1 The Laws of Motion:

1.1 Newton's 1st Law

A body is either at rest, or moving with constant speed in a straight line, if no resultant force acts on it.

$$p = mv \qquad (\mathrm{kg\,m\,s^{-1}})$$

Where p is an object's **momentum** ($\mathrm{kg\,m\,s^{-1}}$), m its **mass** (kg) and v its **velocity** ($\mathrm{m\,s^{-1}}$).

1.2 Newton's 2nd Law

The acceleration of a body is directly proportional to the resultant force applied to it and acts in the same direction.

$$F = ma \qquad (\mathrm{N})$$

Where p is an object's **momentum** ($\mathrm{kg\,m\,s^{-1}}$), m its **mass** (kg) and v ($\mathrm{m\,s^{-1}}$) its **velocity**.

1.3 Newton's 3rd Law

To every action there is an equal and opposite reaction.

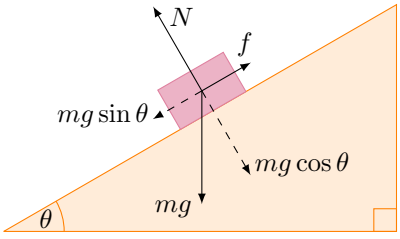
Consider object A and object B:

$$_AF_B = {}_BF_A \qquad (\mathrm{N})$$

2 Force of impact:

$$F_i = \frac{mv - mu}{t} \qquad (\mathrm{N})$$

3 Inclined plane:

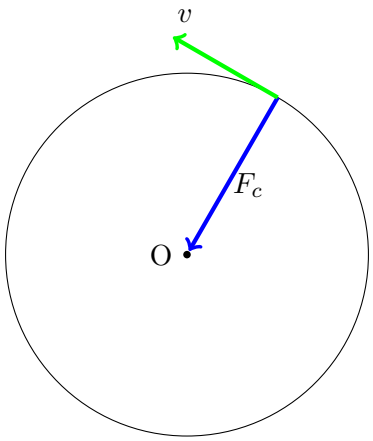


4 Conservation of momentum:

$$Mu_1 + mu_2 = Mv_1 + mv_2$$

Where M and m are object 1 and 2's **masses** (kg) respectively whilst u and v the initial and final **velocities** ($\mathrm{m\,s^{-1}}$) of a given object respectively.

5 Centripetal force:



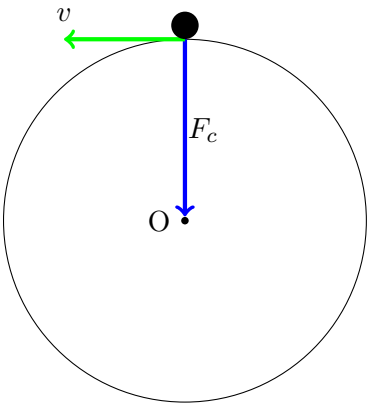
$$F_c = \frac{mv^2}{r} \quad \text{(N)}$$

Where m is the given object's **mass** (kg), v its **tangential velocity**[1] ($\mathrm{m\,s^{-1}}$) and r the **radius** (m) of the cirular path.

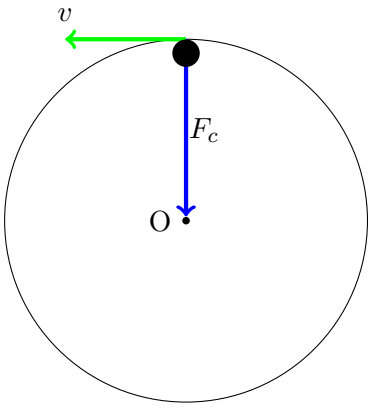
5.1 Periodic time:

$$T = \frac{2\pi r}{v} \quad \text{(s)}$$

5.2 Specific cases:



$$F_c = \frac{mv^2}{r} = mg + R$$



$$F_c = \frac{mv^2}{r} = mg - R$$

[1] The velocity perpendicular to the cirular path's radius.