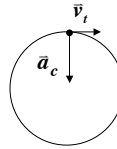


Centripetal Acceleration

$$a_c = \frac{v_t^2}{r}$$


Circular Motion

- This component always points towards the axis of rotation.
- The centripetal acceleration is always perpendicular to tangential motion.

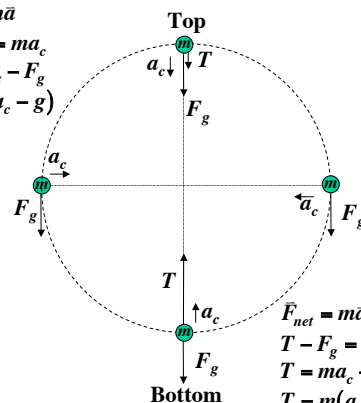
Circular Motion

1

Circular Motion

2

Vertical Motion of a Mass on a Cord

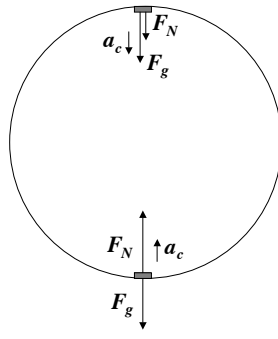


$\vec{F}_{net} = m\vec{a}$
 $T + F_g = ma_c$
 $T = ma_c - F_g$
 $T = m(a_c - g)$

$\vec{F}_{net} = m\vec{a}$
 $T - F_g = ma_c$
 $T = ma_c + F_g$
 $T = m(a_c + g)$

3

Roller-Coaster Loops



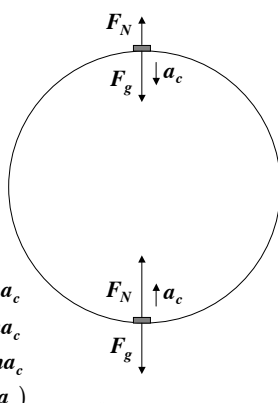
$\vec{F}_{net} = m\vec{a}$
 $F_g + F_N = ma_c$
 $F_N = ma_c - F_g$
 $F_N = ma_c - mg$
 $F_N = m(a_c - g)$

$\vec{F}_{net} = m\vec{a}$
 $F_N - F_g = ma_c$
 $F_N = F_g + ma_c$
 $F_N = mg + ma_c$
 $F_N = m(g + a_c)$

Circular Motion

4

Ferris Wheel



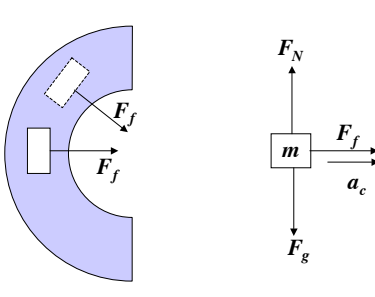
$\vec{F}_{net} = m\vec{a}$
 $F_g - F_N = ma_c$
 $F_N = F_g - ma_c$
 $F_N = mg - ma_c$
 $F_N = m(g - a_c)$

$\vec{F}_{net} = m\vec{a}$
 $F_N - F_g = ma_c$
 $F_N = F_g + ma_c$
 $F_N = mg + ma_c$
 $F_N = m(g + a_c)$

Circular Motion

5

Car on a Curved Road



$\vec{F}_{net} = m\vec{a}$
 $\sum F_y = ma$
 $F_N - F_g = 0$
 $F_N = F_g = mg$
 $\sum F_x = ma$
 $F_f = ma_c$
 $\mu F_N = ma_c$
 $\mu mg = ma_c$
 $\mu g = a_c$

(View from above)

(Side view)

Circular Motion

6