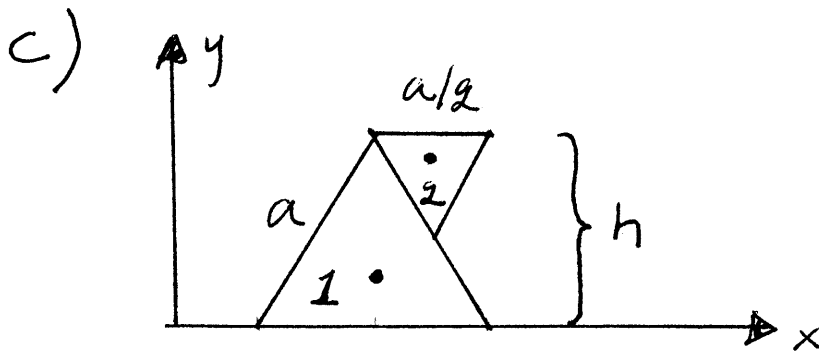


# Lösningar KSI, 13/2 2013

1 a) Se exempel 1.2 i boken.

$$b) \bar{r}_G = \frac{m_1 \bar{r}_{G1} + m_2 \bar{r}_{G2} + m_3 \bar{r}_{G3}}{m_1 + m_2 + m_3}$$



$$h = a \cos(30^\circ) = \frac{\sqrt{3}}{2} a$$

$$y_{G1} = \frac{1}{3} h = \frac{1}{2\sqrt{3}} a$$

$$y_{G2} = h - \frac{1}{6} h = \frac{5\sqrt{3}}{12} = \frac{5}{4\sqrt{3}}$$

$$y_G = \frac{m_1}{m_1 + m_2} y_{G1} + \frac{m_2}{m_1 + m_2} y_{G2} =$$

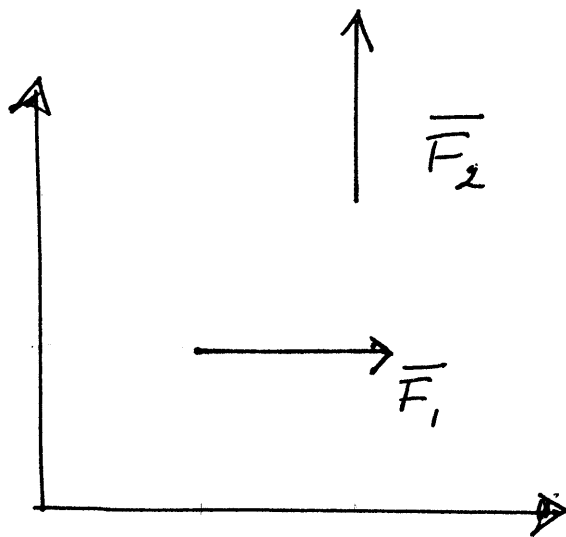
$$= \frac{4}{5} \frac{1}{2\sqrt{3}} a + \frac{1}{5} \frac{5}{4\sqrt{3}} a =$$

$$= \left( \frac{2}{5\sqrt{3}} + \frac{1}{4\sqrt{3}} \right) a = \frac{13}{20\sqrt{3}} a$$

2 a) Se sidorna 43-44 i boken

b) Se sidan 46 i boken

c)



$$\vec{F} = \vec{F}_1 + \vec{F}_2 = F(\vec{e}_x + \vec{e}_y)$$

$$\vec{M}_0 = \vec{r}_1 \times \vec{F}_1 + \vec{r}_2 \times \vec{F}_2 = a(\vec{e}_x + \vec{e}_y) \times F\vec{e}_x$$

$$+ 2a(\vec{e}_x + \vec{e}_y) \times F\vec{e}_y = aF\vec{e}_z$$

Sök en punkt B för vilken  $\vec{M}_B = \vec{0}$ .

Låt koordinaterna för B vara  $(x, y)$ :

$$\vec{M}_B = \vec{M}_0 + \vec{r}_{B0} \times \vec{F} = \vec{0} \Rightarrow$$

$$\vec{r}_{B0} \times \vec{F} = -\vec{M}_0 \Rightarrow$$

$$(x\vec{e}_x + y\vec{e}_y) \times F(\vec{e}_x + \vec{e}_y) = -aF\vec{e}_z \Rightarrow$$

$$(xF - yF)\vec{e}_z = -aF\vec{e}_z \Rightarrow$$

$$x - y = a \Rightarrow y = x - a$$