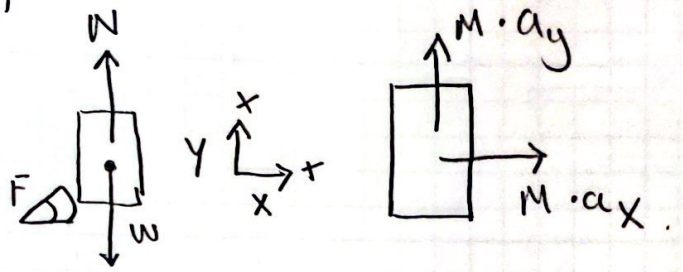
3-3 - Practice	10/31/22	Isaac Abella

Problem)

A) determine the horizontal acceleration of the sprinter?

B) If the force is exerted over .37 sec, determine the speed with which the sprinter leaves the starting blocks

Represent:



Organize:

$m = 62\,kg$

$F = 1556\,N$

$\theta = 23°$

$x\cos\theta = m \cdot a_x$

$y\sin\theta + N - w = m \cdot a_y$

Solution

A) x equation to find horizontal acceleration

$F\cos\theta = m \cdot a_x \rightarrow a_x = \frac{F\cos\theta}{m}$

what we want

$\frac{1556\cos 23}{62\,kg} = \boxed{23.1\ m/s^2}$

B) V given t is $\frac{\Delta V}{\Delta t} = a$ $V = a \cdot t$

using $a = 23.1\ m/s^2$

$23.1 \cdot .37 = 8.547\ m/s$

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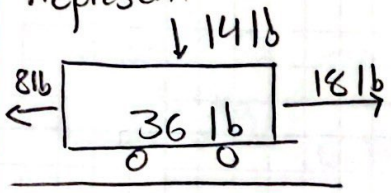
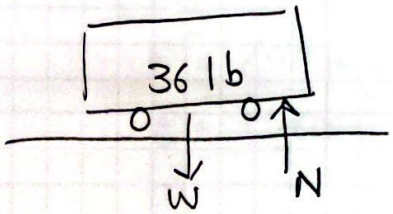
3-3-2	10/31/22	Isaac Abella

Problem: A) what is the magnitude of the net force on the cart

B) What is the magnitude of the acceleration of the cart?

Represent:





Solution:

A) $F_{NET} = 181b - 81b = 101b$

B) Magnitude of acceleration

acceleration =

$\frac{F}{m} = \frac{MA}{M}$ solve for a

$\frac{F}{m} = a$ $\quad \frac{101b}{1.12 \text{ slug}} = 8.94 \text{ ft/s}^2$

Convert to slug.

$\frac{36}{32.2} = 1.12$ slug

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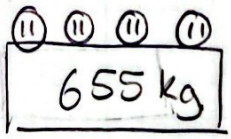
3-3-3	10/31/22	Isaac Abella

problem: A) How many g's of acceleration does Dr. Han Experience? $g = 9.81\ m/s^2$

B) What is the total horizontal force must the road exert on the tires?

Represent.



390m →

5.80sec.

Organize

$g = 9.81$ $\quad X_F = 390$

$F = 699\ kg$ $\quad a = ?$

$t = 5.80$

Solution

A) using constant acceleration equations, isolate and solve for a, then divide by $g = 9.81$

$$\Delta x = V_1 \times t^2 = \tfrac{1}{2} a t^2$$

$$= \frac{\Delta x}{a} = \tfrac{1}{2}(5.80)^2 = \frac{390}{16.82a} = a = 23.2$$

$$23.2 / 9.81 = \boxed{2.36}$$

B) Find Horizontal Force.

via $a = 23.2$ that we derived.

$$F = MA = 699 \cdot 23.186$$

$$F = 1652\ kg \cdot 9.81 \boxed{= 16210\ N}$$

to convert to F = Newtons

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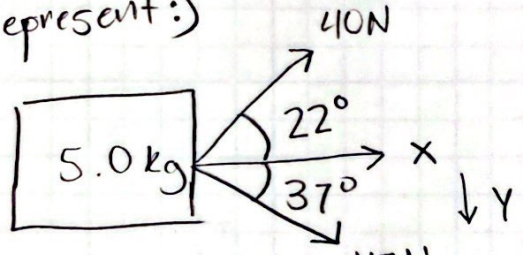
3-3-4	10/31/22	Isaac Abella

Problem :)

A) Determine the magnitude of the acceleration of the block

B) Determine the direction of the acceleration of the block CCW

Represent :)



Organize :)

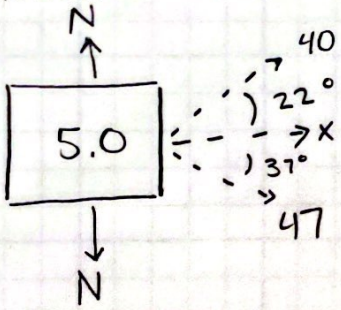
Weight = 5.0 kg = Force

angle = 22°, 37° in x div

$\cos\theta = M a_x$

$\sin\theta = M a_y$

Solution : use Newton's 2nd law equations.



Solution A) using $a = \frac{F_{NET}}{M}$

Calculate magnitude acceleration via x and y components of top view

$-x = 40\cos 22 + 47\cos 37 = 74.623$

$y = 40\sin 22 - 47\sin 37 = -13.3$

$\sqrt{x^2+y^2} = 75.715 = \boxed{15.6\ m/s^2}$

Solution B). using $\tan^{-1}(y/x) = \theta$

given x values you can set up as.

$x = 40\cos 22° + 47\cos 37° = 74.623223 15$

$Y = -47\sin(37) + 40\sin(22) = -13.30104$

$\tan^{-1}\left(\frac{-13.3}{74.6}\right) = -10.1$

$360° - 10.1 = \boxed{349.9°}$

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