Aufgabe 2

Lars
David
Johns

(i) $m_1 a_1 = S_1 - M_1 g$
(ii) $m_2 a_2 = S_2 - m_2 g$
(iii) $m_3 a_3 = m_3 g - S_2$

} Woher?

(IV) $S_1 = 2 S_2$
(V) $2 a_1 = a_3 - a_2$

} Woher?

1	2	3	4
3	4	3,5	2

$\sum 12{,}5$

Forme (ii) & (iii) um:

$$a_2 = \frac{S_2}{m_2} - g \qquad (VI)$$

$$a_3 = g - \frac{S_2}{m_3} \qquad (VII)$$

(VII) − (VI):

$$a_3 - a_2 = 2g - S_2 \left(\frac{1}{m_3} + \frac{1}{m_2}\right) = 2a_1$$

$$\Leftrightarrow S_2 = 2(g - a_1) \frac{m_2 m_3}{m_1 + m_2} \qquad (VIII)$$

(IV) in (i):

$$m_1 a_1 = 2 S_2 - M_1 g \qquad (IX)$$

(VIII) in (IX):

$$m_1 a_1 = 4(g - a_1) \frac{m_3 m_2}{m_3 + m_2} - m_1 g$$

$$\Leftrightarrow a_1 = -g \frac{m_1 (m_2 + m_3) - 4 m_2 m_3}{m_1 (m_2 + m_3) + 4 m_2 m_3}$$ ✓

(i) umformen:

$$S_1 = m_1 (a_1 + g)$$

mit a_1:

$$= g \frac{8 m_2 m_3 m_1}{m_1 (m_2 + m_3) + 4 m_2 m_3}$$ ✓

mit (IV):

$$S_2 = g \frac{4 m_1 m_2 m_3}{m_1 (m_2 + m_3) + 4 m_2 m_3}$$ ✓ (X)

mit (VI):

$$a_2 = g \cdot \frac{3 m_1 m_3 - m_1 m_2 - 4 m_2 m_3}{m_1 m_3 + m_1 m_2 + 4 m_2 m_3}$$ ✓

(X) in (VII):

$$a_1 = g \frac{m_1 m_3 - 3 m_1 m_2 + 4 m_2 m_3}{m_1 m_3 + m_1 m_2 + 4 m_2 m_3}$$ (✓)

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