Reminders 07-21-09:

- 5th Webassign due Wednesday 11:59PM
- Hand in 4th Assignment Problems Tomorrow
- ***Exam 2 Chapters 4-5 Wednesday***
- ***Print Out Sample Exams From Our Website***
  (***focus on problems*** 5 ***Exam*** 1 ***F***01;
  problems 2,3&5 ***Exam*** 2 ***S***00; ***problem*** 1-4
  Exam 3 ***F***01; ***problems 4&5 Exam*** 4 ***S***00.
- **Answers to Standardized Test p. 145**
  1C, 2B, skip 3&4, 5B, 6B, skip 7.

Objectives:

- ***More Newton's Laws*** **Examples**
- **2D Motion**

Examples

- A rescue helicopter is lifting a man (weight 822 N) from a capsized boat by means of a cable and harness.
  - What is the tension in the cable when the man is given an initial upward acceleration of 1.10 m/s^2?

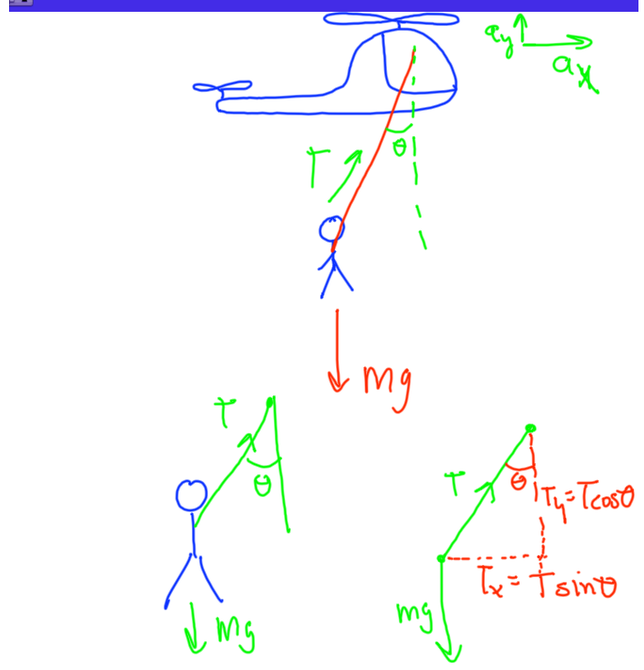
$$T - mg = +ma$$

$$T = mg + ma$$

$$= 822\,N + \left(\frac{822\,N}{9.8\,m/s^2}\right)(1.10\,m/s^2)$$

$$= 914\,N$$

– Now the man is accelerating in the upward direction at a rate of 1.10 m/s² and in the forward direction at a rate of 0.25 m/s². What is the angle the cable makes with the vertical?



$$\Sigma F_y = T\cos\theta - mg = ma_y$$
$$\Sigma F_x = T\sin\theta = ma_x$$

$$T\sin\theta = ma_x$$
$$T\cos\theta = ma_y + mg$$

Divide equations

$$\frac{T\sin\theta}{T\cos\theta} = \frac{ma_x}{ma_y + mg}$$

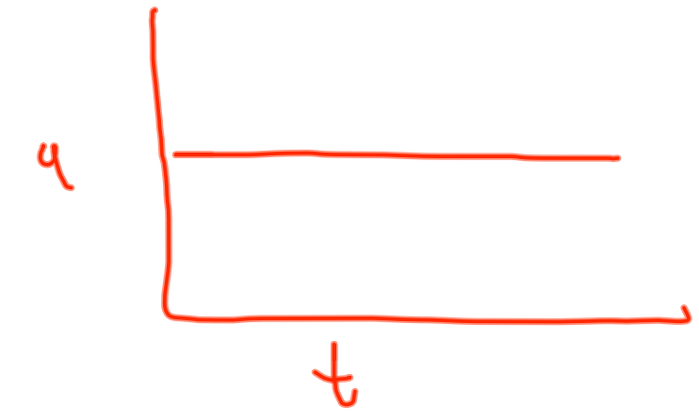
$$\tan\theta = \frac{a_x}{a_y + g}$$

$T\sin\theta = ma_x$

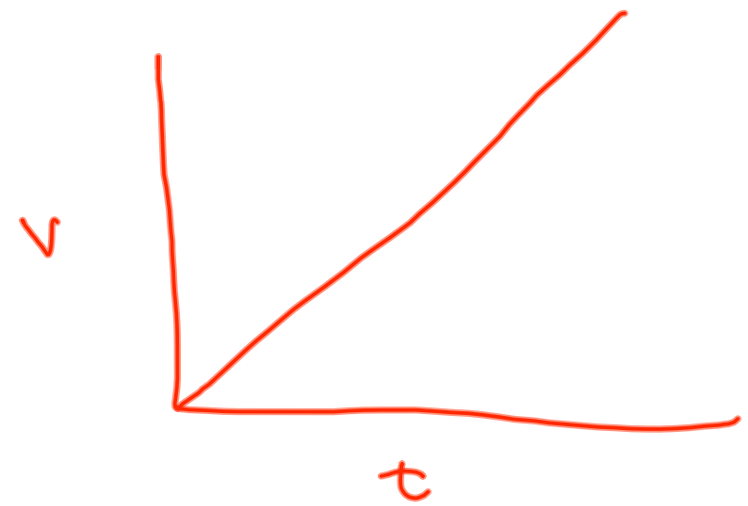
$T = \frac{ma_x}{\sin\theta}$

$$\theta = \tan^{-1}\frac{0.25\ m/s^2}{1.10\ m/s^2 + 980\ m/s^2}$$
$$= \tan^{-1}\left(\frac{0.25}{10.90}\right) = 1.3°$$

What does a position vs. time graph look like for the case where the net force acting on an object is constant? What about velocity vs. time?



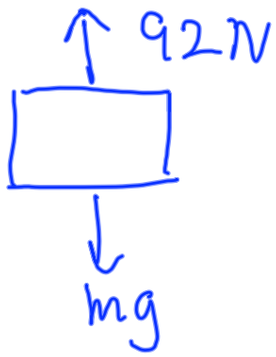
since $F = ma$



parabola

$\Delta x = v_i t + \frac{1}{2} a t^2$

Webassign 8d.



$m = 5.3 kg$

when object is released

$a = -9.80 \, m/s^2$

want to know long it takes for v to go to zero

$V_f = V_i + at$

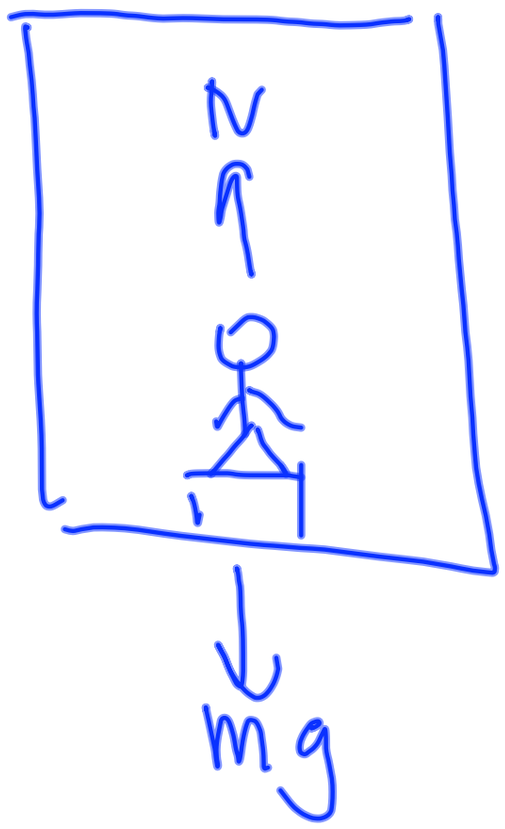
$V_f = 0$

$0 = V_i + at$

$-V_i = at$

$t = \frac{-V_i}{a}$

3e

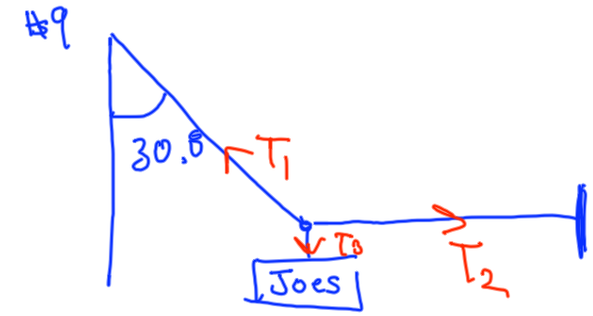


$$\Sigma F_y = N - mg = ma$$

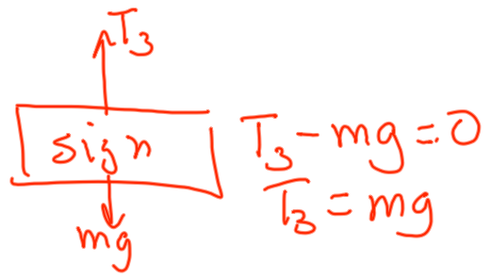
$$N = mg + ma$$

d) if v is constant a is zero

#9

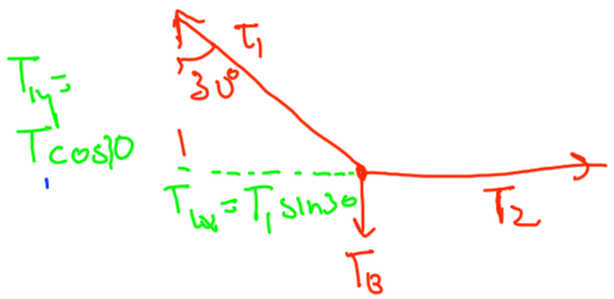


Need 2 F.B.D. one at Knot and one on sign



$T_3 - mg = 0$

$T_3 = mg$



$$\Sigma F_x = -T_1 \sin 30 + T_2 = 0$$

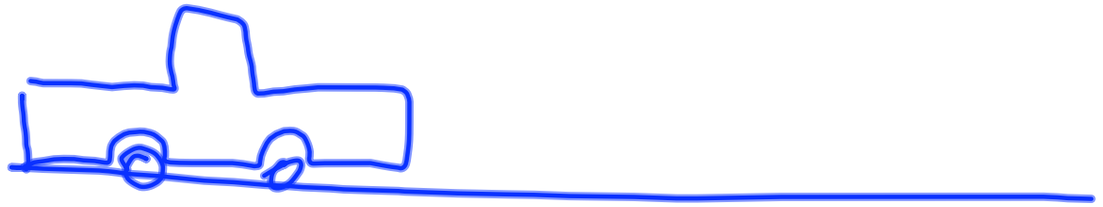
$$\Sigma F_y = T_1 \cos 30 - T_3 = 0$$

$$T_1 \cos 30 = T_3$$

$$T_1 = \frac{T_3}{\cos 30} = \frac{mg}{\cos 30}$$

$$T_2 = T_1 \sin 30$$

6)



$V_i = 0$

$\Delta X = 403.7\,m$

$\Delta t = 11.920\,s$

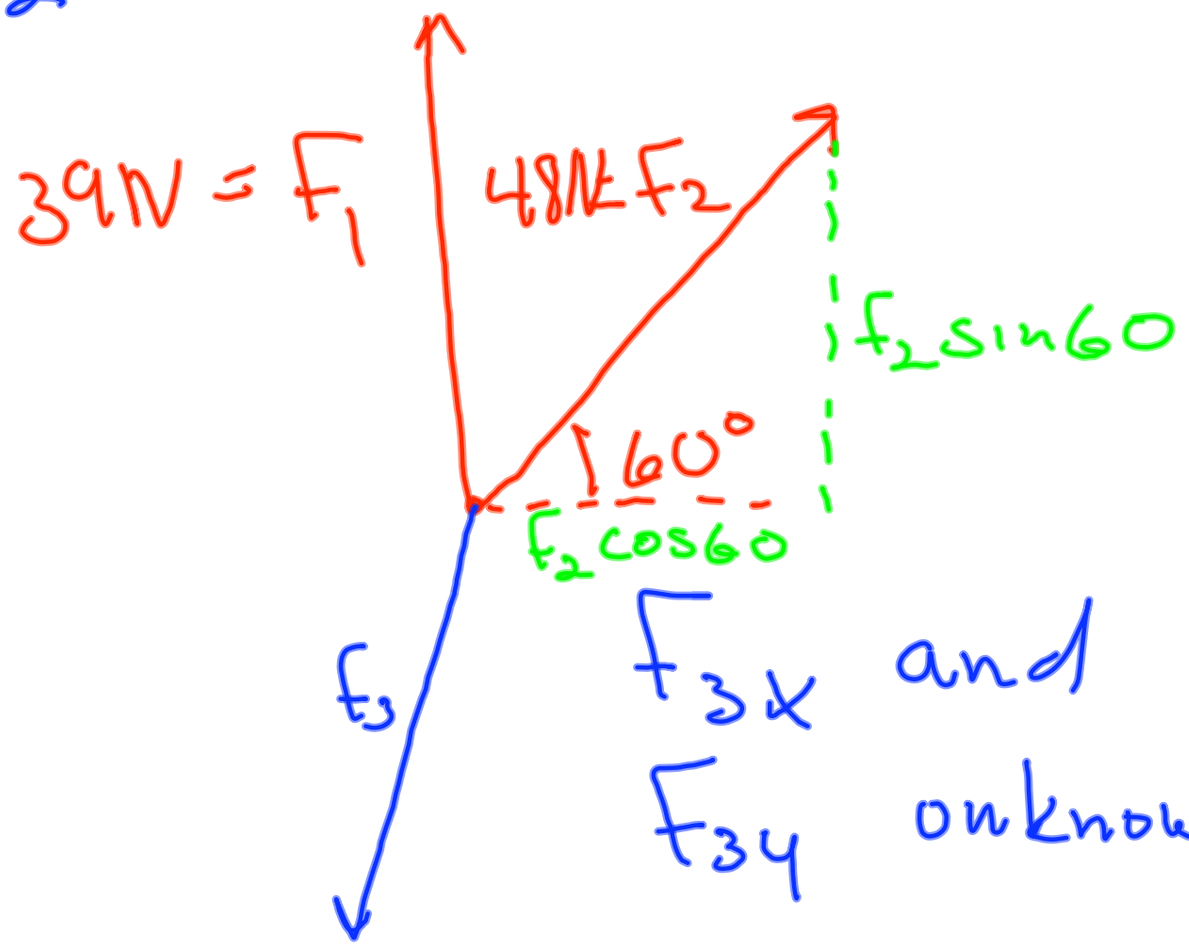
need a und V_f

$$V_{avg} = \frac{\Delta X}{\Delta t} = \frac{V_i + V_f}{2}$$

then use

$$a = \frac{V_f - V_i}{\Delta t}$$

#12

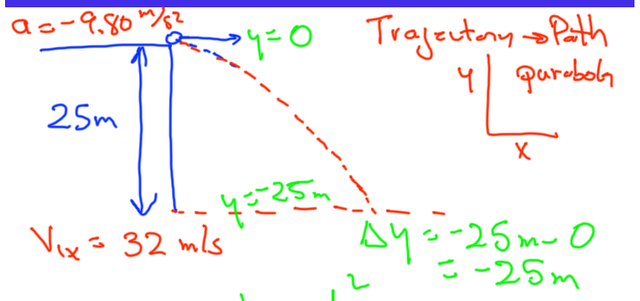


$\Sigma F_x = 0 = f_2 \cos 60 + f_{3x} = 0$

$\Sigma F_y = 0 \quad f_1 + f_2 \sin 60 + f_{3y} = 0$

solve for f_{3x} & f_{3y}

- **An object is fired in the horizontal direction off a 25 m cliff with an initial velocity of 32 m/s.**
  - **How long is it in the air?**
  - **How far does it travel in the horizontal direction?**
  - **What is its velocity when it hits the ground below?**
  - ***Answer: 2.3s; 72m;* 39m/s and 35° below +x-axis**



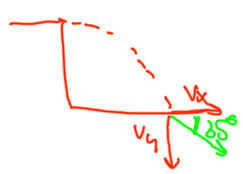
$$\Delta y = \tfrac{1}{2} a t^2$$

$$t = \sqrt{\frac{2\Delta y}{a}} = \sqrt{\frac{2(-25\text{m})}{-9.80\ \text{m/s}^2}}$$

$$= 2.3\text{s}$$

$$\Delta x = (32\text{m/s})(2.3\text{s}) = 72\text{m}$$

want V_f when it hits the ground



$V_{xf} = 32\text{m/s}$

$V_{yf} = ?$

$$V_{yf} = at = (-9.80\ \text{m/s}^2)(2.3\text{s})$$

$$= -22.5\text{m/s}$$

$$= -22\text{m/s}$$

$$V = \sqrt{(32\ \text{m/s})^2 + (-22\ \text{m/s})^2} = 39\ \text{m/s}$$

$\theta = \tan^{-1}\left(\frac{22}{32}\right) = -35°$ or 35° below x-axis