

## 1 Uncertainty

If  $A = X + Y$ :

$$\Delta A = \Delta X + \Delta Y$$

If  $A = XY$ :

$$\Delta A = A \left( \frac{\Delta X}{X} + \frac{\Delta Y}{Y} \right)$$

If  $A = X^n$ :

$$\Delta A = n (\Delta X)$$

## 2 Projectile motion

### 2.0.1 Fundamental SUVAT

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

$$v = u + at$$

$$s = ut + \frac{1}{2}at^2$$

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

### 2.0.2 Symmetrical Projectile motion

$$h = \frac{v^2 \sin^2 \theta}{2g}$$

$$R = \frac{v^2 \sin 2\theta}{g}$$

$$t_{total} = \frac{v \sin \theta}{g}$$

## 3 Circular motion

### 3.0.1 Basic

$\omega$ : Angular velocity,  $\frac{\Delta \theta}{\Delta t}$ , units  $rad/s$

$$v = r\omega$$

$$\omega = \frac{2\pi}{t} = 2\pi f$$

$$a_{cent} = \frac{v^2}{r} = r\omega^2$$

$$F_{net} = m\frac{v^2}{r} = mr\omega^2$$

### 3.0.2 Special

Banking with angle  $\theta$

$$r = \frac{v^2}{g \tan \theta}$$