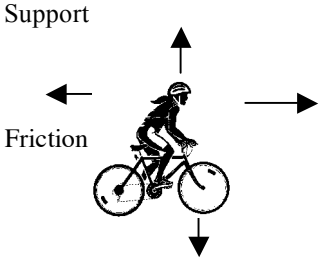
Assessment Schedule – 2006 version 3

Science: Describe aspects of physics (90191)

Evidence Statement

Q	Achievement	Achievement with Merit	Achievement with Excellence
1(a)	2500 metres		
1(b)		Correct solution $V_{av} = \frac{d_{total}}{t_{total}}$ $= \frac{3000}{540}$ = 5.6 m s^{-1} (if 5.5 must have correct working)	
1(c)	Accelerating / increase in speed.		
1(d)	Shows Working. $= \frac{1500}{180}$ =8.3 ms^{-1}		
1(e)		Correct solution $E_k = \frac{1}{2}mv^2$ $= \frac{1}{2} \times 70 \times 8.3^2$ = 2411 J or = 2431 J (if used unrounded v)	
1(f)	All four arrows labelled and correct direction Support  Friction Weight		
1(g)	Forces are balanced. **OR** Forces are equal and opposite. **OR** Friction and push are equal.	For an object to change its speed it requires an unbalanced force / net force. **OR** A net force of zero means that $a = 0$, therefore speed is not changing.	

1(h)		Correct solution (do not need negative) $A = \Delta v / \Delta t$ $= (0 - 8.3) / 180$ $= 0.05$ (or 0.046 unrounded)	
1(i)	Forces become unbalanced. **OR** Friction increases / push decreases.	Friction becomes greater than the push force (causing a deceleration). **OR** Less push relative to friction (causing a deceleration).	
1(j)	Correct solution $F = ma$ $= 70 \times\times 1.5$ $= 105$ N		
1(k)		**EITHER** Correctly calculated work / value. $W\,(E) = F \times d$ $= 105 \times 25$ $= 2625$ **OR** Incorrectly calculated work (working shown) correctly substituted into Power $= \frac{E}{t}$ NB: Must show equation $P = \frac{E}{t}$	Correct solution $W\,(E) = F \times d$ $= 105 \times 25$ $= 2625$ Power $= \frac{E}{t}$ $= \frac{2625}{5}$ $= 525$ W
2(a)	No (air) particles / matter / medium.		
2(b)	Links feature with heat transfer method. A vacuum does not allow conduction / convection. **OR** Silvered surfaces reflect / reduce radiation. **OR** plastic is a poor conductor / good insulator. **OR** A small opening / lid reduces heat loss by convection. NOTE: A student may provide evidence for 2(a) in this answer.	Reason for heat reduction by **ONE** design feature. Conduction / convection will not occur as they need particles / medium to transfer heat. **OR** The silvered internal surface reflects radiated heat back into the mug, reducing heat loss by radiation. **OR** The plastic top is a poor conductor / good insulator of heat, thereby reducing the loss of heat through the lid. **OR** The small opening / lid reduces the amount of heat lost through convection as less hot air particles can escape.	Reason for heat reduction by **TWO** design features. Conduction / convection will not occur as they need particles / medium to transfer heat. **OR** The silvered internal surface reflects radiated heat **back** into the mug, reducing heat loss by radiation. **OR** The plastic top is a poor conductor / good insulator of heat, thereby reducing the loss of heat through the lid. **OR** The small opening / lid reduces the amount of heat lost through convection as less hot air particles can escape.

3(a)	Parallel		
3(b)	If one bulb blows the other will keep going. **OR** All bulbs (in parallel) will be at maximum brightness.	Gives reason for one idea. If one bulb blows, there is still a pathway for current through the other bulb so it will still glow. **OR** Bulbs in parallel will receive the full voltage of the battery leading to maximum brightness.	
3(c)	12 V		
3(d)	Correct solution $P = V\,I$ $= 12 \times 0.5$ $= 6$ W possible follow-on from 3(c) (if use V=6V P= 3W)		
3(e)	No effect / still works.		
3(f)	Correct unit Ω / ohm	**EITHER** Correctly calculated current / value $I = \frac{P}{V}$ $= \frac{30}{12}$ $= 2.5$ **OR** Incorrectly calculated current correctly substituted into $R = \frac{12}{I}$ NB: Must show equation $R = \frac{V}{I}$ **OR** Correct solution (4.8), but wrong / no unit.	Correct solution and unit $I = \frac{P}{V}$ $= \frac{30}{12}$ $= 2.5$ $\text{Resistance} = \frac{V}{I}$ $= \frac{12}{2.5}$ $= 4.8\ \Omega$
3(g)	Describes **ONE** feature A higher wattage bulb has a lower resistance. **OR** A higher wattage bulb draws more current. **OR** A higher wattage bulb transfers more energy per second.	**ONE** idea explained. A higher wattage bulb has a lower resistance, leading to a higher current being drawn by the bulb. **OR** The current is higher which means that the bulb is able to transfer / convert more energy per second, making it brighter.	Links **TWO** explanations A higher wattage bulb has a lower resistance, leading to a higher current being drawn by the bulb. **AND** The bulb is able to transfer / convert more energy per second making it brighter.

3(h)		Correct solution $E = P\,t$ $= 45 \times 120$ $= 5400$ J	

Judgement Statement

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Achievement	Achievement with Merit	Achievement with Excellence
ELEVEN questions answered correctly. Minimum of 11 × A	FOURTEEN questions answered correctly, including at least SEVEN at Merit level. Minimum of 7 × M + 7 × A	FIFTEEN questions answered correctly, including at least TWO at Excellence level with at least ONE from Q1(k) / Q3(f) and at least ONE from Q2(b) / Q3(g), plus at least SIX at Merit level. Minimum of 2 × E [ONE from Q1(k) / Q3(f) and ONE from Q2(b) / Q3(g)] + 6 × M + 7 × A