

Projectiles

1	$v_y = 11.5 \text{ m/s}$ [up] $v_x = 19.9 \text{ m/s}$ [right]	
2a	notes	
2b	notes	
3	all arrows same length	
4	$d_y = 455 \text{ m}$	
5i	$t = 1.75 \text{ s}$, $d_x = 19.2 \text{ m}$ $v_f = 20.4 \text{ m/s}$ [R57'D]	
5ii	$t = 1.89 \text{ s}$, $d_x = 12.0 \text{ m}$ $v_f = 22.4 \text{ m/s}$ [R74'D]	
5iii	$t = 9.27 \text{ s}$, $d_x = 168 \text{ m}$ $v_f = 73 \text{ m/s}$ [R76'D] $d_{y \text{ max}} = 20.6 \text{ m}$	

Circular motion

1	0.619 m/s^2	6a	14.7 m/s
2	240 N	6b	2636 N
3a	1852 N	7	26.7 m/s
3b	1754 N	8	0.0195 n
4a	$71\,061 \text{ m/s}^2$	9	45°
4b	151 m/s	10	39.3 m/s
5a	1776 m		
5b	1470 N		

Attwood machines

1a	245 N	3c	10.9 N
1b	275 N	4	$t = 2.04 \text{ s}$
1c	215 N	5	$d = 35.4 \text{ m}$
2a	349 N	6 (i)	$a = 5.35 \text{ m.s}^{-2}$, $T = 13.4 \text{ N}$
2b	16.5 N	6 (ii)	$a = 2.19 \text{ m.s}^{-2}$, $T = 91.3 \text{ N}$
2c	40.3 N	6 (iii)	$a = 5.03 \text{ m.s}^{-2}$, $T = 11.9 \text{ N}$
3a	94.2 N	6 (iv)	$a = 1.64 \text{ m.s}^{-2}$, $T = 28.8 \text{ N}$
3b	4.46 N		

Torque

1	437.5 N	9	19.2 kg
2	$F_{\text{NET}} = 0$	10	$F_a = 16\,170 \text{ N}$ [up] $F_b = 25\,970 \text{ N}$ [down]
3	$F_{\text{NET}} = 0$ $T_{\text{net}} = 0$	11	231 N [up]
4a	29.4 N	12	$F_a = 17\,738 \text{ N}$ $F_b = 10682 \text{ N}$
4b	231 N 115 N	13a	$T = 18006 \text{ N}$
4c	102 N	13b	$F_x = 10\,328 \text{ N}$ [right]
5	$T_1 = 78.3 \text{ N}$ $T_2 = 110 \text{ N}$	13c	$F_y = 10\,975 \text{ N}$ [down]
6a	8.25 N	14	$m = 33 \text{ kg}$
6b	7.47 N	15a	$F_w = 551 \text{ N}$
7	204 Nm	15b	$F_{\text{Fr}} = 551 \text{ N}$
8	0.83 m	15c	$F_N = 627 \text{ N}$