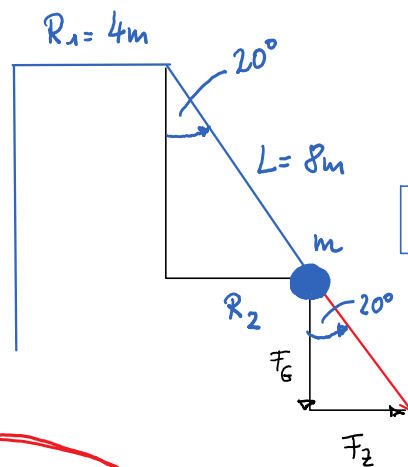


Musterlösung AB6 vom 24.05. mit Tipps vom 27.05. :

3)



$$R_2 = L \cdot \sin \alpha$$

$$= 8m \cdot \sin 20^\circ$$

$$= 2,74m$$

$$r = R_1 + R_2 = 6,74m$$

$$F_G = m \cdot g$$

$$F_Z = m \omega^2 \cdot r$$

$$\frac{F_Z}{F_G} = \tan \alpha = \frac{m \omega^2 r}{m g}$$

$$\Leftrightarrow \sqrt{\frac{g \cdot \tan \alpha}{r}} = \omega$$

$$\Leftrightarrow \omega = 0,728 \frac{1}{s}$$

a)

$$f = \frac{\omega}{2\pi} = 0,116 \text{ Hz}$$

$$T = \frac{1}{f} = 8,631 \text{ s}$$

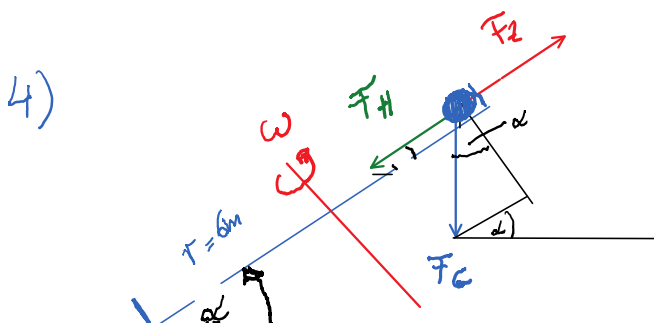
$$v = \omega \cdot r = 4,91 \frac{m}{s}$$

$$b) F_{Ges} = \sqrt{F_G^2 + F_Z^2} = \sqrt{(m \cdot g)^2 + (m \omega^2 r)^2} = m \cdot \sqrt{g^2 + \omega^4 r^2}$$

$$= 200 \text{ kg} \cdot \sqrt{\left(9,81 \frac{m}{s^2}\right)^2 + 0,728^4 \cdot 6,74^2 \frac{m^2}{s^4}}$$

$$= 200 \text{ kg} \cdot 10,44 \frac{m}{s^2} \approx \underline{\underline{2087,3 \text{ N}}}$$

4)



$$F_Z = m \omega^2 r$$

$$F_H = F_G \cdot \sin \alpha = m \cdot g \cdot \sin \alpha$$

"Gleichgewicht": $F_H \stackrel{!}{=} F_Z$

$$\Leftrightarrow m \omega^2 r = m g \sin \alpha$$

$$\Leftrightarrow \omega = \sqrt{\frac{g \cdot \sin \alpha}{r}}$$

✓ 1

✓

$$\Leftrightarrow m \omega r = m g \sin \alpha$$

$$\Leftrightarrow \omega = \sqrt{\frac{g \cdot \sin \alpha}{r}}$$

$$\Leftrightarrow f_{\min} = \frac{1}{2\pi} \sqrt{\frac{9,81 \frac{\text{m}}{\text{s}^2} \cdot \sin 50^\circ}{6 \text{ m}}}$$

$$= \underline{\underline{1,12 \text{ Hz}}}$$