

Question	Answer	Marks	AO Element	Notes	Guidance
1(a)	friction / air resistance / drag	1			
1(b)	number <u>greater</u> than 0 AND <u>smaller</u> than 750 (N)	1			
1(c)	750 (N)	1			
2	6000 (N cm) (1) (moment of force =) 200×30 (1) (moment of force =) force \times (perpendicular) distance (of force from pivot) (1)	3			
3	300 (N) (1) (resultant force =) force to right – force to left OR 1200 – 900 (1) to the right OR in forward direction (1)	3			
4	no resultant force (on object in equilibrium) (1) no resultant moment (on object in equilibrium) (1)	2			

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5	any two from: acceleration / deceleration (1) gravitational field strength (1) impulse (1) momentum (1) velocity (1) weight (1)	2			
6	magnitude OR size (1) direction (1)	2			
7(a)	560 N m (1) $(\Gamma =) Fx_{\perp r}$ OR 620×0.90 (1)	2			
7(b)	540 N (1) use of any moment (1) $T \times 1.2 \sin 60^\circ (= 560)$ OR $(T =) 560 / (1.2 \times \sin 60^\circ)$ (1)	3			
8	1200 (N cm) (1) (moment of force $=$) 60×20 (1) (moment of force $=$) force \times (perpendicular) distance of force from pivot (1)	3			

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9	air resistance	1			
10	50 (Ncm) (1) 2.5 × 20 (1) (moment of force =) force × (perpendicular) distance (of force from pivot) (1)	3			
11	acceleration (1) momentum (1)	2			
12	($F = 2.0 \times 4.0 =$) 8.0 N (1) ($F =$) ma in any form (1)	2			
13	4600 N (1) ($F =$) ma in any form OR 1600 × 2.9 (1)	2			
14	(repeated) acceleration / deceleration / use of brakes / varying speed / motion uphill / uneven road surface cold weather / headwind	1		accept any other explicit example of a variation from ideal conditions	

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15	(resultant force =) 30 (N) (1) (resultant force =) 120 – 90 (1) to the left OR forwards (1)	3			
16	80 N	1			
17	$W=mg$ in any form OR force is (directly) proportional to mass	1			
18	Any two from: • Line on graph is horizontal / gradient is zero • (therefore) no acceleration / speed is constant • (resultant) force causes / is proportional to acceleration	2			
19(a)	(moment of force =) force \times (perpendicular) distance of force from pivot (1) 5.2×6.0 (1) 31.2 (1)	3		5.2×6.0 gains 2 marks 31.2 gains 3 marks	

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19(b)	<p>(sum of) clockwise moment(s) = (sum of) anticlockwise moment(s) (1)</p> <p>$P \times 2.0 + 8.1 \times 2.0 = 5.2 \times 6.0$ OR 31.2 OR answer from (a) (1)</p> <p>$P = (31.2 - 16.2) \div 2.0$ OR $15 \div 2.0$ (1)</p> <p>7.5 (N) (1)</p>	4		<p>$P \times 2.0 + 8.1 \times 2.0 = 5.2 \times 6.0$ OR 31.2 OR answer from (a) gains 2 marks</p> <p>$P = (31.2 - 16.2) \div 2.0$ OR $15 \div 2.0$ gains 3 marks</p> <p>7.5 (N) gains 4 marks</p>	
20	<p>2.8×10^6 N m (2)</p> <p>OR ALLOW</p> <p>(moment =) Fd in any form (1)</p>	2			
[Total: 50]					