Assessment Schedule – 2005

Physics: Demonstrate understanding of heat transfer and nuclear physics (90184)

Evidence Statement

Q	Evidence	Evidence contributing to Achievement	Evidence contributing to Achievement with Merit	Evidence contributing to Achievement with Excellence
1(a)	$Q = mc\Delta T = 0.15 \times 4100 \times 20$ $= 12\ 300$ J	[2] Correct data but wrong answer.	[2] Correct working and answer.	
1(b)	Solid and liquid.	[1] Correct answer. Liquid to solid **not** solid to liquid.		
1(c)	(1) As the drink cools from the liquid to solid, heat energy is released from the drink. (2) The (vibration of) particles slow down to form a solid. **OR** This allows the molecules in the drink to bind together to form a solid.	[1] Mentions (1), that heat energy is released or identifies phase change from liquid to solid.	[1] Mentions (1) **AND** (2)	
1(d)	$Q_1 = mc\Delta T = 0.15 \times 1900 \times 15 = 4275$ J $Q_2 = mL = 0.15 \times 320\ 000 = 48\ 000$ J Total = $Q_1 + Q_2 = 52\ 275$ J	**Correct working and answer either Q_1 or Q_2.**	[2] Correct working and answer for both Q_1 and Q_2.	[2] Correct working and answer for total energy.

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Q	Evidence	Evidence contributing to Achievement	Evidence contributing to Achievement with Merit	Evidence contributing to Achievement with Excellence
2(a)	Radiation.	[1] Correct term.		
2(b)	$E = P \times t = 2200 \times 60 = 132\,000$ J.	[2] Correct working and answer.		
2(c)	$Q = mL = 0.005 \times 2\,260\,000$ $= 11\,300$ J.	[2] Correct working and answer.		
2(d)	Warm air, being less dense, rises. The ice pack is placed at the top to cool the warm air that rises. As the air cools, it becomes denser and sinks to the bottom of the box, so that convection current is set up to cool the interior of the entire box.	[1] Mentions hot air rises **OR** cold air sinks.	[1] Mentions warm air is less dense and rises **OR** cold air is denser and sinks, and the ice cools the warm air.	[1] Correct explanation. Includes good description of convection current, with all of A1 and M1.
2(e)	Plastic is a good insulator of heat. Metals, being good conductors of heat, will transfer heat from the surroundings, and it would not stay cool for as long.	[1] Mentions plastic is a good insulator of heat **OR** metal is a good conductor.	[1] Mentions plastic is a good insulator of heat and compares it with a metal.	
2(f)	Double skin traps air between the walls. Air is a poor conductor of heat, conduction of heat from the surroundings to inside the box is minimised.	[1] Mentions that air is poor conductor (of heat) **OR** relates trapped air to heat.	[1] Clearly **links** trapped air to poor conductivity.	[1] Correct explanation.
2(g)	$Q = mL = 0.93 \times 340\,000 = 316\,200$ J $P = \frac{E}{t} = \frac{316\,200}{50 \times 60}$ $= 105.33$ $= 105$	Correct working and answer for Q (316 200 J).	[2] Correct working and answer for P using t as 50 min. **(Ans 6324 w)**	[2] Correct working and answer.
Unit	Watt or Js^{-1}	[1] Correct unit		

Q	Evidence	Evidence contributing to Achievement	Evidence contributing to Achievement with Merit	Evidence contributing to Achievement with Excellence
3(a)	They both have same number of protons (atomic number) but different numbers of neutrons (mass number).	[1]Correct explanation.		
3(b)	X = 62 Y = 4	[2]Either correct answer.	[2] Both answers are correct.	
3(c)	Extra neutrons will collide with other nuclei to produce further reaction, or to produce a chain reaction.	[1] Mentions chain reaction only.	[1] Correct explanation.	
3(d)	Splitting a large nucleus into smaller ones.	[1]Correct statement.		
3(e)	${}_{2}^{4}He + {}_{0}^{1}n$ **Do not accept N for neutron**	[2] Either correct mass and atomic numbers or the symbol is correct.	[2] Correct answers.	
3(f)	Fusion reaction.	[1] Correct answer.		
	Total opportunities	**criterion 1: 10** **criterion 2: 7**	**criterion 1: 5** **criterion 2: 5**	**criterion 1: 2** **criterion 2: 2**

Judgement Statement

Achievement	Achievement with Merit	Achievement with Excellence
5 × A1	2 × M1 *plus* 2 × A1	1 × E1 *plus* 2 × M1 *plus* 2 × A1
3 × A2	2 × M2 *plus* 2 × A2	1 × E2 *plus* 2 × M2 *plus* 2 × A2
For Achievement, at least 1 A1 and 1 A2 must be from Heat and Nuclear.		