- Calculer l'intensité des forces de gravitation dans les cas suivants :

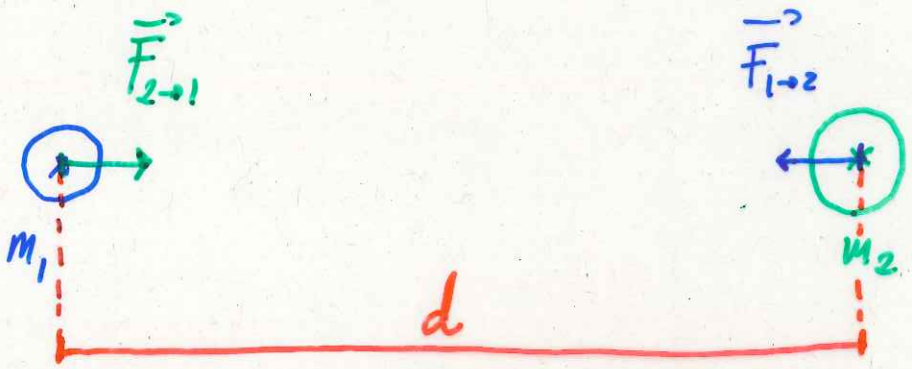
a) $m_1 = 1\,Kg$; $m_2 = 1\,Kg$; $d = 1\,m$

b) $m_1 = 2\,Kg$; $m_2 = 1\,Kg$; $d = 1\,m$

c) $m_1 = 1\,Kg$; $m_2 = 1\,Kg$; $d = 2\,m$

- Représenter les forces de gravitation calculées en ⓐ, ⓑ et ⓒ avec un échelle $4\,cm : 6,67 \cdot 10^{-11}\,N$

F ?



$$F = G \cdot \frac{m_1 \cdot m_2}{d^2}$$

m_1 : La masse de l'objet ①

m_2 : La masse de l'objet ②

d : La distance entre le centre de l'objet ① et le centre de l'objet ②

$G = 6{,}67 \cdot 10^{-11} \left[\frac{N \cdot m^2}{Kg^2}\right]$ La constante de gravitation universelle

a) F_a ? $m_1 = 1Kg$ $m_2 = 1Kg$ $d = 1m$

$$F = G \cdot \frac{m_1 \cdot m_2}{d^2} = 6{,}67 \cdot 10^{-11} \left[\frac{N \cdot m^2}{Kg^2}\right] \frac{1[Kg] \cdot 1[Kg]}{(1[m])^2} = 6{,}67 \cdot 10^{-11} N = F_a$$

b) F_b ? $m_1 = 2Kg$ $m_2 = 1Kg$ $d = 1m$

$$F_b = G \cdot \frac{m_1 \cdot m_2}{d^2} = 6{,}67 \cdot 10^{-11} \left[\frac{N \cdot m^2}{Kg^2}\right] \frac{2[Kg] \cdot 1[Kg]}{(1[m])^2} = 2 \cdot 6{,}67 \cdot 10^{-11} N = 1{,}33 \cdot 10^{-10} N$$

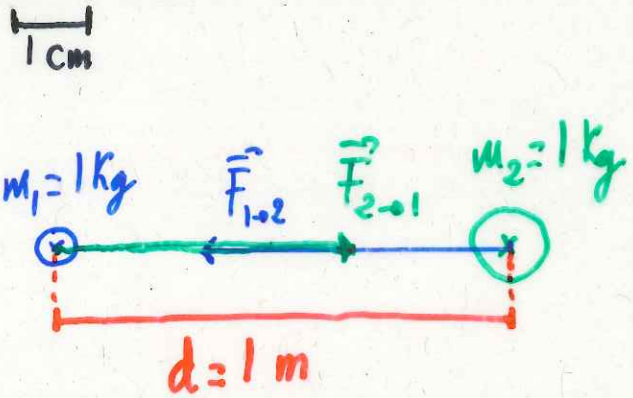
$$F_b = 2 \cdot F_a$$

c) F_c ? $m_1 = 1[Kg]$ $m_2 = 1kg$ $d = 2m$

$$F_c = G \cdot \frac{m_1 \cdot m_2}{d^2} = 6{,}67 \cdot 10^{-11} \left[\frac{N \cdot m^2}{Kg^2}\right] \frac{1[Kg] \cdot 1[Kg]}{(2[m])^2} = \frac{6{,}67 \cdot 10^{-11} N}{4} = 1{,}67 \cdot 10^{-11} N$$

$$F_c = \frac{1}{4} F_a$$

(a)



$$F = G \cdot \frac{m_1 \cdot m_2}{d^2}$$

Échelle : $4\,cm : 6{,}67 \cdot 10^{-11}\,N$

$\vec{F}_{2\to1}$: La force que fait (2) sur (1)

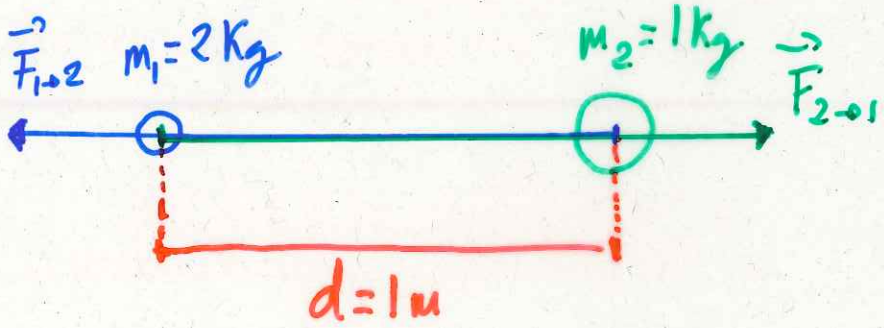
$\vec{F}_{1\to2}$: " " " " (1) sur (2)

$F_a = 6{,}67 \cdot 10^{-11}\,N$

$\vec{F}_{1\to2} = -\vec{F}_{2\to1}$

$F_{1\to2} = F_{2\to1} = F_a$

(b)

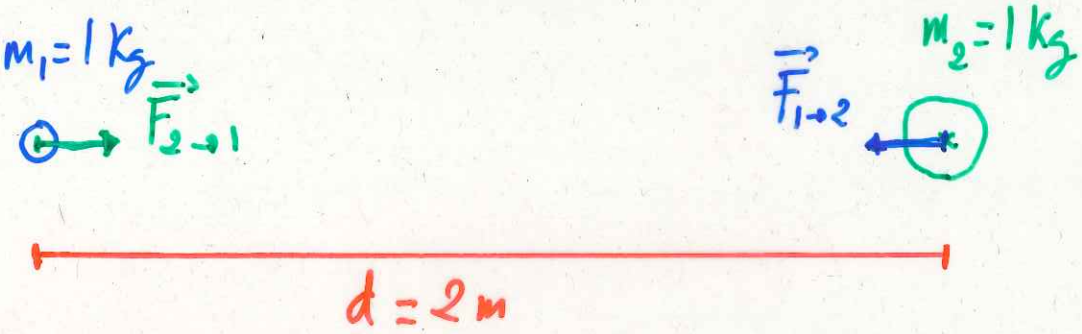


$F_b = 2 \cdot F_a = 1{,}33 \cdot 10^{-10}\,N$

$F_{1\to2} = F_{2\to1} = F_b$

$\vec{F}_{1\to2} = -\vec{F}_{2\to1}$

(c)



$F_c = \frac{1}{4} F_a = 1{,}67 \cdot 10^{-11}\,N$

$F_{1\to2} = F_{2\to1} = F_c$

$\vec{F}_{1\to2} = -\vec{F}_{2\to1}$