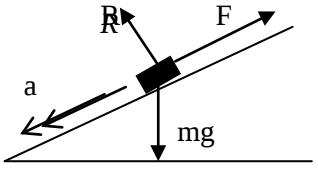
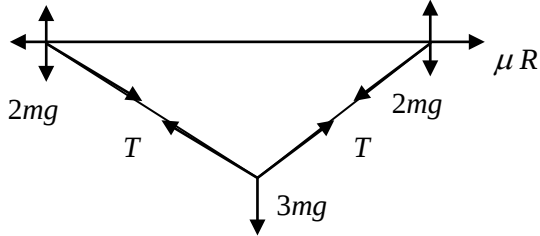
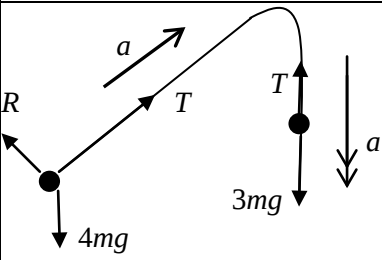
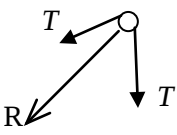
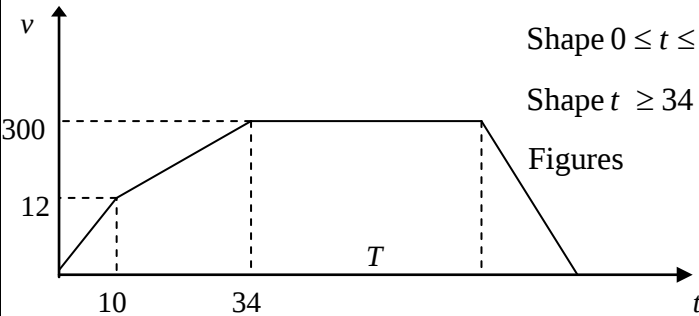


Question Number	Markscheme	Marks
1	(a) CLM: $600 \times 4 - m \times 2 = (600 + m) \times 0.5$ $\Rightarrow m = \underline{840\text{kg}}$ (b) $I = 600(4 - 0.5)$ $= \underline{2100 \text{ Ns}}$	M1 A1 ↓ M1 A1 (4) M1 → M1 A1 (3)
2	(a) M(C): $P \times 1.8 + 100 \times 0.8 = 2200 \times 0.2$ $\Rightarrow P = \underline{200 \text{ N}}$ (b) M(C): $120(2 - x) + 100(1 - x) = 2200x$ $\Rightarrow 340 = 2420x \Rightarrow x \approx \underline{14 \text{ cm}}$ (Solve x)	M1 A2, 1, 0 A1 (4) M1 A2, 1, 0 ↓ M1 A1 (5)

Question Number	Markscheme	Marks
3 (a)	 R $R(\perp): R = mg \cos 30$ $R(\parallel): ma = mg \sin 30 - F$ $F = 0.4 R$ used Eliminate R $ma = mg \sin 30 - 0.4 \cdot mg \cos 30$ Solve: $a = 4.9 - 0.4 \times 9.8 \times \sqrt{3}/2$ $\approx 1.5 \text{ or } 1.51 \text{ m s}^{-2}$ (b) $v^2 = 2 \times 1.51 \times 3 \Rightarrow v = 3 \text{ or } 3.01 \text{ m s}^{-1}$ (c) $1.5/1.51 \text{ m s}^{-2}$ (same as (a))	B1 M1 A1 B1 ↓ M1 ↓ M1 A1 (7) M1 A1 (2) $R \uparrow$ (1)
4 (a)	 $R \uparrow$ for C : $2T \sin \theta = 3 mg$ $\sin \theta = \frac{3}{5} \Rightarrow T = \frac{5}{2} mg$ (*) (b) $R \uparrow$ for A or B: $R = 2mg + T \sin \theta$ $= 2mg + \frac{5}{2} mg \cdot \frac{3}{5} = \frac{7}{2} mg$ $R \rightarrow$ for A or B: $T \cos \theta = \mu R$ Solve to get μ as number: $\frac{5}{2} mg \cdot \frac{4}{5} = \mu \cdot \frac{7}{2} mg \Rightarrow \mu = \frac{4}{7}$ (Accept 0.57 awrt)	M1 A1 A1 (3) M1 A1 ↓ M1 A1 M1 ↓ ↓ M1 A1 (7)

Question Number	Markscheme	Marks
5	(a)  $A: T - 4g \sin 30 = 4a$ $B: 3g - T = 3a$ $\Rightarrow T = \frac{18g}{7} = \underline{25.2 \text{ N}}$ (b)  $R = 2T \cos 30$ $\approx \underline{44 \text{ or } 43.6 \text{ N}}$ (c) (i) String has no weight/mass (ii) Tension in string constant, i.e. same at A and B	M1 A1 M1 A1 M1 A1 (6) M1 A1 A1 (3) B1 B1 (2)
6	(a) After 10 s, speed = $1.2 \times 10 = 12 \text{ m s}^{-1}$ After next 24 s, $v = "u + at" = 12 + 0.75 \times 24 = 30 \text{ m s}^{-1}$ (b)  Shape $0 \leq t \leq 34$ Shape $t \geq 34$ Figures (c) $\text{Distance} = \frac{1}{2} \times 10 \times 12 + \frac{1}{2} (30 + 12) 24$ $= 60 + 504 = \underline{564 \text{ m}}$ (d) $\text{Distance travelled decelerating} = \frac{1}{2} \times 30 \times 10$ $564 + 30T + \frac{1}{2} \times 30 \times 10 = 3000$ $\Rightarrow T = \underline{76.2 \text{ s}}$	B1 M1 A1 (3) B1 B1 B1 B1, M1 A1 A1 (4) B1 M1 A1 $\sqrt{\quad}$ A1 (4)

EDEXCEL 6677 MECHANICS M1 JANUARY 2004 MARK SCHEME

Question Number	Markscheme	Marks
7 (a)	$\tan \theta = \frac{3}{5} \Rightarrow \theta = 31^\circ$	M1 A1 (2)
(b)	$\mathbf{a} = 9t \mathbf{j}$ $\mathbf{b} = (-10 + 3t)\mathbf{i} + 5t \mathbf{j}$	B1 M1 A1 (3)
(c)	B south of A $\Rightarrow -10 + 3t = 0$ $t = 3\frac{1}{3} \Rightarrow \underline{1520 \text{ hours}}$	M1 A1 (2)
(d)	$AB = \mathbf{b} - \mathbf{a} = (3t - 10)\mathbf{i} + 5t \mathbf{j}$ $d^2 = \mathbf{b} - \mathbf{a} ^2 = (3t - 10)^2 + 16t^2$ $= 25t^2 - 60t + 100 \quad (*)$	M1 A1 ↓ M1 A1 (4)
(e)	$d = 10 \Rightarrow d^2 = 100 \Rightarrow 25t^2 - 60t = 0$ $\Rightarrow t = (0 \text{ or }) 2.4$ $\Rightarrow \text{time } \underline{1424 \text{ hours}}$	M1 A1 A1 (3)