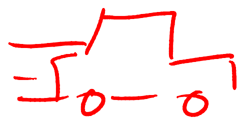
October-07-10
1:38 PM

Pg 144 #7 W/B



↓ south

$m = 925\ kg$

$t = 10.0\ s$

$V_f = -25.0\ m/s$

$V_i = 0\ m/s$

$F = ?$

$F_{NET} = m\vec{a}$

$a = ?$

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

$$\frac{-25\ m/s - 0\ m/s}{10.0\ t} = -2.5\ \frac{m}{s^2}$$

$F_{NET} = ma$

$= (925\ kg)(-2.5\ m/s^2)$

$= -2312.5\ N$

$= -2.31 \times 10^3\ N$ or 2310 South
or 2.31×10^3 South

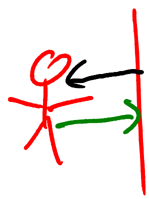
Newton's 3rd law

- For every force there is an equal

- For every force there is an equal but opposite force

ex)

wall

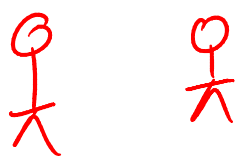


$F_{wall} = -25\,N$

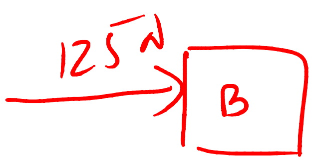
$F_{app} = 25\,N$

ex

$A = 65\,kg$ $\quad B = 90\,kg$



If person A pushes person B with an applied force of 125N, determine person B's acceleration, assume no friction



$F = ma$

$a = \frac{F_{NET}}{m} = \frac{125\,N}{90\,kg} = 1.39\ m/s^2$

b) Calculate person A's accel.

$F_N = -125$ due to Newton 3rd law

$a = \frac{-125\ N}{65\ kg} = -1.9\ m/s^2$

c) if person A's arms are .5m long determine A's final velocity

$a = -1.9\ m/s^2$

$d = -.50\ m$

$V_i = 0$

$V_f = ?$

$V_f^2 = V_i^2 + 2ad$

$V_f = \sqrt{V_i^2 + 2ad}$

$= \pm\sqrt{2(-1.9\ m/s^2)(-.50m)}$

$= -1.4\ \frac{m}{s}$

ex a 75kg man is standing on a canoe in still water, if the man jumps out of the canoe with an acceleration of $0.75\ \frac{m}{s^2}$, find the acceleration of the canoe if its mass is 150kg

$F_{man} = m_{man} \cdot a_{man} \qquad -F_{canoe}$

$= (75kg)(.75\ \frac{m}{s^2}) = -F_{canoe}$

$(75kg)(.75\ \frac{m}{s^2}) = -m_{canoe} \cdot a_{canoe}$

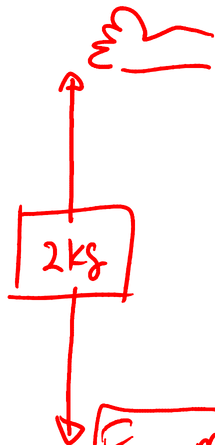
$-a_{canoe} = \frac{(75kg)(.75\ m/s^2)}{150kg}$

$-a = .38\ \frac{m}{s^2}$

$a = -.38\ m/s^2$

Tension

ex



$F_g = m \cdot g$

$= (2\,kg)(9.8\,\frac{m}{s^2})$

$= 19.6\,N$

$F_{upwards} = 19.6$

$F_{Tension} = 19.6\,N$

$F_T = 19.6\,N$

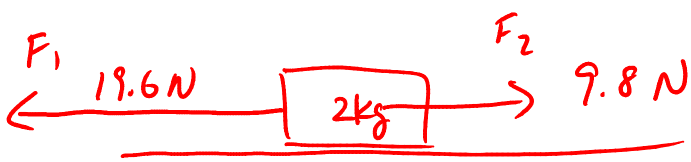
$F = ma$

When doing dynamics Q's you must do F.B.D = "Free body diagram" labelling vectors

$F_{NET} = \sum F$ sum of all forces

(↑ sigma)

ex



find F_{NET}

$F_{NET} = F_1 + F_2$

$= -19.6\,N + 9.8\,N$

$= -9.8\,N$

$= -9.8\ N$

Find "a" of the 2kg block

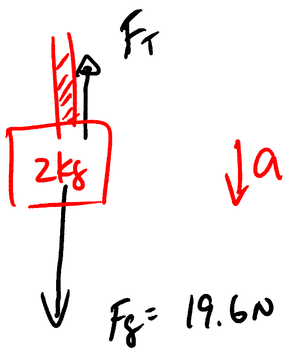
$F_{NET} = ma$

$a = \frac{F_{NET}}{m} = \frac{-9.8N}{2kg}$

$= -4.9\ \frac{m}{s^2}$

you can only calculate $\underline{\underline{a}}$ if you have F_{NET}

ex) find $F_T = ?$



↓ $a = -4.9 m/s^2$

label FBD

since I am given "a"

$F_{NET} = (2kg)(-4.9 m/s^2)$

$= -9.8\ N$

$F_{NET} = \Sigma F$

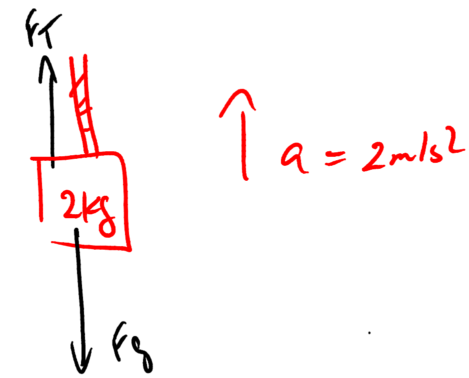
$-9.8N = \underline{\underline{F_T}} + F_g$

$F_T = -9.8N - F_g$

$= -9.8\,N - -19.6\,N$

$= 9.8\,N$ up

ex)



Find F_T

Since I know "a" I have F_{NET}

$F_{NET} = m \cdot a$

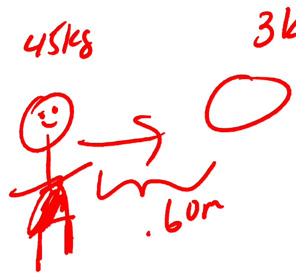
$= 4\,N$

$F_{NET} = F_T + F_g$

$4N = F_T + (-19.6\,N)$

$F_T = 23.6\,N$ up

#8/ PS 12/8



Rock ⇒ $m = 3kg$

$F_{Rock} = ?$

$V_f^2 = V_0^2 + 2ad$

Rock

$a = ?$
$V_i = 0$
$V_f = 9.6\ m/s$
$d = .60$

$$a = \frac{V_f^2 - V_i^2}{2d}$$
$$= 76.8\ \frac{m}{s^2}$$

$$F_{Rock} = m \cdot a$$
$$= (3kg)(76.8\ \tfrac{m}{s^2})$$
$$= 230.4\ N \text{ Right}$$

$F_{girl} = -230.4\ N$
$m_{girl} = 45\ kg$
$a = -5.12\ m/s^2$
$V_i = 0$
$V_f = ?$
$d = -0.6\ m$

$$V_f^2 = V_i^2 + 2ad$$
$$V_f = -2.5\ m/s$$

Zac's mass 81 kg what is Zac's weight on earth

$$F_g = mg$$
$$= (81kg)(-9.80\ \tfrac{m}{s^2})$$ ← on earth
$$= -7.9 \times 10^2\ N$$

What is Zac's mass on the moon if "g_{moon}" $= -1.6\ m$

What is Zac's mass on the moon if "g_{moon}" $= -1.6 \frac{m}{s^2}$

$\therefore$ Zac = 81 kg on any planet

mass never changes

Determine his weight on the moon

$F_g = mg = -129.6\ N$

weight is a vector and points ↓

New Formula

$$F_g = mg \quad \text{or} \quad F_g = \frac{G m_1 m_2}{r^2}$$

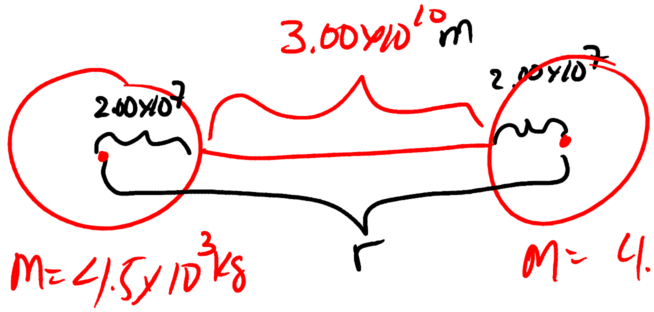
describes the attractive forces between any 2 objects

"G" - universal gravitational constant

$= -6.67 \times 10^{-11} \frac{Nm^2}{kg^2}$

m_1, m_2 are two masses

r^2 is the distance between the centres of the two masses ex if two planets of diameter 4.00×10^7 m are seperated by a distance of 3.00×10^{10} m, calculate the attractive force between them

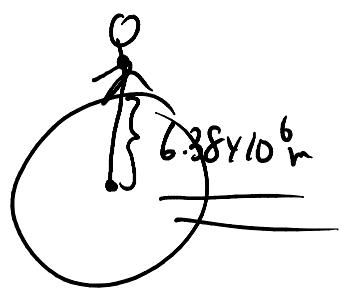


$$F_g = \frac{G m_1 m_2}{r^2} = \frac{\left(6.67 \cdot 10^{-11} \frac{Nm^2}{kg^2}\right)(4.5 \times 10^3 \, kg)(4.5 \times 10^3 \, kg)}{(3.00 \times 10^{10} \, m + 4 \times 10^7 \, m)^2}$$

$$= 1.49 \times 10^{-24} \, N$$

what is the gravitational Force of Earth on Zac

$$F_g = \frac{G m_1 m_2}{r^2}$$



$$= \frac{\left(6.67 \times 10^{-11} \frac{Nm^2}{kg^2}\right)(81 \, kg)(5.98 \times 10^{24} \, kg)}{(6.38 \times 10^6 \, m)^2}$$

$$= 794 \, N$$

Zac Zac

$$F_g = mg = \frac{G m_1 m_2}{r^2}$$

$= G m_1$

$g' = \frac{Gm_2}{r^2}$

Pg 152 #1-13 odd w/B

Quiz Thur. Don't forget

Unit test Next class