



Physics Formula Checklist

WEEK 1 FORMULAE

GRAVITATIONAL FORCE (NEWTON'S LAW OF UNIVERSAL GRAVITATION)

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



F = gravitational force of attraction acting from the centre of mass of the two objects (N).
 G = gravitational constant = $6.67 \times 10^{-11} \text{ Nm}^2\text{kg}^{-2}$
 m_1 = mass of one of the objects (kg)
 m_2 = mass of the other object (kg)
 r = distance between the centre of mass of the two objects (m)

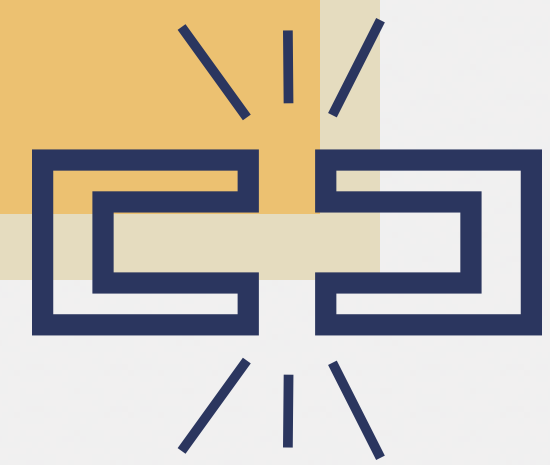
$$F = m \times g$$

CALCULATING WEIGHT FORCE (a.k.a GRAVITATIONAL FORCE)

F = gravitational force or weight force on an object (N)
 m = mass of object (kg)
 g = gravitational field strength = 9.8 N/kg on and near the surface of the Earth.

ELECTROSTATIC FORCE (COULOMB'S LAW)

$$F = \frac{k \times q_1 \times q_2}{r^2}$$

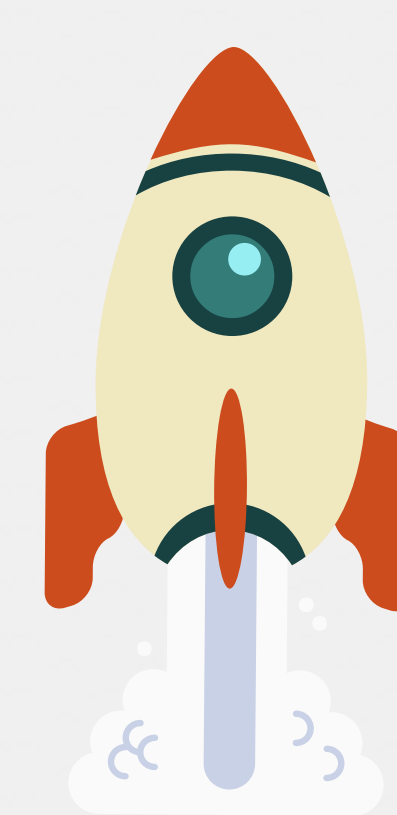


F = electrostatic force acting between two charged objects (N).
 k = Coulomb's constant = $9.0 \times 10^9 \text{ Nm}^2\text{C}^{-2}$
 q_1 = magnitude of one of the charged objects (C)
 q_2 = magnitude of the other charged object (C)
 r = distance between the centre of the two charges (m)

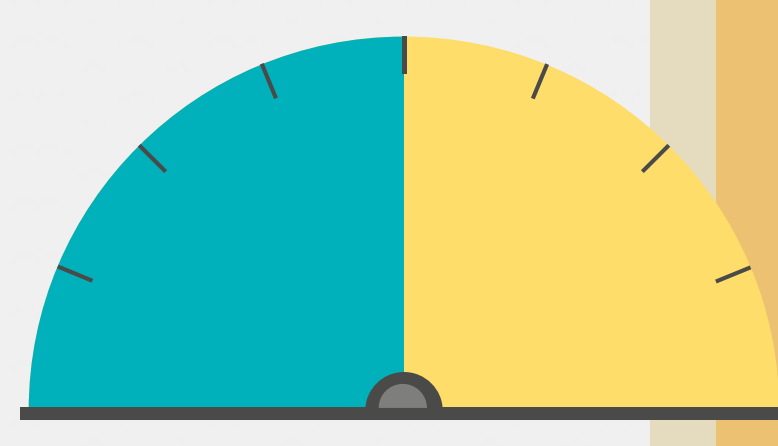
$$\Sigma F = m \times a$$

NEWTON'S 2ND LAW OF MOTION

ΣF = net force acting on an object (N)
 m = mass of object (kg)
 a = acceleration of object (m/s²)



CONSTANT ACCELERATION FORMULAE



v = final velocity (m/s)
 u = initial velocity (m/s)
 a = acceleration (m/s²)
 s = displacement (m)
 t = time (s)

$$v = u + at$$

$$s = ut + 0.5at^2$$

$$s = vt - 0.5at^2$$

$$s = \frac{(u + v) \times t}{2}$$

$$v^2 = u^2 + 2as^2$$

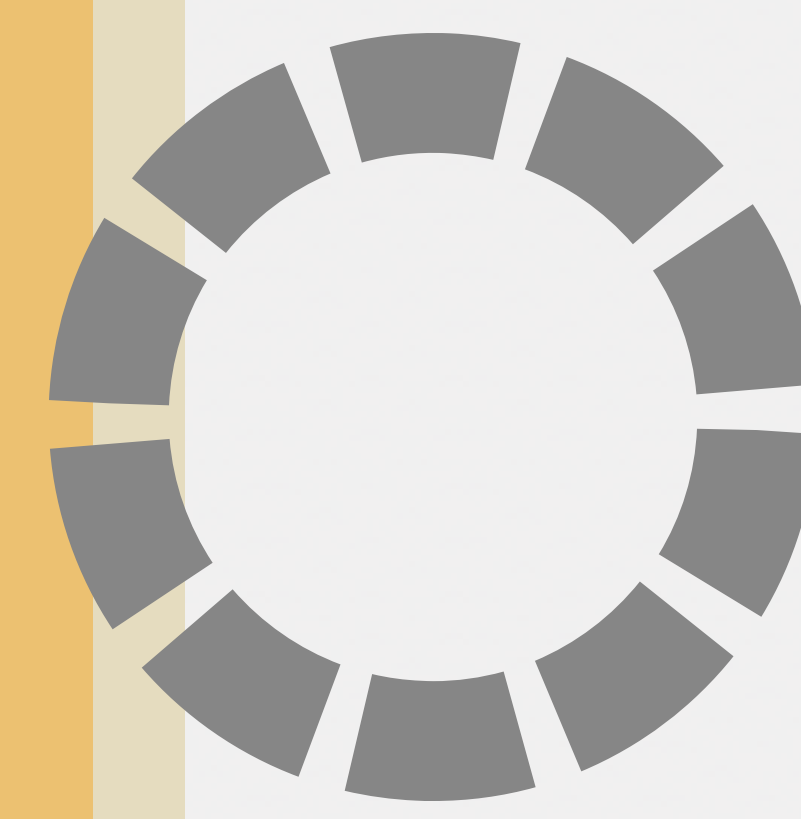
$$v = \frac{\text{distance}}{\text{time}} = \frac{2 \times \pi \times r}{T}$$

$$a = \frac{v^2}{r} = \frac{4 \times \pi^2 \times r}{T^2}$$

$$\Sigma F = m \times a = \frac{m \times v^2}{r} = \frac{m \times 4 \times \pi^2 \times r}{T^2}$$

$$f = \frac{1}{T}$$

CIRCULAR MOTION



v = velocity (m/s)
 r = radius of circle (m)
 T = period, i.e. time taken for one complete cycle (s)
 a = acceleration a.k.a. Centripetal acceleration (m/s²)
 f = frequency, i.e. number of cycles per second (Hz)
 ΣF = net force acting on an object, a.k.a. Centripetal force (N)



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