Forces and Newton's laws – AS Mathematics P1

1.	A horizontal force of 30 N straight line, on a smooth	N causes a crate to t	ravel with an acc	eleration of 2 m s	s ⁻² , in a
	Find the weight of the c	rate.			
	Circle your answer.			I	1 mark]
	15 kg	15 <i>g</i> N	15 N	15 <i>g</i> kg	
2.	June/2022/Paper_7356/01/No.2 Two points A and B lie in respectively.		and have coordin	ates (–2, 7) and	(3, 19)
	A particle moves in a str force of magnitude 6.5 N	_	3 under the actio	n of a constant re	esultant
	Express the resultant for	ce in vector form.		[3	marks]
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Two particles, P and Q, are initially at rest at the same point on a horizontal plane.

A force of $\begin{bmatrix} 4 \\ 0 \end{bmatrix}$ N is applied to P.

A force of $\begin{bmatrix} 8 \\ 15 \end{bmatrix}$ N is applied to Q.

1	(a)	Calculate	to the	nearest	dearee	the	acute	angle	between	the	two	forces
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[2 marks

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(b)

The particles begin to move under the action of the respective forces.	
P and Q have the same mass.	
P has an acceleration of magnitude 5 m s ⁻²	
Find the magnitude of the acceleration of Q.	[3 marks]

4.	June/2022/Paper	7356/01/No.:	16

Jermaine and his friend Meena are walking in the same direction along a straight path.

Meena is walking at a constant speed of $u \, \text{m s}^{-1}$

Jermaine is walking $0.2\,\mathrm{m\,s^{-1}}$ more slowly than Meena.

When Jermaine is d metres behind Meena he starts to run with a constant acceleration of $2 \,\mathrm{m}\,\mathrm{s}^{-2}$, for a time of t seconds, until he reaches her.

(a) Show that

$d = t^2 - 0.2t$	[4 marks]
 	
 	
 	
 	

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When Jermaine's speed is $7.8\,\mathrm{m\,s^{-1}}$, he reaches Meena.

(b)

Given that $u = 1.4$ find the value of d .	[2 marks

5. June/2022/Paper_7356/01/No.17



A car and caravan, connected by a tow bar, move forward together along a horizontal road.

Their velocity $v \, \text{m} \, \text{s}^{-1}$ at time t seconds, for $0 \le t < 20$, is given by

$$v = 0.5t + 0.01t^2$$

(a)	Show that when	<i>t</i> = 15	their acceleration	is 0.8m s^{-2}

[2 marks]

(b) The car has a mass of 1500 kg

The caravan has a mass of 850 kg

When t=15 the tension in the tow bar is 800 N and the car experiences a resistance force of 100 N

(b) (i) Find the total resistance force experienced by the caravan when t=15

[2 marks]

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) (ii)	Find the driving force being applied by the car when $t = 15$	[3 marks]
	State one assumption you have made about the tow bar.	[1 mark]