1) 38 s (1)	2			
6(c)	(thermal) energy is used to increase the temperature of / lost to cylinder / piston / heater / surroundings	1			
7	(shiny surfaces) are <u>good</u> reflectors OR <u>poor</u> absorbers / emitters (1) so less thermal energy lost by radiation (1)	2			
8	electrons mentioned (1) electrons travel (a great distance) through the metal or (vibrating) atoms hit (free) electrons (1) electrons hit (distant) particles or transfer energy (to distant atoms) (1)	3			

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9	any three from: (heat causes) water molecules (to) move further apart OR (hot) water expands / volume increases (hot water) is less dense (so hot / less dense) water rises (and is replaced by cooler / more dense water) convection / current (in water)	3		NOT molecules less dense/expand	
10	road / black surfaces are good absorbers (of radiation) OR sea is a poor absorber (of radiation)	1			
[Total: 30]					