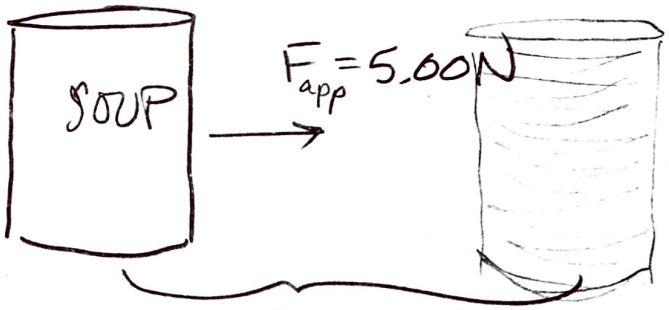
7.23



$$W = F \cdot x$$
$$= (5.00 N)(0.600 m)$$
$$= 3.00 N \cdot m$$
$$= \boxed{3.00 J}$$

work done by attendant

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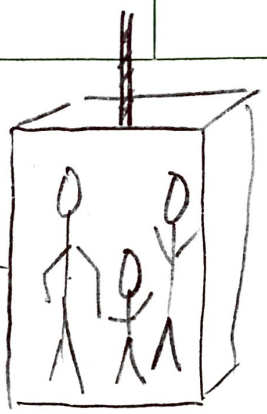
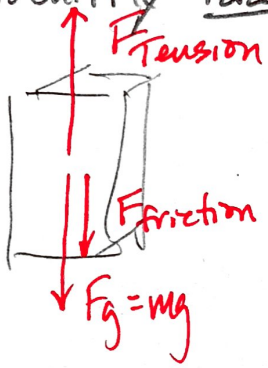
7.25



$\Delta x = 40\,m$

$F_{friction} = 100\,N$

a) Find Work done "by cable" to lift at constant speed. Free-body diagram needed to help identify Force applied by cable.



$\Sigma F_y = ma_y = 0$

$F_{Tension} - F_g - F_{friction} = 0$

$F_{Tension} = F_g + F_{friction}$

$= mg + F_{friction}$

$= (1500)(9.8) + 100$

$= 1.48e4\,N$

$W = Fx = (1.48e4)(40) = \boxed{5.92e5\,J}$

b) Work done by gravity?

$W = F_g \times \cos\theta$

$= mg \times \cos\theta$

$= (1500)(9.8)(40)\cos 180$

$= \boxed{-5.88e5\,J}$

(-1, $\vec{F}$ & $\vec{x}$ in opposite directions)

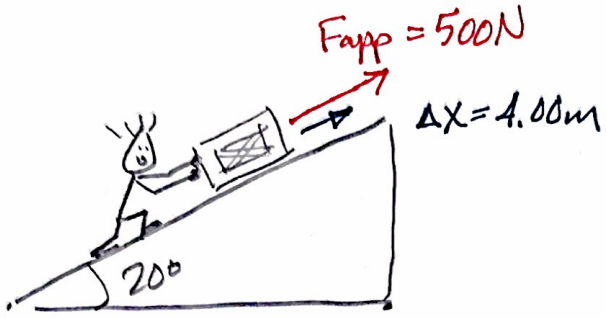
c) Total Work done, or net Work done =

$W = F_{net} \cdot \Delta x$

$F_{net} = 0!$ (constant velocity)

so net Work done $= 0 \cdot 40 = \boxed{0\ Joules}$

7.27



Work done on crate $= \vec{F}_{app} \cdot \vec{x}$

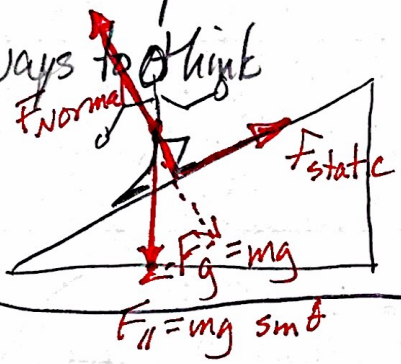
$= F_{app} \times \cos\theta$

$= F_{app} x$

$= (500N)(4.00m)$

$= \boxed{2000J}$

To get himself up the ramp, there are a couple of different ways to think about it.



Conceptually, he's working against F_g, so he's applying vertical force mg, while moving 4.00m at 20°.

$W = F x \cos\theta$

$= (mg)(4)(\cos 90 - 20)$

$= (85)(9.8)(4)(\cos 70)$

$= \underline{1140J}$

...or, F_{static} from ramp $= F_{\parallel}$, and $W = \vec{F}_{static} \cdot \vec{x}$

$= F_{\parallel} x$

$= mg \sin\theta \, x$

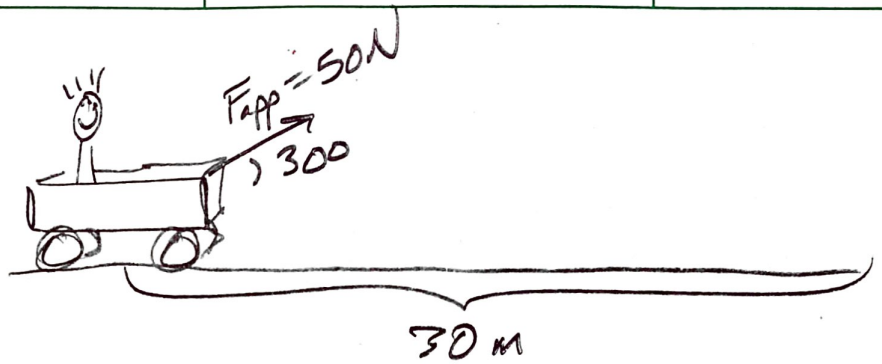
$= (85)(9.8)(\sin 20)(4)$

$= \underline{1140J}$

!

Either way, total Work $= 2000 + 1140 = \boxed{3140J}$

7.28



$$W = F \times \cos\theta$$
$$= (50N)(30m)(\cos 30)$$
$$= \boxed{1.30e3 \text{ Joules}}$$

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