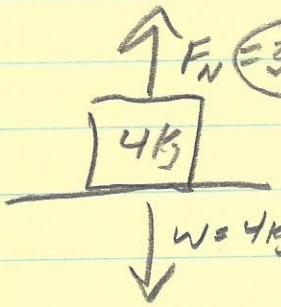
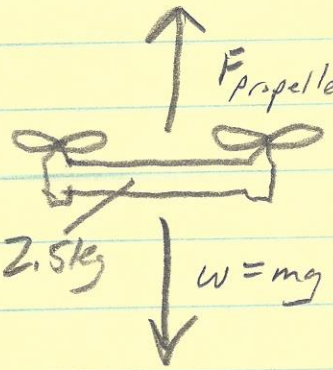
1. $10.67g = 10.67(9.8\ m/s^2) = 104.5\ m/s^2$

$W = F_{gravity} = ma = 80kg(104.5\ m/s^2) = 8,370N$

2.



3.

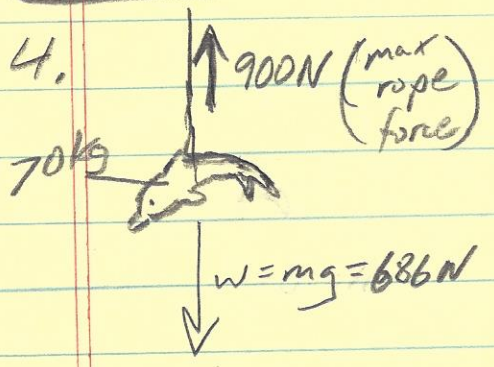


Sum of forces ↓ ma ↓

$\Sigma F = F_{Propellers} - 24.5N = 2kg(2\ m/s^2)$

$F_{Propellers} = 29.5N$

4.



Sum of forces ↓ ma ↓

$\Sigma F = 900N - 686N = 70kg(a)$

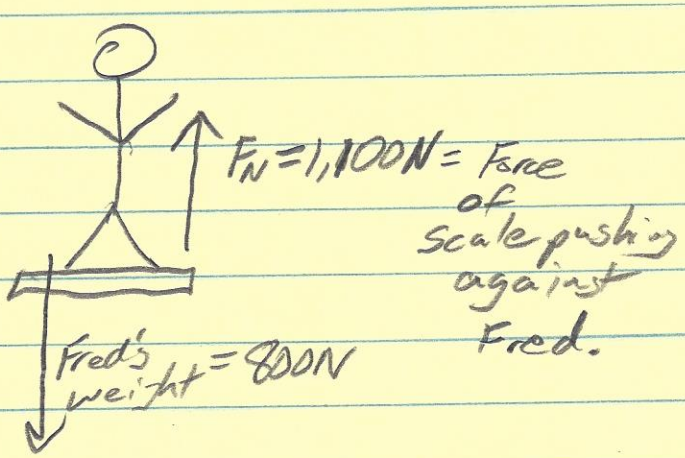
$a = 3.06\ m/s^2$

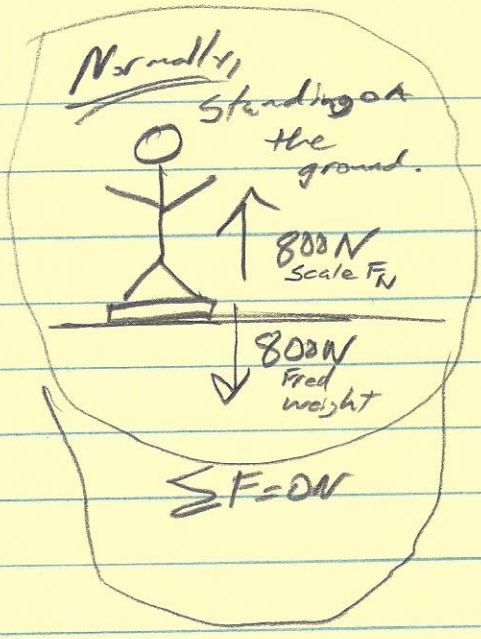
$\Delta y = V_{oy}t + \frac{1}{2}at^2$

$5m = 0t + \frac{1}{2}(3.06\ m/s^2)t^2$

$t = 1.81s$

5.





$\sum F = 1100N - 800N = ma = \sum F$

$300N = ma$

$W = mg$

$800N = m(9.8 m/s^2)$

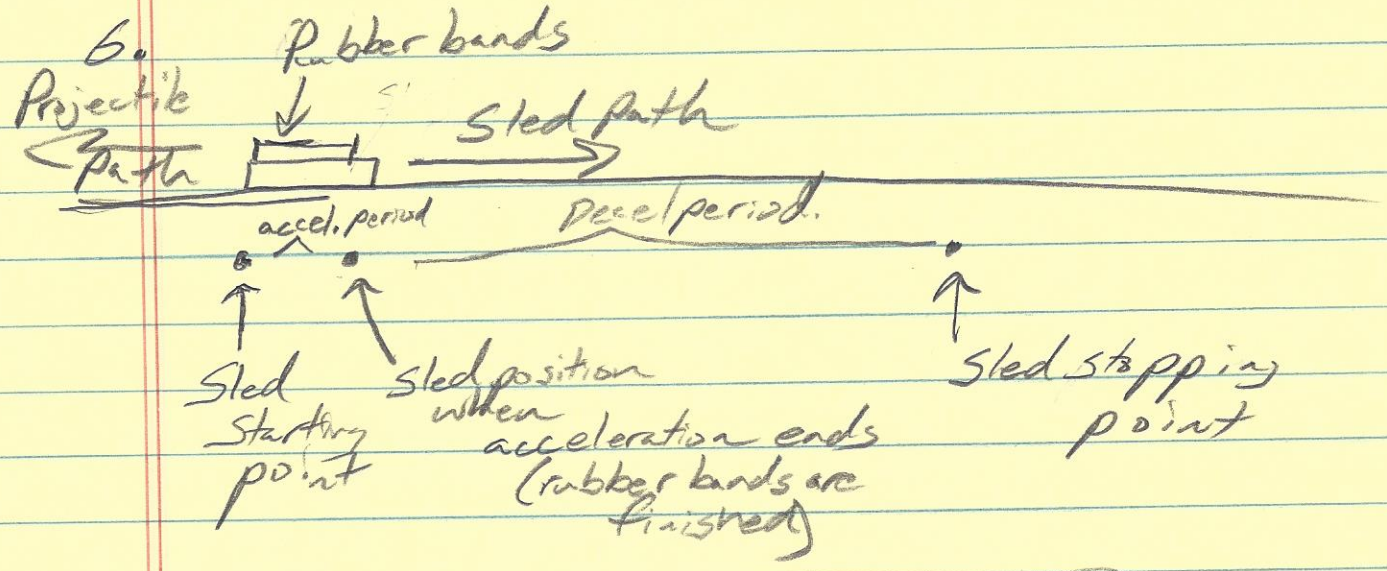
$m = 81.6kg$

$300N = 81.6kg\,(a)$

$a = 3.68 m/s^2$

Tell the pilot to accelerate upward at this rate.

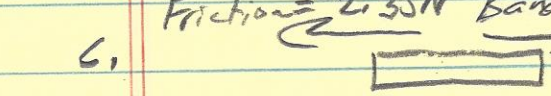
6.



a. $W = mg = 0.4\,kg(9.8\,m/s^2) = \boxed{3.92N}$

b. $F_{fr} = \mu F_N = \mu(\text{weight}) = 0.6(3.92N) = \boxed{2.35N}$ backward

6.



$\Sigma F = \text{Bands} - \text{friction} = 9N - 2.35N = \boxed{6.65N}$

d. $F = ma \Rightarrow 6.65N = 0.4\,kg(a)$

$\boxed{a = 16.6\,m/s^2}$

e. Max V = V at end of acceleration

$V_x^2 = V_{ox}^2 + 2a\Delta x$ (Accel. Distance)

$V_x^2 = 0 + 2(16.6\,m/s^2)(0.1\,m)$

$V_x = \text{Max } V = \boxed{1.82\,m/s}$

#6, continued.

No Rubber band force

f. 

$\Sigma F = -2.35N$ (or 2.35N backward)

g. $\Sigma F = ma = -2.35N$

$0.4kg\,(a) = -2.35N$

$a = -5.9 m/s^2$

h. $V_x^2 = V_{ox}^2 + 2a\Delta x$

V_x: End Velocity = 0 m/s

V_{ox}: Max V (V at start of decel.)

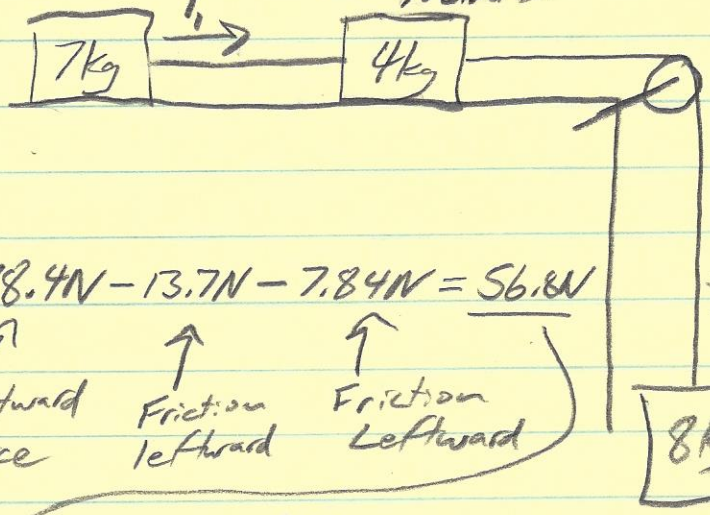
$0 = (1.82 m/s)^2 + 2(-5.9 m/s^2)(\Delta x)$

$\Delta x = 0.28m$

7.

$F_{fr} = \mu mg = 13.7N$ ←

$F_{fr} = \mu mg = 0.2(4kg)9.8\,m/s^2 = 7.84N$ ←



a) $\sum F = 78.4N - 13.7N - 7.84N = 56.8N$

↑ Rightward force; ↑ Friction leftward; ↑ Friction Leftward

$W = mg = 78.4N$ ↓

$\sum F = 56.8N = 19kg(a)$ (ma ⇓)

$a = 3\,m/s^2$

b) $\sum F_{8kg\ block} = T_2 - 78.4_N = 8kg(3\,m/s^2)$

(Tension up ⇓, Weight down ⇓, ma ⇓)

$T_2 = 54.4N$

$\sum F_{7kg\ block} = T_1 - 13.7N = 7kg(3\,m/s^2)$

⇑ Tension to right; ⇑ Friction to left; ⇑ m; ⇑ a

$T_1 = 34.7N$