Assessment Schedule – 2005

Physics: Demonstrate understanding of mechanics in one dimension (90183)

Evidence Statement

Q	Evidence	Evidence contributing to Achievement	Evidence contributing to Achievement with Merit	Evidence contributing to Achievement with Excellence
1(a)	One pascal is a force of one newton applied over an area of one square metre.	[1] mentions force per unit of area / Nm^{-2}.	[1] Correct explanation.	
1(b)	$F = mg = 88 \times 10 = 880$ N $A = \frac{F}{P} = \frac{880}{733} = 1.2$ m^2	[2] Correct answer for force.	[2] Correct working and answer.	
1(c)	$v = \frac{d}{t} = \frac{2.8}{0.70} = 4.0$ ms^{-1}	[2] Correct working and answer.		
1(d)	$v = \frac{d}{t} = \frac{2.8}{0.40} = 7.0$ ms^{-1} $a = \frac{\Delta v}{\Delta t} = \frac{7-4}{5.0} = 0.60$ ms^{-2}	**Correct working and answer for velocity.** Replacement for 1(c).		[2] Correct working and answer.
	Unit is ms^{-2}.	[1] Correct unit.		
2(a)	Gradient of the line = $\frac{8-2}{10} = 0.6$ ms^{-2}	[2] Correct answer.		
	Unit is ms^{-2}.	**[1] Correct unit.** replacement for 1(d)		
2(b)	Area under the graph $= (2 \times 10) + (0.5 \times 10 \times 6)$ $= 50$ m	[2] Uses the concept that area is the distance but calculated it wrongly.	[2] Correct working and answer.	
2(c)	B – Moving at a constant velocity (of 2.0 ms^{-2}.) C – moving at a constant acceleration (of 0.4 ms^{-2}.)	[1] B – constant velocity. C – acceleration / increasing speed.	[1] B – constant velocity. C – constant acceleration.	
2(d)	Gradient is zero because the object has zero acceleration / moving at a constant velocity. This is because the driving force and the friction force cancel each other. So the unbalanced force on the board is zero (producing zero acceleration).	[1] Gradient is zero because the object has zero acceleration / moving at a constant velocity / z force.	[1] As for Achievement **plus** the forces are balanced / equilibrium / zero net force.	[1] As for Merit **and** clear explanation showing understanding of the actual forces involved.
2(e)	Friction force ← → Driving / thrust / wind / push force	[1] Correct directions **:** correct sizes / names.	[1] Correct answers.	

Q	Evidence	Evidence contributing to Achievement	Evidence contributing to Achievement with Merit	Evidence contributing to Achievement with Excellence
2(f)	Gradient = acceleration $= \frac{6-2}{30-20} = 0.4\ \text{ms}^{-2}$ Force = $m \times a = 88 \times 0.4 = 35.2$ N	**Correct working and answer for gradient.** Replacement for 2(a).	[2] Correct gradient and correct working for force but wrong answer.	[2] Correct working and answer.
3(a)	$3.5\ \text{ms}^{-1} \rightarrow - 1.6\ \text{ms}^{-1} \leftarrow$ $= 5.1\ \text{ms}^{-1}$ to the right ($\rightarrow$)	[2] Correct answer with no / wrong direction.	[2] Correct answer with correct direction.	
3(b)	$E_k = \frac{1}{2} m \times v^2$ $= \frac{1}{2} \times 70 \times 1.6^2$ $= 89.6$ J (90 J)	[2] Correct working and answer.		
3(c)	$E_k = \frac{1}{2} m \times v^2$ $= \frac{1}{2} \times 88 \times 1.2^2$ $= 63.36$ J $F \times d = 63.36$ $F = \frac{63.36}{0.70} = 90.5$ N (91 N)	[2] Correct working and answer for E_k.	[2] Correct methods and working, but wrong answer.	[2] Correct working and answer.
3(d)	Towards Lee / opposite to the board's direction of motion / backwards / towards the board / against the board / into the board.	[1] Correct answer.		
3(e)	$E_p = mgh = 5.6 \times 10 \times 1.1 = 61.6$ J $t = \frac{E}{P} = \frac{61.6}{34.2} = 1.8$ s	[2] Correct working and answer for E_p.	[2] Correct methods and working, but wrong answer.	[2] Correct working and answer.
3(f)	One watt is one joule per second.		[1] Correct explanation.	
3(g)	(1) Work is done when a force acts along the direction of motion. (2) Here the supporting force is upwards while direction of motion is forward / right angles to the force, so no work is done.		[1] Given statement (1).	[1] Correct and clear explanation including both statements.
4(a)	Downwards	[1] Correct direction.		
4(b)	$\frac{1}{2} m \times v^2 = 728$ $v^2 = 728 \times \frac{2}{91} = 16$ $v = 4\ \text{ms}^{-1}$	[2] Correct substitution but wrong answer.	[2] Correct working and answer.	

Q	Evidence	Evidence contributing to Achievement	Evidence contributing to Achievement with Merit	Evidence contributing to Achievement with Excellence
4(c)	(1) Principle: Conservation of energy. All the kinetic energy at the beginning of the motion is converted **to** gravitational potential energy at the point P. (2) Assumption: No kinetic energy is used to overcome friction (converted into heat).	[1] Mentions conservation of energy (may describe energy changing from gravitational potential to kinetic.)	[1] Explanation shows a clear understanding of the situation, but fails to state the assumption.	[1] Explanation shows a clear understanding of the situation and states the assumption.
4(d)	Sail area experiences air resistance to his downward motion, so his actual speed is smaller than the calculated value.	[1] Mentions air resistance / friction	[1] Answer linking air resistance to slower speed.	
Total opportunities		**criterion 1: 9 + 1R** **criterion 2: 10 + 2R**	**criterion 1: 7** **criterion 2: 7**	**criterion 1: 3** **criterion 2: 4**

Judgement Statement

The grade awarded is the highest one that has been demonstrated in all achievement criteria up to and including that grade.

The following is a guide to the standard required for each grade in the two criteria.

Criterion 1

Achievement	Achievement with Merit	Achievement with Excellence
FOUR opportunities answered at Achievement level or higher. 4 × A1	SIX opportunities answered with THREE at Merit level or higher. 3 × M1 *plus* 3 × A1	SEVEN opportunities answered with at least ONE at Excellence level and THREE at Merit level. 1 × E1 *plus* 3 × M1 *plus* 3 × A1

Criterion 2

Achievement	Achievement with Merit	Achievement with Excellence
FOUR opportunities answered at Achievement level or higher. 4 × A2	SIX opportunities answered with THREE at Merit level or higher. 3 × M2 *plus* 3 × A2	EIGHT opportunities answered with at least TWO at Excellence level and THREE at Merit level. 2 × E2 *plus* 3 × M *plus* 3 × A