

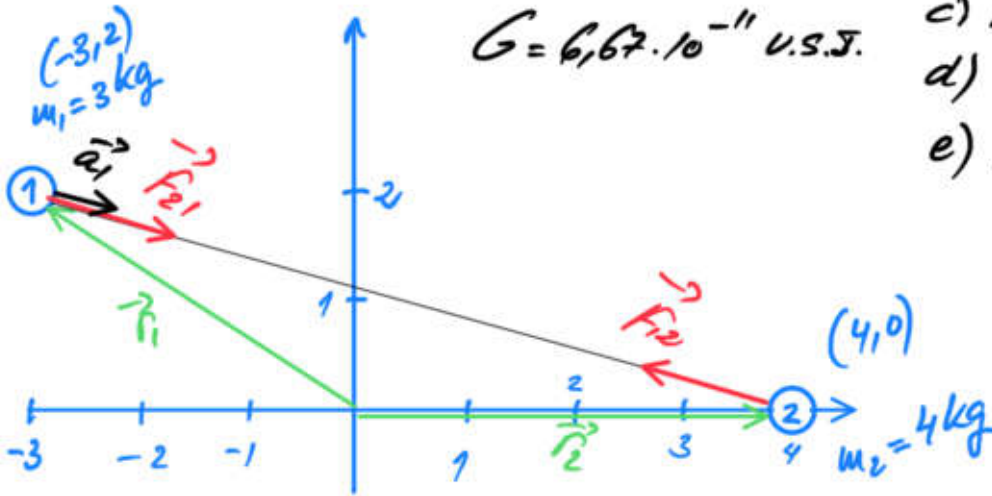
### EJERCICIO FQMBE2674:

$$m_1 = 3 \text{ kg en } (-3, 2)$$

$$m_2 = 4 \text{ kg en } (4, 0)$$

$$G = 6,67 \cdot 10^{-11} \text{ u.s.f.}$$

- a)  $\vec{r}_1$
- b)  $\vec{r}_2$
- c)  $\vec{F}_{21}$
- d)  $\vec{a}_1$
- e)  $\vec{F}_{12}$



$$a) \vec{r}_1 = (-3, 2) = -3\vec{i} + 2\vec{j} \text{ (m)}$$

$$b) \vec{r}_2 = (4, 0) = 4\vec{i} + 0\vec{j} \text{ (m)}$$

$$c) \vec{F}_{21} = ?$$

$$\vec{F}_{21} = -G \frac{m_2 m_1}{r_{21}^2} \frac{\vec{r}_{21}}{r_{21}}$$

$$\vec{r}_{21} = -7\vec{i} + 2\vec{j}$$

$$r_{21} = (-3, 2) - (4, 0) = (-7, 2)$$

$$|\vec{r}_{21}| = \sqrt{(-7)^2 + (2)^2} = \sqrt{53} \text{ m}$$

$$\vec{F}_{21} = -6,67 \cdot 10^{-11} \frac{4 \cdot 3}{(\sqrt{53})^2} \frac{-7\vec{i} + 2\vec{j}}{\sqrt{53}}$$

$$\vec{F}_{21} = +1,45 \cdot 10^{-11} \vec{i} - 4,15 \cdot 10^{-12} \vec{j} \text{ (N)}$$

$$|\vec{F}_{21}| = \sqrt{(1,45 \cdot 10^{-11})^2 + (-4,15 \cdot 10^{-12})^2} =$$

$$F_{21} = 1,51 \cdot 10^{-11} \text{ N}$$

d) aceleración sobre  $m_1$ ?

$$\vec{F} = m \cdot \vec{a} \Rightarrow \vec{a}_1 = \frac{\vec{F}_{21}}{m_1} \checkmark 3 \text{ kg}$$

$$\vec{a}_1 = \frac{+1,45 \cdot 10^{-11} \vec{i} - 4,15 \cdot 10^{-12} \vec{j}}{3}$$

$$\vec{a}_1 = +4,83 \cdot 10^{-12} \vec{i} - 1,38 \cdot 10^{-12} \vec{j} \text{ (m/s}^2\text{)}$$

$$|\vec{a}_1| = \frac{|\vec{F}_{21}|}{m_1} = 5,03 \cdot 10^{-12} \text{ m/s}^2$$

e)  $\vec{F}_{12} = ?$

$$\vec{F}_{12} = -1,45 \cdot 10^{-11} \vec{i} + 4,15 \cdot 10^{-12} \vec{j} \text{ (N)}$$

$$|\vec{F}_{12}| = 1,51 \cdot 10^{-11} \text{ N}$$

- mismo módulo y dirección que  $\vec{F}_{21}$   
- sentido contrario!