

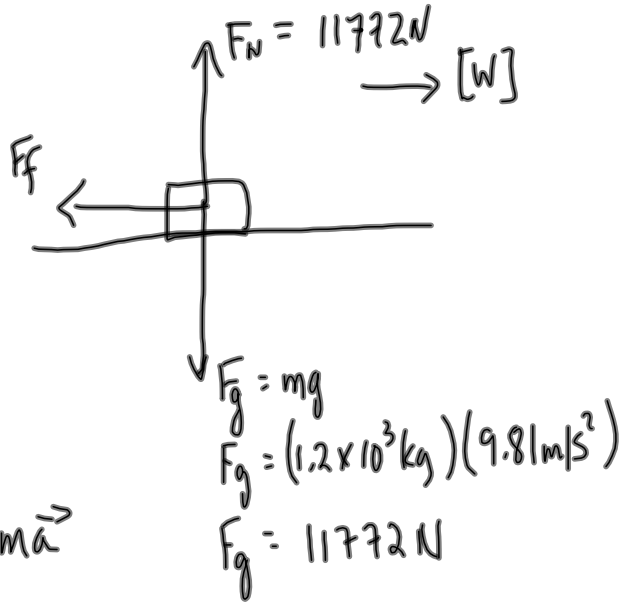
PP1168

b. $m = 1.2 \times 10^3 \text{ kg}$

$\vec{v}_1 = 45 \text{ km/h [W]} = 12.5 \frac{\text{m}}{\text{s}}$
 $\vec{v}_2 = 0$
 $\Delta d = 35 \text{ m}$

$\mu = ?$

$\vec{F}_{\text{net}} = m\vec{a}$



$-F_f = m\vec{a}$ ← we had acceleration

$v_2^2 = v_1^2 + 2a\Delta d$

$v_2^2 - v_1^2 = 2a\Delta d$

$a = \frac{v_2^2 - v_1^2}{2\Delta d}$

$a = \frac{0^2 - (12.5 \text{ m/s})^2}{2(35 \text{ m})}$

$a = -2.23 \text{ m/s}^2$

$-F_f = ma$

$-F_f = (1.2 \times 10^3 \text{ kg})(-2.23 \frac{\text{m}}{\text{s}^2})$

$F_f = 2678.57 \text{ N}$

$F_f = \mu F_N$

$\mu = \frac{F_f}{F_N}$

$\mu = \frac{2678.57 \text{ N}}{11772 \text{ N}}$

$\mu = 0.23$

$a \rightarrow F_{\text{net}} \rightarrow F_f \rightarrow \mu$

7.

$$m = 7.2 \times 10^{-25} \text{ kg}$$

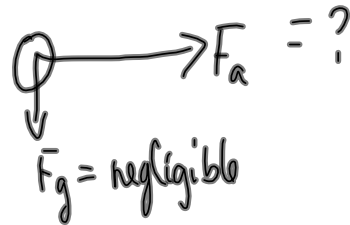
$$0 \rightarrow 7.3 \times 10^6 \text{ m/s [E]}$$

$$\vec{v}_1 = 0$$

$$\vec{v}_2 = 7.3 \times 10^6 \frac{\text{m}}{\text{s}} \text{ [E]}$$

$$\Delta t = 5.5 \times 10^{-6}$$

$\rightarrow a$



$$a = \frac{\Delta v}{\Delta t}$$

$$\vec{F}_{\text{net}} = m\vec{a}$$

$$F_a = ma$$

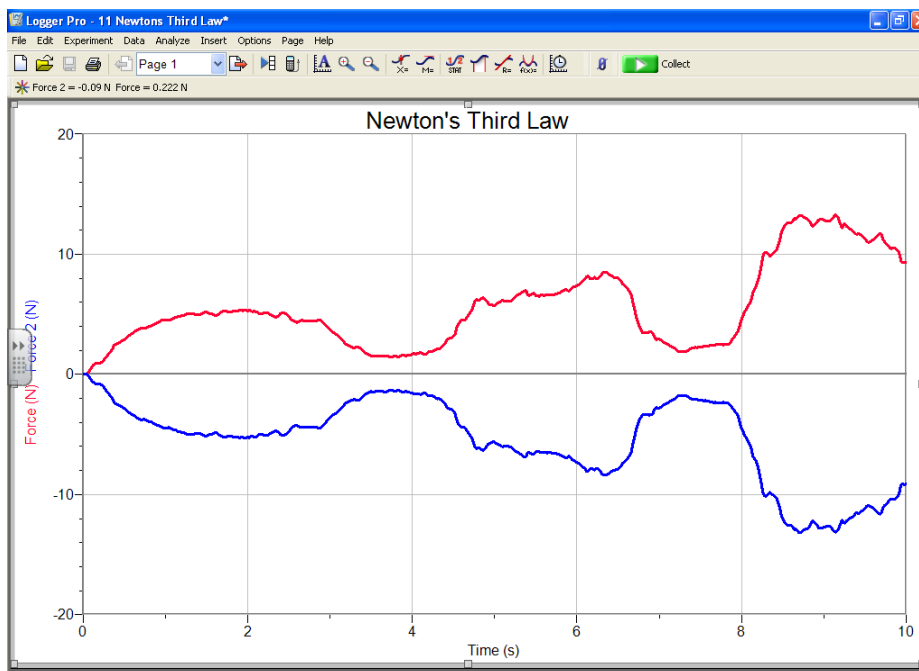
\leftarrow need acceleration

$$F_a = ?$$

kinematics $\rightarrow a \rightarrow$ force
 info \leftarrow \leftarrow

Newton's Third Law

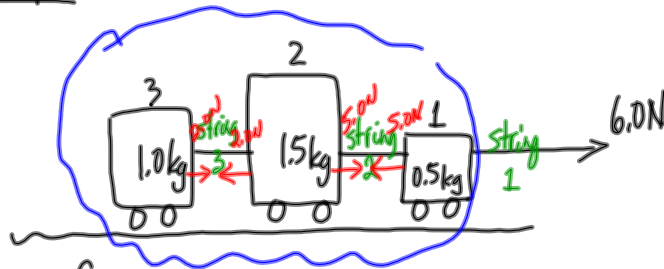
	A	B	C	D
1	0	6	12	7
2	1	1	6	17
3	5	7	4	9



For every action force on object B due to object A, there is a reaction force, equal in magnitude but opposite in direction due to object B acting back on object A

$$\vec{F}_{A \text{ on } B} = - \vec{F}_{B \text{ on } A}$$

Example

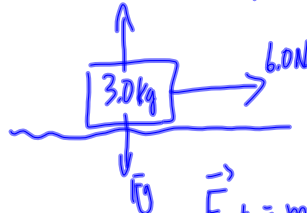


• neglect friction
 What is the tension in each string?

Find the acceleration of the "system" (i.e. all 3 cars)



compression

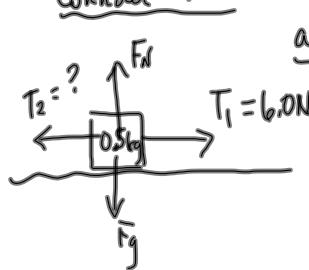


$$\vec{F}_{net} = m\vec{a}$$

$$6.0N = (3.0kg)a$$

$$a = 2.0m/s^2$$

Consider Cart 1



$$a = 2.0m/s^2$$

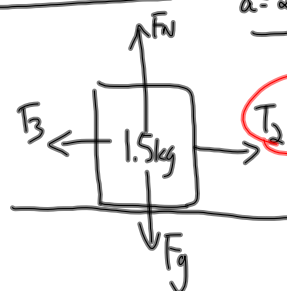
$$\vec{F}_{net} = m\vec{a}$$

$$T_1 - T_2 = m_1 a$$

$$6.0N - T_2 = (0.5kg)(2.0m/s^2)$$

$$6.0N - T_2 = 1.0N$$

Consider cart 2:



$$a = 2.0m/s^2$$

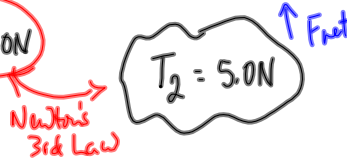
$$\vec{F}_{net} = m\vec{a}$$

$$T_2 - T_3 = m_2 a$$

$$5.0N - T_3 = (1.5kg)(2.0m/s^2)$$

$$5.0N - T_3 = 3.0N$$

$$T_3 = 2.0N$$



Newton's 3rd Law