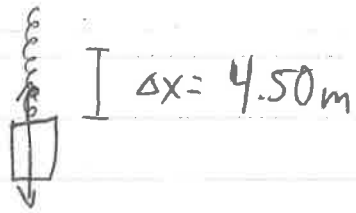
Dynamics Part 2 Review

1.



$k = 875\ N/m$

$F_E = k\Delta x$

$F_g = mg$

$F_g = F_E$

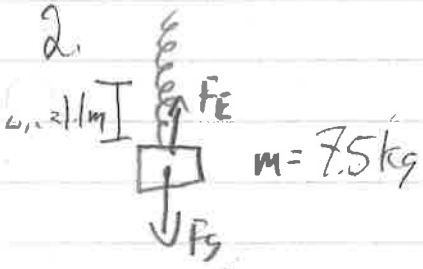
$mg = k\Delta x$

$m = \dfrac{k\Delta x}{g}$

$m = \dfrac{(875\ N/m)(4.50\ m)}{9.80\ m/s^2}$

$= 401.785 = \boxed{402\ m}$

2.



$F_g = mg$

$F_E = k\Delta x$

$F_g = F_E$

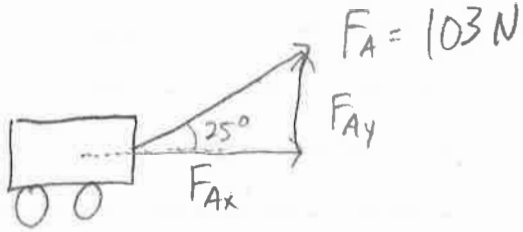
$mg = k\Delta x$

$\therefore k = \dfrac{mg}{\Delta x}$

$= \dfrac{(7.5\ kg)(9.80\ m/s^2)}{(1.1\ m)}$

$= 66.818 = \boxed{67\ N/m}$

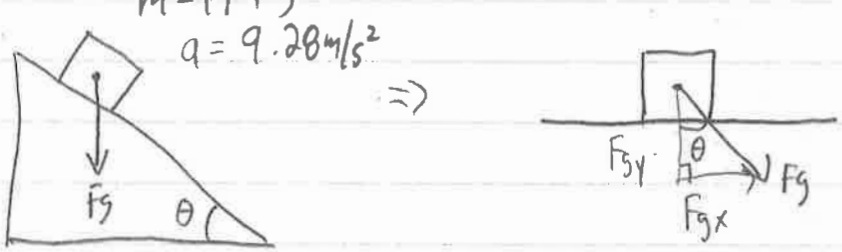
9.



$$F_{Ax} = F_A \cos 25°$$
$$= (103N)(\cos 25°)$$
$$= 93.349 = \boxed{93N}$$

$$F_{Ay} = F_A \sin 25°$$
$$= (103N)(\sin 25°) =$$
$$= 43.529 = \boxed{44N}$$

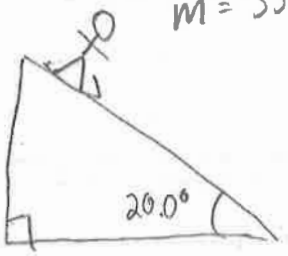
10.



$$F_{NET} = ma$$
$$F_g = mg$$

$$F_{NET} = F_{gx}$$
$$ma = F_g \sin\theta$$
$$ma = mg \sin\theta$$
$$\sin\theta = \frac{a}{g}$$

$$\theta = \sin^{-1}\left(\frac{a}{g}\right)$$
$$= \sin^{-1}\left(\frac{9.28\,m/s^2}{9.80\,m/s^2}\right)$$
$$= 71.251$$
$$= \boxed{71°}$$

11. 

$m = 55.0\,kg$

$d = 147\,m$
$t = 10.0\,s$
$V_0 = 0\,m/s$
$a = ?$

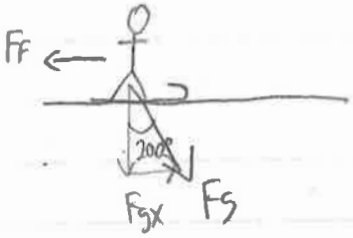
$d = V_0 t + \frac{1}{2} a t^2$

$d = \frac{1}{2} a t^2$

$\therefore \quad a = \frac{2d}{t^2}$

$= \frac{2(147\,m)}{(10.0\,s)^2}$

$= 2.94\,m/s^2$



$F_{NET} = F_{gx} - F_F$

$F_F = F_{gx} - F_{NET}$
$= F_g \sin\theta - ma$
$= mg\sin\theta - ma$
$= m(g\sin\theta - a)$
$= (55.0\,kg)(9.80\,m/s^2 \cdot \sin 20° - 2.94\,m/s^2)$

$= 22.6488 = \boxed{23\,N}$

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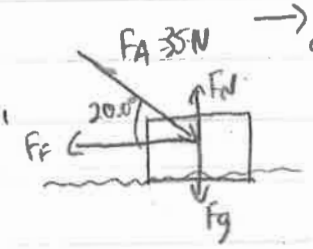
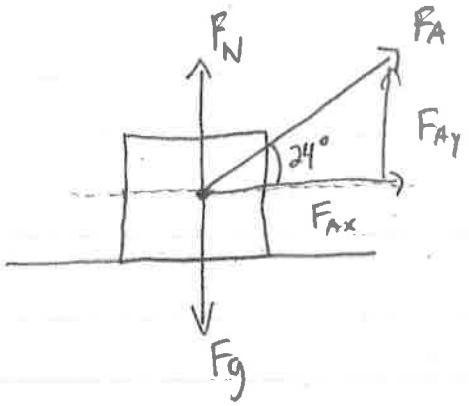
12. 

$m = 15\,kg$

$F_{NET} = ma$
$F_{AX} - F_F = ma$
$\therefore \quad F_F = F_{AX} - ma$
$= (35\,N)(\cos 20°) - (15\,kg)(1.2\,m/s^2)$
$= 14.889$

$= \boxed{15\,N}$

13.



$m = 170\,kg$

$F_{Ax} = 85\,N$

$F_{Ax} = F_A \cos 24°$

$F_A = \frac{F_{Ax}}{\cos 24°}$

$F_N + F_{Ay} = F_g$

$F_N = F_g - F_{Ay}$

$= mg - F_A \sin 24°$

$= mg - \frac{F_{Ax} \sin 24°}{\cos 24°}$

$= (170kg)(9.80 m/s^2) - \frac{(85N)\sin 24°}{\cos 24°}$

$F_N = 1666N - 37.844N$

$= 1628.155$

$= \boxed{1600N}$