1 km = 1000 m      1 m = 100 cm        1 mm = 0.001 m         1 kg = 1000 g

acceleration due to gravity on earth  =  \( g = 10 \text{ m/s}^2 \)

weight (\( w \)) = mass (\( m \)) \times g, \hspace{1cm} w = m \times g

Net force (\( F_{\text{Net}} \)) = mass (\( m \)) \times acceleration (\( a \)), \hspace{1cm} F_{\text{Net}} = m \times a

\[
\text{avg velocity} = \frac{\text{distance}}{\text{time}} \hspace{1cm} \text{d} = \text{v} \times \text{t} \text{ when the acceleration is zero}
\]

\[
\text{acceleration} = \frac{\text{velocity change}}{\text{time}}
\]

Distance an object falls from rest in time \( t \): \( d = \frac{1}{2} \times g \times t^2 \)

Speed an object acquires after falling from rest for a time \( t \): \( v = g \times t \)

\[
\text{time (t) to travel a distance (d) at an acceleration a: } \hspace{1cm} t = \sqrt{\frac{2d}{a}}
\]

present velocity (\( v \)) = initial velocity (\( v_0 \)) + acceleration (\( a \)) \times time (\( t \))
\[
\text{v = v}_0 + a \times t
\]

time (\( t \)) for a ball thrown up with initial velocity \( v_0 \) to reach its highest point:
\[
t = \text{initial velocity} / g, \hspace{1cm} t = \frac{v_0}{g}
\]

Maximum height (\( h \)) an object reaches if thrown vertically up with velocity \( v_0 \):
\[
h = \frac{v_0^2}{2g}
\]

initial velocity \( v_0 \) that an object thrown vertically up requires to reach a height \( h \):
\[
v_0 = \sqrt{2 \times g \times h}
\]

\[
\text{time (t) for an object starting from rest to fall a distance h: } \hspace{1cm} t = \sqrt{\frac{2h}{g}}
\]

momentum = mass \times velocity = m (kg) \times v (m/s), \hspace{1cm} p = m \times v

Work (\( W \) in Joules) = Force (\( F \) in N) \times distance (\( d \) in m) = F \times d

Kinetic Energy (\( J \)) = \( \frac{1}{2} m v^2 \)

Gravitational Potential Energy (Joules) = m (kg) \times g (m/s^2) \times height (m)
\[
\text{GPE} = m \times g \times h = w \times h
\]

Centripetal acceleration
\[
a_{\text{cent}} = \frac{(\text{velocity})^2}{\text{radius}} = \frac{v^2}{r}
\]

Centripetal force
\[
F_c = m \times a_{\text{cent}}
\]

Torque (N m)
\[
= \text{Force (N) \times lever arm (m)}
\]