MOTION ON AN INCLINED PLANE

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(a) /	A truck of mass 12 kg is rolling down a very slight incline as shown in Fig. 1.1.	
	12 kg	
	Fig. 1.1	
Th	e truck travels at constant speed.	
Ex	plain why, although the truck is on an incline, it nevertheless does not accelerate.	
		 [1]
(b) Th	e slope of the incline is increased. As a result of this, the truck now accelerates.	
(i)	Explain why there is now acceleration.	
		[1]
(ii)	Write down an equation linking the resultant force on the truck and the accelerat of the truck.	ior
		[1]
(iii)	The truck's acceleration is 2.0 m/s ² .	
	Calculate the resultant force on the truck.	
	resultant force =	[2]

	(C)	The friction force up the slope in (b)(III) was 14.0 N.
	Ву	suitable lubrication, the friction force is now almost totally removed.
	(i)	Calculate the new acceleration of the truck.
		appolaration —
		acceleration =[3]
	(ii)	The lubricated truck travels down the incline, starting from rest at the top of the incline. It takes 2.5s to reach the bottom of the incline.
		Calculate its speed as it reaches the bottom of the incline.
		speed = [2]
(d)	The	e incline is reduced to the original value and the lubricated truck is placed on it.
	De	scribe the motion of the truck when it is released.
		[1]
		[Total: 11]

(a) idea of accelerating force/force down slope = friction force OR no resultant force/forces balanced (accept energy argument if Physics correct) (b) (i) idea of accelerating force/force down slope > friction force OR forces unbalanced (accept energy argument if Physics correct) (ii) F = ma NOT f α a B1 (iii) 12 × 2 24N A1 (c) (i) resultant force = 38N OR his (b)(iii) + 14 38/12 OR (his (b)(iii) + 14)/12 3.166 m/s² or 3.17 m/s² or 3.2 m/s² NOT 3.16 e.c.f. (ii) v = at or 3.2 × 2.5 e.c.f. 7.8 - 8.0 m/s e.c.f. (d) idea of acceleration B1	 (a) idea of accelerating force/force down slope = friction force OR no resultant force/forces balanced (accept energy argument if Physics correct) (b) (i) idea of accelerating force/force down slope > friction force OR forces unbalanced (accept energy argument if Physics correct) (ii) F = ma NOT f α a (iii) 12 × 2 C1 24N (c) (i) resultant force = 38N OR his (b)(iii) + 14 C1 38/12 OR (his (b)(iii) + 14)/12 C1 3.166 m/s² or 3.17 m/s² or 3.2 m/s² NOT 3.16 e.c.f. (ii) v = at or 3.2 × 2.5 e.c.f. (iii) v = at or 3.2 × 2.5 e.c.f. (iiiii) v = at or 3.2 × 2.5 e.c.f. (iiiiiii) Algorithm force in the fo			Marking Scheme		
OR forces unbalanced (accept energy argument if Physics correct) (ii) F = ma NOT f α a B1 (iii) 12 × 2 24N C1 24N A1 (c) (i) resultant force = 38N OR his (b)(iii) + 14 38/12 OR (his (b)(iii) + 14)/12 3.166 m/s² or 3.17 m/s² or 3.2 m/s² NOT 3.16 e.c.f. A1 (ii) v = at or 3.2 × 2.5 e.c.f. C1 7.8 - 8.0 m/s e.c.f. A1 (d) idea of acceleration B1	OR forces unbalanced (accept energy argument if Physics correct) (ii) $F = ma \text{ NOT f } \alpha \text{ a}$ B1 (iii) 12×2 $24N$ (c) (i) resultant force = 38N OR his (b)(iii) + 14 $38/12 \text{ OR (his (b)(iii)} + 14)/12$ $3.166 \text{ m/s}^2 \text{ or } 3.17 \text{ m/s}^2 \text{ or } 3.2 \text{ m/s}^2 \text{ NOT } 3.16$ (ii) $v = \text{at or } 3.2 \times 2.5 \text{ e.c.f.}$ $7.8 - 8.0 \text{ m/s}$ e.c.f. (d) idea of acceleration B1 [1	(a)	OR	of accelerating force/force down slope = friction force no resultant force/forces balanced		
(iii) 12 × 2	(iii) 12 × 2	(b)	(i)	OR forces unbalanced	B1	
(c) (i) resultant force = 38N OR his (b)(iii) + 14	(c) (i) resultant force = 38N OR his (b)(iii) + 14		(ii)	F = ma NOT f α a	B1	
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			(ii)			
		(4)	idos	of acceleration	R1	[1