Answer on Question #45280, Physics, Other

A monkey of mass 20 kg is holding a vertical rope. The rope will not break when a mass of 25 kg is suspended from it but will break if the mass exceeds 25 kg. What is the maximum acceleration it which the monkey can climb the rope? (g=10 m/s^2).

Solution:

Given:

$$20\ \text{kg},$$
$$M \quad 25\ \text{kg},$$
$$g \quad 10\ \text{m/s}^2,$$
$$a \quad ?$$

Let the monkey climb up with acceleration a.

Then tension caused in the rope will be

$$T \qquad (g + a)$$

where *m* is the mass of the monkey.

Maximum value of T is

$$T_{max} \quad Mg$$

From given

$$Mg \qquad (g + a)$$

Thus,

$$a \quad \frac{M -}{} g \quad \frac{25 - 20}{20} \cdot 10 \quad 2.5\ \text{m/s}^2$$

Answer: $a \quad 2.5\ \text{m/s}^2.$