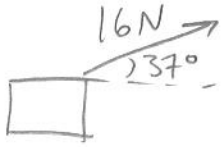
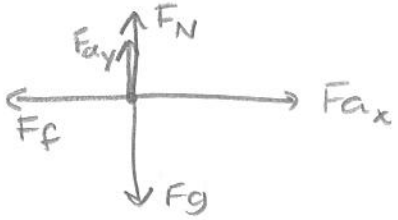
Practice Questions: Work and Power
ANSWERS

1) 

① $F_{ax} = 16N \cos 37°$
$= 12.8N$



② $v_i = 4.0 m/s$
$v_f = 6.0 m/s$
$\Delta d = 5.0 m$
$a = ?$

$v_f^2 = v_i^2 + 2a\Delta d$

$a = \frac{v_f^2 - v_i^2}{2\Delta d}$

$= \frac{(6.0 m/s)^2 - (4.0 m/s)^2}{2(5.0 m)}$

$= 2.0 m/s^2$

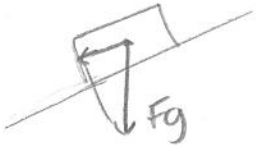
③ $F_{net} = F_{ax} - F_f$

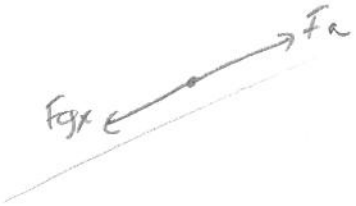
$F_f = F_{ax} - F_{net}$
$= 12.8N - 6.0N$
$= 6.8N$

$F_{net} = ma$
$= (3.0kg)(2.0 m/s^2)$
$= 6.0N$

④ $W_f = F_f \cdot \Delta d$
$= (6.8N)(5.0m)$
$W_f = \underline{34 J}$

2) note: pulling the string 20cm does not raise the block by 20cm.





① $F_g = mg$
$= (100kg)(9.8 \frac{M}{S^2})$
$= 980N$

② $F_{g_x} = F_g \sin 30°$
$= 98N \sin 30°$
$= 490N = F_a$

③ $W = F_a \cdot \Delta d$
$= (490N)(0.20M)$
$= 98J$

④ $P = \frac{W}{\Delta t}$
$= \frac{98J}{0.5s}$
$P = 196W$

3) ① $F_{a_x} = 10.0N \cos 35°$

$= 8.19N$

② $W = F_{a_x} \cdot \Delta d$

$= (8.19N)(20_M)$

$= \underline{164J}$

---

4) $W = F \cdot \Delta d$

$F = \frac{W}{\Delta d}$

$= \frac{520J}{260_M}$

$F = \underline{2.0N}$

---

5) ① $v = \frac{\Delta d}{\Delta t}$

$\Delta d = v \Delta t$

$= (0.80 \frac{M}{S})(30_{min})(60 \frac{s}{min})$

$= 1440_M$

② $W = F \cdot \Delta d$

$= (40N)(1440_M)$

$= \underline{57600J}$

6) ① $v_i = 5.0\,m/s$

$v_f = 10.0\,m/s$

$\Delta t = 10\,s$

$\Delta d = ?$

$$\Delta d = \left(\frac{v_i + v_f}{2}\right)\Delta t$$

$$= \left(\frac{5.0\,m/s + 10.0\,m/s}{2}\right)(10\,s)$$

$$\Delta d = 75\,m$$

$v_i = 5.0\,m/s$

$v_f = 10.0\,m/s$

$\Delta t = 10.0\,s$

$a = ?$

$$v_f = v_i + a\Delta t$$

$$a = \frac{v_f - v_i}{\Delta t}$$

$$= \frac{10.0\,m/s - 5.0\,m/s}{10.0\,s}$$

$$a = 0.5\,m/s^2$$

② $F_{net} = ma$

$= (60\,kg)(0.5\,m/s^2)$

$= 30\,N = F_a$

③ $W = F_a \cdot \Delta d$

$= (30\,N)(75\,m)$

$= \underline{\underline{2250\,J}}$

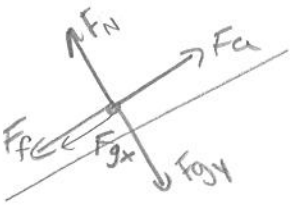
7) $P = \frac{W}{\Delta t}$

$P = \frac{F \cdot \Delta d}{\Delta t}$

$P = F \cdot v$

$= (5.0N)(2.5 m/s)$

$= \underline{12.5 W}$

8) 

① $F_g = mg$

$= (20kg)(9.8 m/s^2)$

$= 196N$

$F_{gx} = 196N \sin 30°$

$= 98N$

$F_{gy} = 196N \cos 30°$

$= 169.7N$

② $F_f = \mu F_N$

$= (0.2)(169.7N)$

$= 33.94N$

③ $F_a = F_f + F_{gx}$

$= 33.94N + 98N$

$= 131.94N$

④ $W = F_a \cdot \Delta d$

$= (131.94N)(5.0m)$

$= 659.7N$

⑤ $P = \frac{W}{\Delta t}$

$= \frac{659.7N}{20s}$

$P = \underline{32.99 W}$