Mark scheme

Turning effects

Physics 0625 · Questions from Paper 3, Paper 4 and Paper 6

Total marks

72

MARKS FOR EACH QUESTION

1	2	3	4	5	6	7	8	9	10	Total
4	5	6	8	8	9	7	8	8	9	**72**

Question 1 [4]

1(a)	below	**B1**
1(b)	B A D C	**B3**

Question 2 [5]

2 **(a)** rule balanced and pivot at centre of mass [1]

(b) EITHER take readings from 50.2 cm mark
OR add mass/weight/load
OR place pivot at 50.2 cm mark [1]

(c) **(i)** cm, cm [1]

(ii) clockwise 77.5 (or 78) (N cm)
anticlockwise 78 (N cm) [1]

(d) EITHER repeats
OR estimate between two best positions that almost balance but tip opposite sides o.w.t.t.e
OR suitable method to locate centre of mass **Q** [1]

[Total: 5]

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Question 3 [6]

3(a)	any **three** from: line drawn alongside cotton thread / string hang triangle from a different corner (B or C) repeat marking of string (position on the card) centre of mass is where lines intersect	**B3**
3(b)	(moment of weight =) weight × distance (of direction of force from pivot)	**C1**
	(moment =) 1.4 × 20	**C1**
	28 (N cm)	**A1**

Question 4 [8]

4(a)	both boxes ticked	**B1**
4(b)	moment = force × distance in any form	**C1**
	300 × 1.4	**C1**
	420 (Nm)	**A1**
4(c)	clockwise moments = anticlockwise moments	**C1**
	W x 0.6 = candidates (b) **OR** *W* = candidates (b) / 0.6	**C1**
	700 (N)	**A1**
4(d)	child 's OR left side goes down **OR** adult side goes up **OR** right side goes up **OR** child's moment is larger **OR** child's turning force larger	**B1**
	Total:	**8**

Question 5 [8]

5(a)(i)	stop the tractor tipping up/keep tractor level owtte	**B1**
5(a)(ii)	moment = force × (perp.) distance from pivot in any form	**C1**
	6000 × 2.1	**C1**
	12 600	**A1**
	Nm	**B1**
5(b)	Any **three** from: (wide tyres have) greater area (in contact with ground) pressure = force ÷ area in any form the bigger the area the smaller the pressure so tractor less likely to sink/become stuck (in soft ground)	**B3**

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Question 6 [9]

6(a)(i)	(moment =) force × (perpendicular) distance in any form	**C1**
	0.14 × 5.5	**C1**
	0.77 (N cm)	**A1**
6(a)(ii)	(sum of) ACM = (sum of) CM	**C1**
	0.19 × *X* = 0.77 **OR** 0.19 × *X* = 0.8 **OR** 0.19 × *X* = 0.14 × 5.5	**C1**
	4.1 (cm) **OR** 4.2 (cm)	**A1**
6(b)	(*m* =) *W* ÷ *g* **OR** *W* ÷ 9.8 in any form	**C1**
	0.19 ÷ 9.8	**C1**
	0.019 (kg)	**A1**

Question 7 [7]

7 **(a)** No resultant/net force OR no resultant force in any direction
OR no resultant force in any two perpendicular directions B1

No resultant/net moment/turning effect/couple/torque
OR (total) clockwise moment = (total) anticlockwise moment B1

Either order

(b) **(i)** F × 120 / F × 0.12 C1
= 20 × 500 OR 20 × 0.5 C1
F = 83.3 N at least 2 significant figures. Allow $83^1/_3$ *Unit penalty applies A1

(ii) F/A or in words OR 83.3/0.0036 ecf from **(b)(i)** C1
= 23100 Pa / N/m^2 OR 2.31 N/cm^2 OR 23.1 kPa *Unit penalty applies A1 **[7]**

*Apply unit penalty once only

Question 8 [8]

8 **(a)** **(i)** 120 Ncm OR 1.2 Nm B1

(ii) 60 Ncm OR 0.6 Nm B1

(iii) idea of CW moments = ACW moments C1
60 + 20*F* = 120 OR 0.6 + 0.2*F* = 1.2 e.c.f. C1
3.0 N OR 3 N e.c.f. A1

(b) 1.2 × 20 = 2.0 × *d* OR 1.2 × 0.2 = 2.0 × *d* C1
(*d* =) 12 OR 0.12 C1
18 c.a.o. OR special case (30 – his 12) correctly evaluated B1 A1

[Total: 8]

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Question 9 [8]

9(a)	force × perpendicular distance (from pivot)	**A2**
	Any one from: • force × distance from pivot • reference to perpendicular distance (from pivot) • reference to perpendicular force	C1
	(it measures the) turning effect (of a force)	**B1**
9(b)(i)	point where (all) the weight (of an object) seems to act	**B1**
9(b)(ii)	2.2×10^7 N m	**A2**
	1.7 (m) **OR** 3.4 / 2 **seen**	C1
9(c)	resultant force = 0 **OR** (all) forces cancel out owtte	**B1**
	resultant moment = 0 **OR** moments balance owtte	**B1**

Question 10 [9]

10(a)	force × perpendicular distance (from point)	**B1**
10(b)(i)	0.80 N	**B1**
10(b)(ii)	(moment = force × distance =) 0.8 × 0.25	**C1**
	(moment =) 0.20 N m	**A1**
10(b)(iii)	same value as (ii) with correct unit	**B1**
10(b)(iv)	$F \times 0.75 = 0.20$ in any form OR (F =) 0.2 / 0.75	**C1**
	(F = 0.2 / 0.75 =) 0.27 N	**A1**
10(c)	(perpendicular) distance (from pivot) of F decreases / is less (than 0.75 m) OR (perpendicular) distance (from pivot) of W increases / is more (than 0.75 m)	**M1**
	(so) increased / greater (force F) (needed for greater moment)	**A1**

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