

1.8.2021

Home Assignment

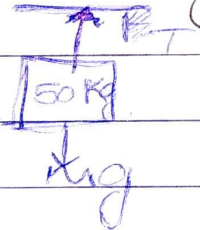
Numericals

Q1. A 5kg body collides with a 20kg body and exerts 20N force on it. So force exerted by 20kg body on 5kg body is

sol:- (c) 20N

Q2. A man of mass 50kg is pulling (being suspended from it) a light rope suspended from a roof. By what force the rope is pulling the roof?

sol:-



$$T = mg$$

$$mg = 50 \times 10$$

$$= 500N$$

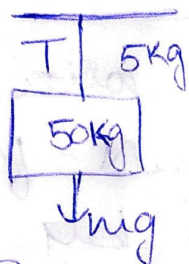
$$\Rightarrow T = 500N$$

\therefore The rope is pulling the roof with 500N force.

Q3. A man of mass 50kg is pulling (being suspended from it) a rope

of mass 5 kg suspended from a roof.
By what force the rope is pulling the roof?

Solⁿ-



$$T = mg$$

$$mg = 50 \times 10 = 500 \text{ N}$$

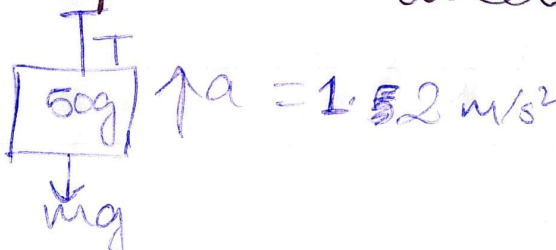
$$\therefore T = 500 \text{ N}$$

\therefore The rope is pulling the roof with 500 N force.

8. A pendulum bob of mass 50g is suspended from the ceiling of an elevator. Find the tension in the string if the elevator.

(a) goes up with acceleration 1.2 m/s^2 .

Solⁿ-



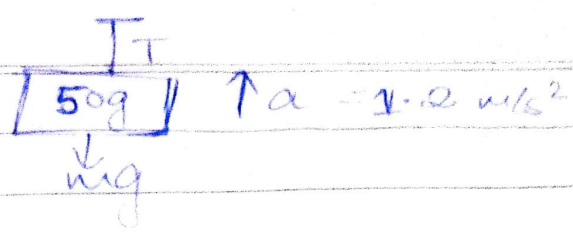
$$T - mg = a$$

$$\Rightarrow T - \frac{50}{1000} \times 10 = \frac{12}{10}$$

$$\Rightarrow T = \frac{12 + 5}{10}$$

of.

Ans:



$$T - mg = ma$$

$$\Rightarrow T = mg + ma$$

$$\Rightarrow T = m(g + a)$$

$$m = \frac{50}{1000} \text{ kg}$$

$$a = 1.2 \text{ m/s}^2$$

$$T = \frac{50}{1000} (9.8 + 1.2)$$

$$\Rightarrow T = \frac{50}{1000} \times 11 \Rightarrow T = \frac{55}{100}$$

$$\Rightarrow T = 0.55 \text{ N}$$

(b) goes up with deceleration 1.2 m/s^2

Ans:

$$T = m(g - a)$$

$$\Rightarrow T = \frac{50}{1000} (9.8 - 1.2)$$

$$\Rightarrow T = \frac{5}{100} \times 8.6 = \frac{43}{1000} = 0.043 \text{ N}$$

(c) goes up with uniform velocity.

Ans:

$$T - mg = 0 \quad [a = 0]$$

$$\Rightarrow T = mg$$

$$\Rightarrow T = \frac{50}{1000} \times \frac{98}{10} = \frac{490}{1000} = 0.49 \text{ N}$$

(d) goes down with acceleration 1.2 m/s^2

Ans:- $mg - T = ma$

$$\Rightarrow T = m(g - a)$$

$$\Rightarrow T = \frac{50}{1000} (9.8 - 1.2)$$

$$\Rightarrow T = \frac{5}{100} \times 8.6 = 0.43 \text{ N}$$

(e) goes down with deceleration 1.2 m/s^2

Ans:- $a = -a$

$$mg - T = -ma$$

$$\Rightarrow T = m [g - (-a)]$$

$$\Rightarrow T = m (g + a)$$

$$\Rightarrow T = \frac{5}{100} (9.8 + 1.2)$$

$$\Rightarrow T = \frac{5}{100} \times 11 = 0.55 \text{ N}$$

(f) goes down with uniform velocity

Ans:- $T = mg$ $[a = 0]$

$$\Rightarrow T = \frac{50}{1000} \times \frac{98}{10} = 0.49 \text{ N}$$

Ans³-

$$T_{\text{max}} = 600 \text{ N}$$

Mass of monkey = 40 kg

(a) $a = 6 \text{ m/s}^2$

$$T - mg = ma$$

$$\Rightarrow T = m(g + a)$$

$$\Rightarrow T = 40 \cancel{9.8} + (10 + 6)$$

$$\Rightarrow T = 640 \text{ N}$$

(b)

$$a = 4 \text{ m/s}^2$$

$$mg - T = ma$$

$$\Rightarrow T = m(g - a)$$

$$\Rightarrow T = 40 \times \cancel{10} - 6$$

$$= 240 \text{ N}$$

$$(c) a = 0$$

$$\Rightarrow T = mg = 400 \text{ N}$$

$$(d) T = 0 \text{ N}$$

In (a), $T > T_{\text{max}}$

\therefore The ~~the~~ rope will break in case (a).