Assessment Schedule – 2007

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

Evidence Statement

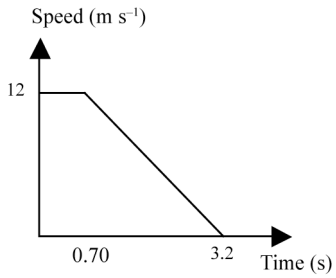
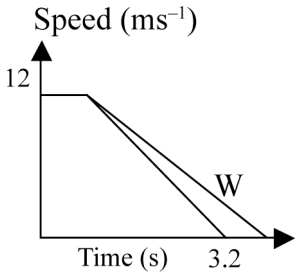
Note: Minor computational errors will not be penalised. A wrong answer will be accepted as correct provided there is sufficient evidence that the mistake is not due to a lack of understanding. Such evidence includes:

- the last written step before the answer is given has no unexpanded brackets or terms and does not require rearranging
- the power of any number that is multiplied by a power of 10 is correct.

Correct units and significant figures are required only in the questions that specifically ask for them.

Evidence Statement

Q	Evidence	Achievement	Achievement with Merit	Achievement with Excellence
1(a)	8.5 km, east.	[2] Correct distance or direction.	[2] Correct distance and direction.	
1(b)	$t = \frac{18}{60} = 0.30$ $v = \frac{d}{t} = \frac{17.1}{0.30} = 57 \text{ km h}^{-1}$	[2] Correct method but 18 minutes is used to get 0.95 km h^{-1}.	[2] Correct working and answer.	
1(c)	$v = \frac{d}{t} = \frac{8\,500}{18 \times 60} = 7.9 \text{ m s}^{-1}$ east	[2] Correct working and answer, but no direction given.	[2] Correct working and answer, with direction.	
1(d)	$W = mg = 0.65 \times 10 = 6.5$ N	[2] Correct answer.		
1(e)	Mass is the amount of material (matter) in the parcel. NOT amount atoms/particles. Weight is the gravitational force on the parcel. NOT stuff/amount of gravity.	[1] Either statement is given.	[1] BOTH statements are given.	
1(f)	Net force is zero. Net (unbalanced) force causes acceleration. The box is not accelerating because the weight force is balanced by the supporting force, so the net force is zero. OR $F = ma$ and as stationary, $a = 0$ so $F = 0$	[1] Mentions zero force.	[1] Achieved plus mentions that the acceleration is zero/stationary/balanced forces.	1 Achieved plus correct coherent explanation / REASON, eg Newton Laws.

2(a)	$d = v \times t = 12 \times 0.70 = 8.4$ m	[2] Correct answer.		
2(b)		[1] Correct shape but $t = 3.2$ s or $v = 12$ ms^{-1} not correct. allow curve.	[1] Correct graph with data.	
2(c)	By calculating the area under the graph.	[1] Correct answer.		
2(d)		[1] Correct shape (accept any line extending beyond 3.2 s mark).		
2(e)	If the road is wet and slippery, there is less friction between the tyre and the road. This will cause the van to slide on the road and the deceleration of the van is less. Because of this the van takes longer to stop.	[1] Mentions less friction.	[1] Explanation links only less friction to greater distance / time travelled / slope.	[1] Correct explanation links less friction to slower deceleration / slope and therefore longer distance / time.
2(f)	$E_k = ½ m \times v^2$ $= ½ \times 2100 \times 12^2$ $= 151\,200$ J $F \times d = 151\,200$ $F = \frac{151\,200}{27} = 5600$ N OR $a = v/t$ $= 12/2.5$ $= 4.8$ $F = ma$ $= 2100 \times 4.8$ $= 10080$ N	2.Correct working and answer for Ek. OR Correct working and answer for a. (can use either time of 2.5 s OR 3.2 s.)	[2] Correct value for E_k PLUS used the idea $E_k = F \times d$, but final answer is incorrect/incorrect E_k but correct method for F . OR Correct value for a PLUS used the idea $F=ma$ but final answer is incorrect/ Incorrect a but correct method	[2] Correct working and answer.
2(g)	The speed is doubled, so the kinetic energy is increased by 4 times (4 times as much work must be done to stop it). The braking force is unchanged, so the distance travelled will increase by 4 times.	1.more than 2× because has 2× kinetic energy	[1] Explanation links doubling speed to 4 times increase in E_k.	[1] Correct explanation.

3(a)	$m = \frac{(3500+5500)}{10} = 900$ kg		[2] Correct working and answer.	
3(b) 3(c)	Side C $P_{max} = \frac{F}{A} = \frac{1150}{0.90} = 1278$ COE possible from 3(b)	2.Incorrect side but correct working: A: 1150/1.8 = 6.39 B: 1150/1.125 = 1022	[2] Correct side, working and answer.	
Unit	Pascal / N m^{-2} / Pa	[1] Correct unit.		
3(d)	$F_R = 1440 - (1390 + 35) = 15$ N		[2] Correct working and answer.	
3(e)	$a = \frac{F}{m} = \frac{15}{139} = 0.11$ m s^{-2} COE possible from 3(d)	[2] Correct working and answer.		
3(f)	$E_k = ½\ m \times v^2$ $= ½ \times 115 \times 0.28^2$ $= 4.5$ J	[2] Correct working and answer.		
3(g)	$E_p = mgh = 115 \times 10 \times 1.9 = 2185$ J $P = \frac{E}{t} = \frac{2185}{9.0} = 242.8 = 243$ W	[2] Correct working and answer for E_p.	[2] Correct working but used h = 190 cm and obtained P = 24 277 W / Incorrect E_p but correct working by using wrong h conversion (eg 0.19)	[2] Correct working and answer.
3(h)	$E_p = mgh = 750 \times 10 \times 1.8 = 13\ 500$ J $W = F \times d = 2550 \times 5.5 = 14\ 025$ J Loss of energy = 14 025 –13500 = 525 J	[2] Correct working and answer for E_p. Or W	2.Correct calculations for E_p and W only. OR correct working for W and loss for wrong value E_p	[2] Correct working and answer.

Judgement Statement

	Achievement	Achievement with Merit	Achievement with Excellence	
Criterion One	4 × A1	3 × M1 + 2 × A1	1 × E1 + 2 × M1 + 2 × A1	Plus 1 × E from either criterion.
Criterion Two	6 × A2	4 × M2 + 2 × A2	1 × E2 + 5 × M2 + 2 × A2	