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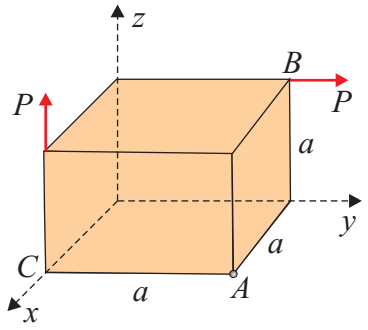
SG1130-2016-02-26

Svar till KS1 2016-02-26

1. a. Se boken, sid. 34

b. Se boken, sid. 47

c.



1) Bestäm kraftsumman $\mathbf{F}$

$$\mathbf{F} = \mathbf{F}_1 + \mathbf{F}_2 = \underline{\underline{P\mathbf{e}_y + P\mathbf{e}_z}}$$

2) Bestäm kraftmomentet $\mathbf{M}_A$

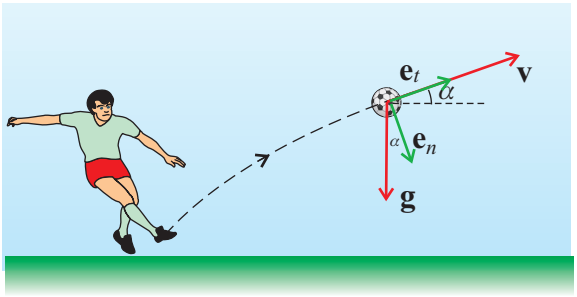
$$\mathbf{M}_A = \mathbf{r}_{AB} \times \mathbf{F}_1 + \mathbf{r}_{AC} \times \mathbf{F}_2 = a\left(-\mathbf{e}_x + \mathbf{e}_z\right) \times P\mathbf{e}_y +$$

$$+\left(-a\mathbf{e}_y\right) \times P\mathbf{e}_z = \underline{\underline{-aP\left(2\mathbf{e}_x + \mathbf{e}_z\right)}}$$

3) Undersök skalärprodukten $\mathbf{F} \cdot \mathbf{M}_A = -aP^2 \neq 0 \;\Rightarrow$ Kraftsystemet kan inte reduceras till endast en kraft.

2.a. Se boken, sid. 61-62

b.



Betrakta bollens acceleration i naturliga komponenter

$$\mathbf{a} = \dot{v}\mathbf{e}_t + \frac{v^2}{\rho}\mathbf{e}_n \quad \Rightarrow \mathbf{a} \cdot \mathbf{e}_t = \dot{v}\text{, men } \mathbf{a} = \mathbf{g}$$

Betrakta skalärprodukten

$$\mathbf{g} \cdot \mathbf{e}_t = g\cos(\pi/2 + \alpha) = -g\sin\alpha = -\frac{g}{2} = -5 \text{ m/s}^2$$

$$\Rightarrow \quad \underline{\underline{\dot{v} = -\frac{g}{2} = -5 \text{ m/s}^2}}$$

c. Betrakta normalkomponenten av accelerationen

$$a_n = \frac{v^2}{\rho} = g\cos\alpha = g\frac{\sqrt{3}}{2} \quad \Rightarrow \quad \underline{\underline{\rho = \frac{2v^2}{\sqrt{3}\,g} = \frac{20}{\sqrt{3}}m}}$$

Alternativt betrakta totala accelerationen. Vi har $a^2 = a_t^2 + a_n^2 \quad \Rightarrow \quad a_n = \sqrt{a^2 - a_t^2} \quad \Rightarrow$

$$\frac{v^2}{\rho} = \sqrt{g^2 - \dot{v}^2} \quad \Rightarrow \quad \rho = \frac{v^2}{\sqrt{g^2 - \dot{v}^2}} = \frac{100}{\sqrt{100 - 25}}\text{m} = \underline{\underline{\frac{20}{\sqrt{3}}\text{m}}}$$