Practice – Centripetal Force

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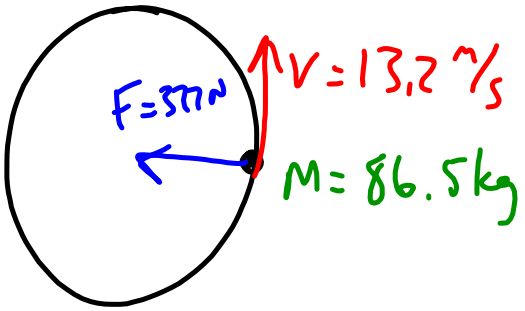
2)



$F_c = F_f$

$$F_c = ma_c$$

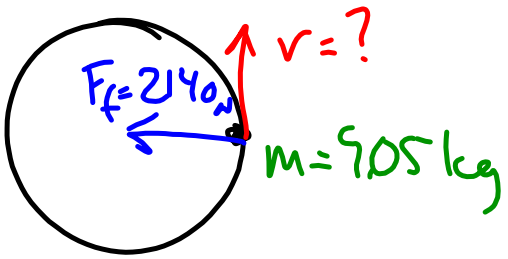
$$F_c = \frac{mv^2}{r}$$

$$r = \frac{mv^2}{F_c}$$

$$= \frac{(86.5\,kg)(13.2\,m/s)^2}{377\,N}$$

$$= 39.9\,m$$

4)



$$C = 2\pi r$$

$$r = \frac{C}{2\pi} = \frac{3250\ m}{2\pi} = 517\ m$$

$$F_c = F_f \qquad F_c = ma_c$$

$$F_c = \frac{mv^2}{r}$$

$$v = \sqrt{\frac{F_c r}{m}}$$

$$= \sqrt{\frac{(2140\ N)(517\ m)}{(905\ kg)}}$$

$$= 35\ m/s$$

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2)

$a = 17\ m/s^2$

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

$$v = \sqrt{a_c r}$$

$$= \sqrt{(17\ m/s^2)(12\ m)}$$

$$= 14.3\ m/s$$

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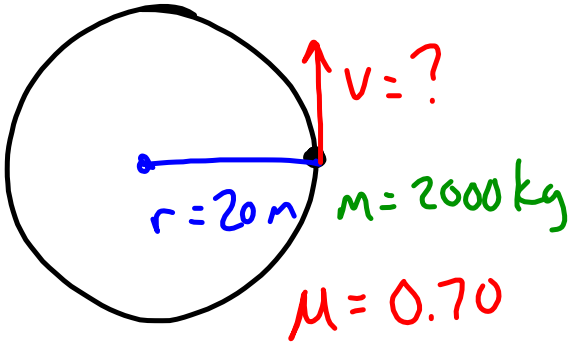
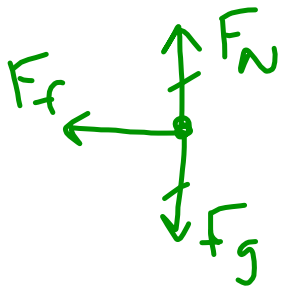
$$F_f = \mu F_N$$



FBD



$$F_f = F_c = ma_c$$

$$F_f = \frac{mv^2}{r}$$

$$v = \sqrt{\frac{F_f r}{m}}$$

$$= \sqrt{\frac{\mu m a_g r}{m}}$$

$$= \sqrt{\mu a_g r}$$

$$= \sqrt{(0.70)(9.8\ m/s^2)(20\ m)}$$

$$= 11.7\ m/s$$

$$F_f = \mu F_N$$
$$= \mu F_g$$
$$= \mu m a_g$$

GRAVITATION

m_1	m_2	r	F	(a_g) g
m_1	$5m_2$	$2r$	$\frac{5(Gm_1m_2)}{4r^2} = \frac{5}{4}F$	$\frac{5(Gm_2)}{4r^2} = \frac{5}{4}g$
m_1	m_2	$\frac{1}{4}r$	$\frac{Gm_1m_2}{(\frac{1}{16})r^2} = 16F$	$\frac{Gm_2}{(\frac{1}{16})r^2} = 16g$
m_1	$\frac{1}{10}m_2$	$\frac{1}{4}r$	$\frac{\frac{1}{10}(Gm_1m_2)}{(\frac{1}{16})r^2} = \frac{8}{5}F$	$\frac{\frac{1}{10}(Gm_2)}{(\frac{1}{16})r^2} = \frac{8}{5}g$
$2m_1$	$3m_2$	$\frac{1}{3}r$	$\frac{(2)(3)(Gm_1m_2)}{(\frac{1}{9})r^2} = 54F$	$\frac{3(Gm_2)}{(\frac{1}{9})r^2} = 27g$
$2m_1$	$3m_2$	$\frac{1}{4}r$	$\frac{(2)(3)(Gm_1m_2)}{(\frac{1}{16})r^2} = 96F$	$48g$

$$\frac{3(Gm_2)}{x^2r^2} = 48g$$

$$\frac{3}{x^2} = 48$$

$$x^2 = \frac{1}{16}$$

$$x = \frac{1}{4}$$