1993 BR

MCMB 2 FRMB 5 MCMR 5 FRMR 10
MCGB 9 FRGB 3 MCER 7 FRER 0

MC

3) 11, 21, 14, 15, 16, 31, 37, 42, 46
48, 50, 53, 57, 59, 61, 68, 70

3) v_1 $\rightarrow v$ v_2

$\vec{v} + \vec{v}_2 = \vec{v}_1$

$\vec{v} = \vec{v}_1 - \vec{v}_2$ (b) d

11) (e) d

21) $mv_0 = \frac{2}{5}m \cdot \frac{v_0}{2} + \frac{3}{5}mv_f$

$\frac{6}{5}mv_0 = \frac{3}{5}mv_f$

$v_f = \frac{6}{5} \cdot \frac{5}{3}$

$v_f = 2v_0$ (e) ✓ +1

14) $W = mgh$ (c) +1

15) (b) e 16) (b) d 31) $U_\infty = 0$

(c) d

+2

37) (b) +1 42) 2 46) $V = IR$

$= I(0.2\,\Omega + 1\,\Omega)$

$= 2.4V$

$6V - 2.4V$

$= 3.6V$ (?) (b) c

48) $E = \frac{kQ}{R^2}$ $E = \frac{kQ}{(\frac{R}{2})^2} = \frac{4kQ}{R^2}$

(e) +1

blur

+2

50) $E = \frac{dV}{dr} = -2ar^{-3}$ (a) e

53) $\Delta V = 4V$ (d) +1

57) $I = \frac{V}{R} = \frac{V}{R_1 + R_2}$ (a) b

59) $I = \frac{V}{R} = \frac{\mathcal{E}}{R}$ (b) a

~~61) $\mathcal{E} = -L\frac{dI}{dt}$ (e)~~

68) (d) a 70) $R = 2\,\Omega$ (b) e

+1

FRM

1) b) $PE_{s0} + \cancel{KE_0} = \cancel{PE_{sf}} + KE_f + W_f$ +1

$\frac{1}{2}kA^2 = \frac{1}{2}mv_c^2 + \mu m_c g A$

$\frac{1}{2}mv_c^2 = \frac{1}{2}kA^2 - \mu m_c g A$

$mv_c^2 = kA^2 - 2\mu m_c g A$

$v_c^2 = \frac{kA^2}{m_c} - 2\mu g A$

$v_c = \sqrt{\frac{kA^2}{m_c} - 2\mu g A}$

$= \sqrt{\frac{(400\,N/m)(0.5m)^2}{4kg} - 2(0.4)(9.8\,m/s^2)(0.5m)}$

$= \boxed{4.59\,m/s}$ +1

c) $v_f = \frac{m_c}{m_c + m_s}(v_c) = \frac{4kg}{6kg}(4.59\,m/s)$

$= \boxed{3.06\,m/s}$ +1

+3

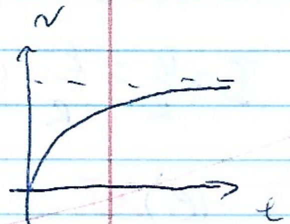
d) $d = \frac{v_f^2}{2\mu g} = \frac{(3.04\,m/s)^2}{2(0.4)(9.8\,m/s^2)}$

$= \boxed{1.19\,m}$ +1

2)c)?

3) a) $\tau = \vec{r} \times \vec{F} = rF$ +1

2)d)



$v_f = ?$

3) c)-e) +2

FR E/M

1) b)(i) $E \cdot 2\pi r = \frac{\rho \cdot \pi R^2}{\varepsilon_0}$

$\boxed{E = \frac{\rho R^2}{2\varepsilon_0 r}}$ +1

(ii) ~~E 2πr = ρπR²~~

$E \cdot 2\pi r\, d\ell = \frac{Q r^2}{\varepsilon_0 R^2}$ +1

$E \cdot 2\pi r\, d\ell = \frac{\rho A\, d\ell\, r^2}{\varepsilon_0 R^2}$

$E\, 2\pi r = \frac{\rho \cdot \pi \cancel{R^2} r^2}{\varepsilon_0 \cancel{R^2}}$

$E = \frac{\rho r^2}{2 r \varepsilon_0} = \boxed{\frac{\rho r}{2\varepsilon_0}}$ +1

+3

MCM 3) b 11) d 15) c 16) d 31) d)

+5

MCE

42) B 46) C 50) e 57) b 59) a
68) a 70) e

+7

FRM

2) c) $u = F_0 - kv$ $du = -k\,dv$

$-\frac{1}{k}\int \frac{du}{u} = \int \frac{1}{m}\,dt$

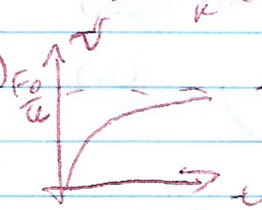
$\ln(F_0 - kv) - \ln C = -\frac{k}{m}t$ +1

$v = \frac{1}{k}\left(F_0 - Ce^{-kt/m}\right)$ +1

$C = F_0$, $t = 0$, $v = 0$

$v = \frac{F_0}{k}\left(1 - e^{-kt/m}\right)$ +1

2) d)



+1

3) c) $a = \alpha r$ $r = \frac{L}{2}$ +2

$a = \frac{3}{2}\frac{g}{L} \cdot \frac{L}{2} = \frac{3}{4}g$

d) $\sum F = ma = Mg - F_r$

$F_r = Mg - Ma$

$= Mg - M \cdot \frac{3}{4}g$ +1

$F_r = \frac{1}{4}Mg$ +1

+8

3) e) $\frac{1}{2} I \omega^2 = Mg \frac{l}{2} \sin\theta$

$\omega = \sqrt{\frac{Mgl}{I} \sin\theta}$ +1

$= \sqrt{\frac{3g}{l} \sin\theta}$ +1

+2