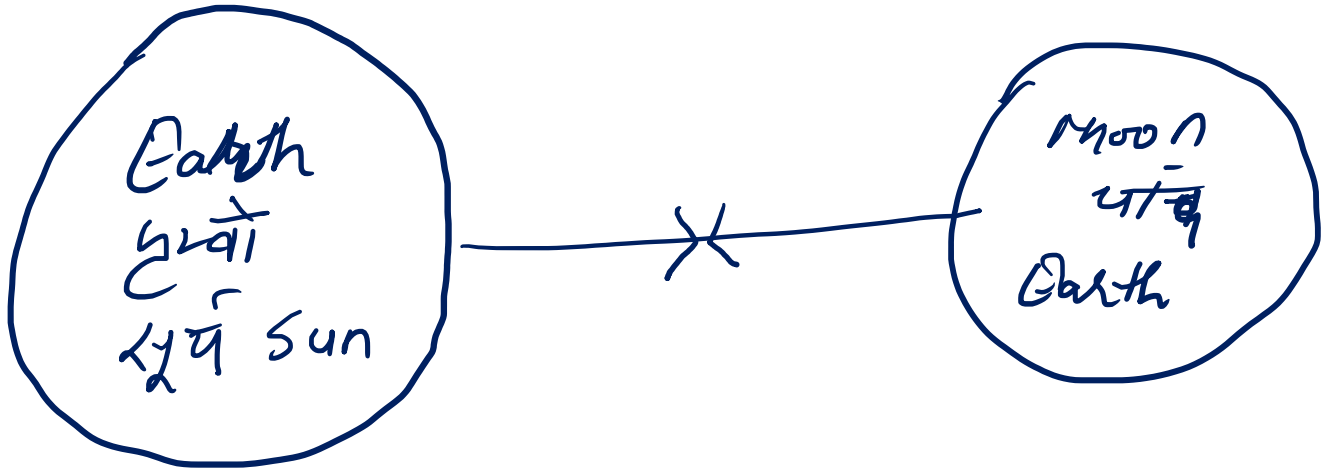
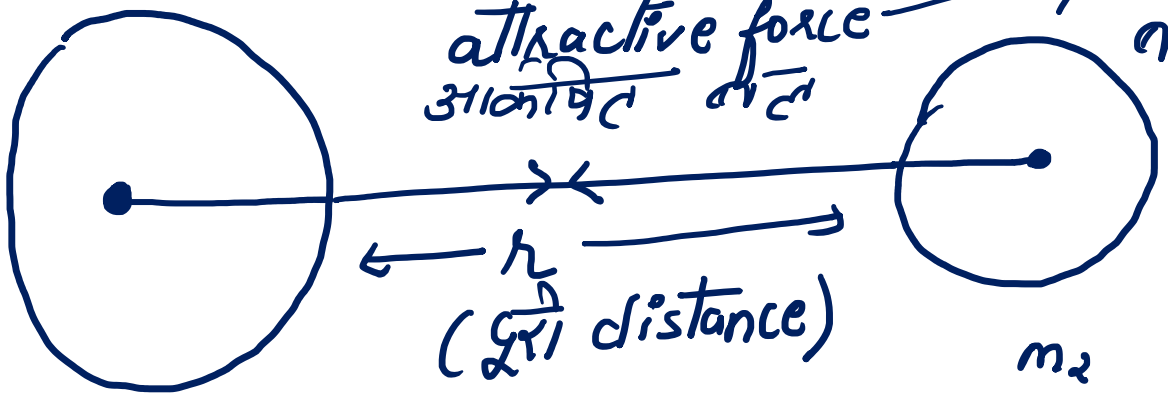
Gravitation / गुरुत्वाकर्षण

Newton's Law of Gravitation =
गुरुत्वाकर्षण का नियम

Universe





(m_1 mass द्रव्यमान)

$$F \propto m_1 m_2$$

inc – inc
dec – dec — (1)

$$F \propto \frac{1}{r^2}$$

dec – inc
inc – dec — (2)

eq ① and ②

$$F \propto \frac{m_1 m_2}{r^2}$$

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

G = constant

G = gravitation गुरुत्वाकर्षण

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

formula ⇒ Newton

Henry Cavandish → 1.1

Value मान $G \Rightarrow 6.67 \times 10^{-11}\ N m^2 kg^{-2}$ → same समान

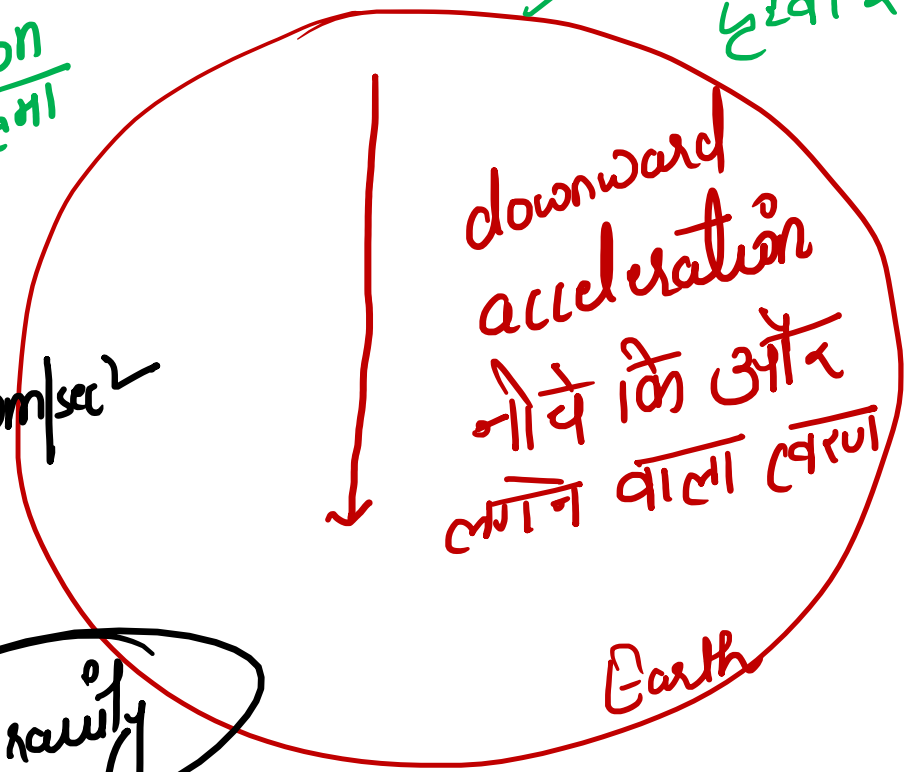
gravity गुरुत्व

Earth पृथ्वी

Moon चंद्रमा

out of Earth पृथ्वी से बाहर

$g = 0$



Max $\Rightarrow 9.8 m/sec^2 \approx 10 m/sec^2$

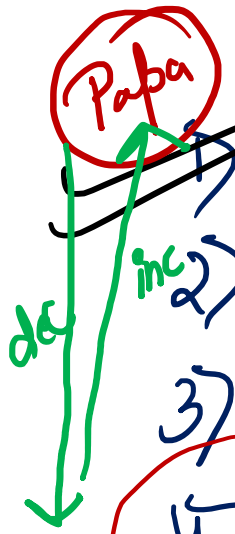
Min $= 0 \ m/sec^2$

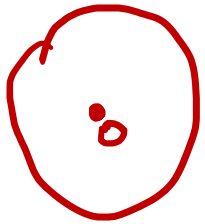
no gravity

Ques → Where gravity is More
गुरुत्व कहाँ ज्यादा होता है

1) Pole पर = 9.8 m/sec²
2) equator भूमध्य रेखा → less than 9.8 m/sec²
more than 0 m/sec²
3) Centre केन्द्र ⇒ 0 m/sec²
4) None of these

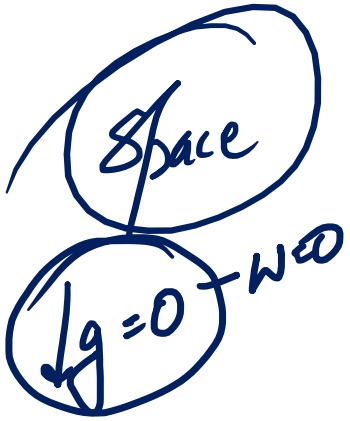
Pole
equator
centre
O



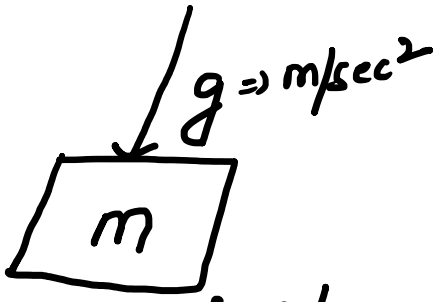


centre केन्द्र
O केन्द्र

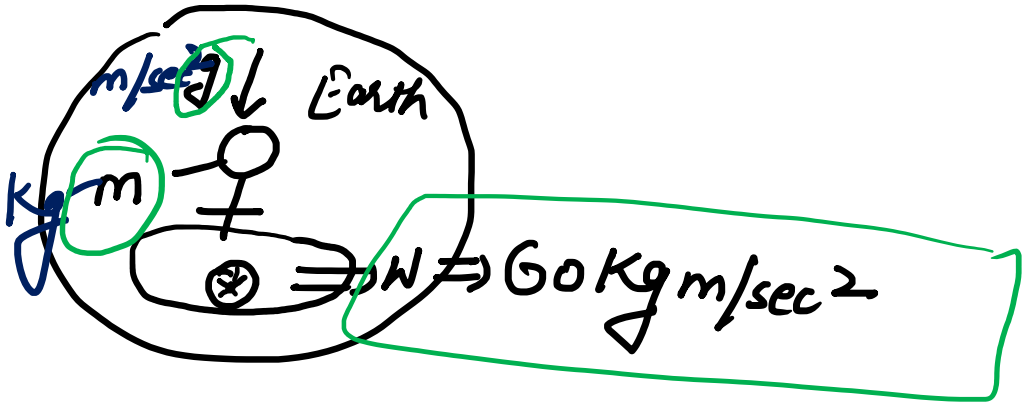
Difference b/w weight and Mass
द्रव्यमान और भार में अंतर



mass
द्रव्यमान



⇒ weight
भार ⇒ Kg m/sec²



Weight ⇒ Mass × gravity
भार ⇒ द्रव्यमान × गुरुत्वीय

$$W = mg$$

m = constant (No change) नियत

(↑ ऊपर g = घटता | ↓ नीचे g = बढ़ता)

g = change W = change

Ex $W_1 = 100kg \times 5 = 500 kg\,m/sec^2$

space Centre $W_2 = 100kg \times 0 = 0 kg\,m/sec^2$

$W_3 = 100kg \times 4 = 400 kg\,m/sec^2$

g changes then the value of W changes

g बदलने पर W का मान बदल जाता है

Weight of a body on Moon in comparison to Earth

पृथ्वी पर पिंड का भार दूसरे ग्रह पर कितना होगा, ज्ञात करना है?

$$W_M = \frac{1}{6} W_E$$

force ⇒ $W_E = 120\ kgm/sec^2$

$W_M = ?$

$$W_M = \frac{1}{6} W_E$$

$$W_M = \frac{120}{6} \Rightarrow 20\ kgm/sec^2$$

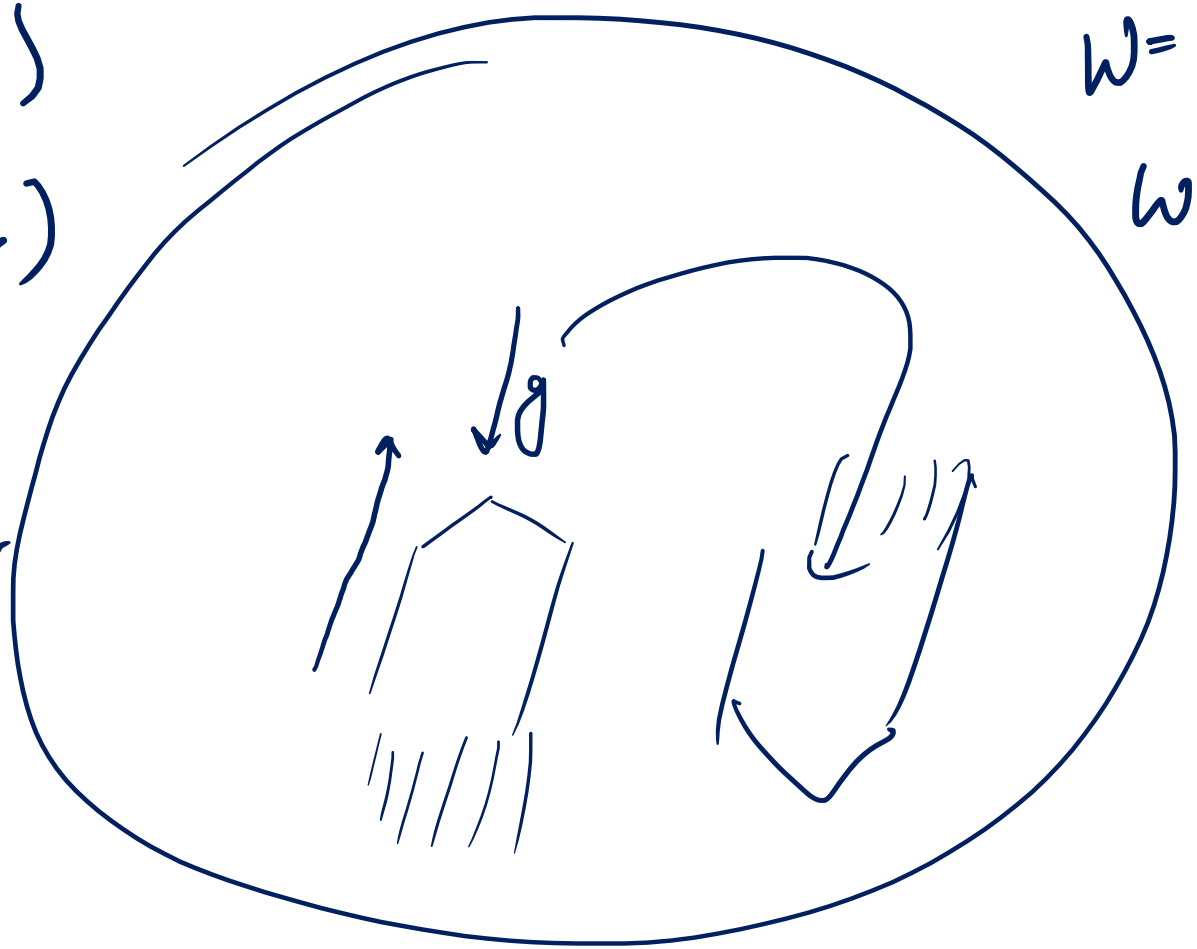
Escape Velocity of Earth
पृथ्वी का पलायन वेग

$W = m(g+a)$

$= 10(6+7)$

$= 10 \times 13$

$W = 130$ kgw



$W = m(g-a)$

$W = 10(6-2)$

$W = 10 \times 4$

$= 40$ Kg m/sec

escape velocity

11.2 Km/sec