1	(a)(i)	BI			
	(ii)	(change in)displacement/time or rate of change of displacement			
	(iii)	scalar has a magnitude only e.g. speed vector has magnitude and a direction e.g. velocity			
	(b)(i)	velocity travels in two opposite directions or equivalent words / increasing and decreasing displacement			
	(ii)	Z any peak or trough / A / B / 0 / 3.0 / 6.0s M any point where gradient is a maximum (1.0 – 1.6 or 4.4 – 5.0 s) If M and Z are given on Fig.1.1 then max 1			
	(iii)	tangent to curve drawn	B1		
	` '	values given correct from graph	C1		
		answers correct for maximum in range of 1.3 to 1.5 TOTAL	A1 , [11]		
2	(a)	weight = $28 \times 9.8 / \text{mg}$	C 1		
	()	= 270 (N) (274.4) (using g = 10 then -1)	A1		
	(b)	a completed triangle drawn with correct orientation at least two labels for triangle with correct directions given			
		<u>calculation:</u> <u>scale diagram:</u> force P / weight = tan 35 <u>scale given</u>	C 1		
		force $P = 192$ (N) 185 to 200 (N)	A1		
	(c)	tension is greater (reference to triangle) tension force would be greater (longer) as t	B1 he holding		
		force P would be larger (longer) for greater angle / larger			
		value needed so vertical component still balances the weight TOTA	B1 L [8]		
3	(a)(i)	horizontal velocity = 25cos30	B 1		
		$= 21.65 \text{ (m s}^{-1})$	A0		
	(ii)	vertical velocity = $25\sin 30$ = $12.5 \text{ (m s}^{-1}) \text{ allow } 13 \text{ (2 sig. fig.)}$	C1 A1		
	(b)(i)	straight line with positive gradient through 0.0			

3	b(ii)	curved line with positive increasing gradient			
		zero gradient	MAX 3	В3	
	(c)(i)	line to time a	vith positive gradient (through 0,0) xis when ball hits sand ine coming down to zero between impact a	B1 B1	
		at rest	and stone B1		
	(ii)		e non zero (positive value) osite) value from impact with sand	B1 M1	
			ero between impact and stone at rest	A1	
				MAX 5	
				TOTAL [11]	
4 (a)(i)	(when a system is in equilibrium) the sum of the anticlockwise moments equals the sum of the clockwise moments (about the same pivot) B1			
	(ii)		rces equals zero / resultant force is zero oments equals zero	B1 B1	
	(b)(i)	W vertically of Force at O ve		B1 B1	
	(ii)	$V \times 0.9 \times \cos 60 = W \times 0.35 \times \cos 60$			
		V = (2	B 1		
		·	A0		
	(iii)	total force is a force at hinge	zero stated or implied / 25 – 9.7	C1 A1	
		Torce at minge	15.5 (14)	7 8 8	
		(or may take moments about G or V)			
				TOTAL [9]	
5	(a)	cast iron:	brittle brittle explained as having no plastic reg elastic	ion	
			elastic explained as returning to original length when the load is removed / linear graph / Hooke's law obeyed or equivalent words		
			or equivalent words	MAX 3	

5 (a)(cont)						
		copper:	ductile ductile explained as can be formed into a wire initially elastic			
			plastic where it stretches more and more with little increase in stress	;		
			plastic explained as does not return to its original lawhen the load is removed	ength		
			reference to necking at the end	MAX 3		
		polythene:	easy to deform / deformed with a small force plastic ductile			
			polymeric	MAX 2		
				MAX 8		
QWC:		spelling, pur organisation	B1 B1			
6	(a)(i)	motive force road that acts engine (to en	nd by the B1			
	(ii)		drag acts against the motive force balances the motive force	B1 B1		
(iii) (b)(i)		power = Fv	C 1			
		= 500 = 125	A1			
		distance = 25 = 15	C1 A1			
	(ii)	1. braking di	stance = $75 - 15.5 = 59.5$ (m)	A1		
note ecf from (b)(i)						
		2. 0 = 6	$(25)^2 + 2a 59.5$	C 1		
		a = -($(25)^2 / 2 \times 59.5$ = (-) 5.25	A1		
		unit =	= m s ⁻²	B 1		
note ecf fron		n (b)(ii)		L [11]		