

Answer on Question#36818 – Physics - Mechanics | Kinematics | Dynamics

A string tied on roof can bear maximum tension of 50 kg wt .the minimum acceleration that can be acquired by man of 98 kg to descend will be $g=9.8 \text{ m/s}^2$

Solution:

$m = 50 \text{ kg}$ – maximum tension weight of the string;

$M = 98 \text{ kg}$ – weight of the man;

$T_{max} = mg$ – maximum tension force of the string;

Newton's second law for the string (along Y-axis):

$$y: Mg - T_{max} = Ma_{min}$$
$$a_{min} = \frac{Mg - T_{max}}{M} = \frac{Mg - mg}{M} = \frac{g(M - m)}{M} = \frac{9.8 \frac{\text{m}}{\text{s}^2} (98 \text{ kg} - 50 \text{ kg})}{98 \text{ kg}} = 4.8 \frac{\text{m}}{\text{s}^2}$$

Answer: minimum acceleration is equal to $4.8 \frac{\text{m}}{\text{s}^2}$.