1-26-2015

$\frac{m}{s}$ V = RATE OF CHANGE OF DISTANCE WITH TIME

IS SPEED (SCALAR)

or $\frac{ft}{s}$

e km/h

mph

↖ MILES

60mph $\cong$ 100 km/h $\cong$ 27 m/s

$\vec{V}$ = RATE OF CHANGE OF POSITION WITH TIME

IS VELOCITY

- SPEED
- DIRECTION

$\frac{m/s}{s} = \frac{m}{s^2}$

m/s^2

RATE OF CHANGE OF SPEED OR VELOCITY

IS ACCELERATION

a = SCALAR

$\vec{a}$ = VECTOR

A SPECIAL CASE: CONSTANT ACCELERATION

SPEED = (INITIAL SPEED) + (ACCELERATION)*(T

$V = V_0 + a \cdot t$

$\frac{m}{s} = m/s + \frac{m}{s^2} \cdot s$

DECELERATION MEA

$a < 0$

X LOCATION = (INITIAL X) + (INITIAL SPEED)*(TIME)

$+ \frac{1}{2}$(ACCELERATION)*(TIME)^2

$x = x_0 + V_0 \cdot t + \frac{1}{2} a t^2$

$m = m + \frac{m}{s} \cdot s + \frac{m}{s^2} \cdot s^2$

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SPECIAL CASE: ZERO ACCELERATION

V IS CONSTANT AND

$$X - X_0 = V \cdot t$$

$$\boxed{d = V \cdot t}$$ DISTANCE = SPEED * TIME

MASS VS. WEIGHT

kg
g
SLUG

MASS - A SCALAR QUANTITY THAT MEASURES THE AMOUNT OF MATTER IN AN OBJECT
- INDEPENDENT OF LOCATION

m — kilogram = 1000 GRAMS

NEWTON (N)
POUND (lb)

WEIGHT - A VECTOR QUANTITY THAT MEASURES THE EFFECT OF GRAVITY ON A PARTICULAR MASS
- DEPENDS ON LOCATION (AND MOTION)

$\vec{F}_G$ OR $\vec{W}$
- SIZE
- DIRECTION (DOWN)

FINDING WEIGHT FROM MASS

GRAVITATIONAL ACCELERATION NEAR EARTH

$g = 9.8\ m/s^2$ (CONSTANT)
$= 32.2\ ft/s^2$

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(ALL OBJECTS FALL AT THE SAME RATE IF AIR RESISTANCE IS IGNORED.)

WEIGHT = MASS * (GRAV. ACCEL.)

$F_G = m \cdot g$ (DOWN)

(N) (kg) $\cdot \left(\frac{m}{s^2}\right)$

$1\,N = 1\,\frac{kg\,m}{s^2}$

$1\,lb = 1\,\frac{slug \cdot ft}{s^2}$

PERSON HAS A MASS OF $m = 80\ kg$

$$F_G = m \cdot g = (80\ kg)(9.81\ m/s^2) = 784.8\ N$$

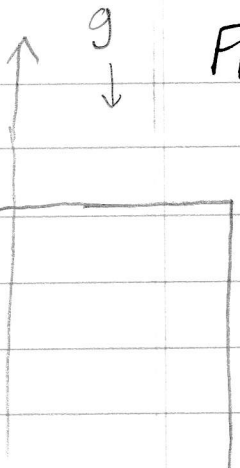
2.2 lbs IS ~~1 NEWTON~~ WHAT 1 Kilogram WOULD WEIGH ON EARTH

$0.22\ lbs = 1\ N$

$$784.8\ N \left| \frac{0.22\ lbs}{1\ N} \right. = 172\ lbs.$$

$$m = \frac{172\ lbs}{32.2\ ft/s^2} = 5.34\ slug$$

FREE-FALL MOTION FROM REST



	$t(s)$	$y(m)$	$v(m/s)$	$a=g(m/s^2)$
⊙	0	0	0	-9.8
⊙	1	-4.9	-9.8	-9.8
⊙	2	-19.6	-19.6	-9.8
⊙	3	-44.1	-29.4	-9.8

$y=-\frac{1}{2}gt^2$ $v=-g\cdot t$ $g=-9.8$