10 August 2024 09:54 AM


(Stays constant)

$M_0$ (Initial mass of object)

→ 1000 Kg

------- = 12.5 Kg/s

⇒ Applying newton's IInd law

$$\vec{F} = \frac{d(mv)}{dt}$$

$$\vec{F} = v\left(\frac{dm}{dt}\right) + m\left(\frac{dv}{dt}\right)$$ {By product rule}

$$\vec{F} = v\left(\frac{dm}{dt}\right) + m(0)$$ {v = constant}

⇒ Now, we'll find acceleration on the system

We know, $F = ma$

$$a = \frac{F}{m}$$

* The mass after 5 s

$= M_0 - \Delta m\,(dt)$

$= 1000 - 12.5 \times 5$

$= 1000 - 62.5$

$M_t = 937.5$ Kg

Now, finding acceleration by $a = \frac{F}{m}$

$$a_t = \frac{v\,(dm/dt)}{937.5}$$

Solving this you get,

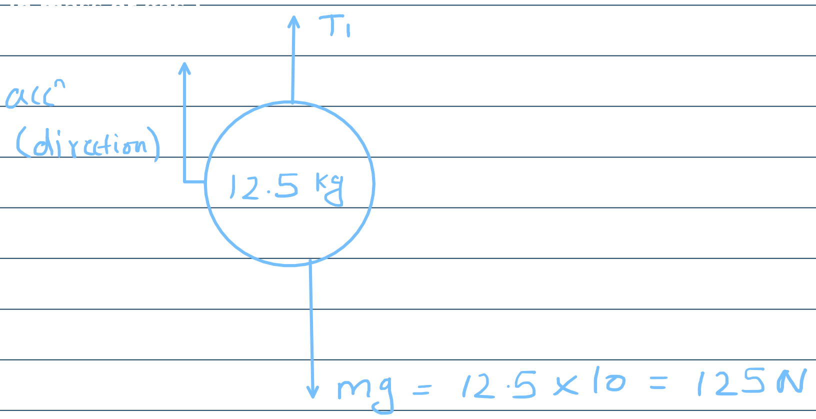
$a_f = 66.\overline{66}$

and the net acceleration will be

$a_f - g$

$66.\overline{66} - 10$

$a_{net} = 56.\overline{66}\ m/s^2$




Using F = ma we get,

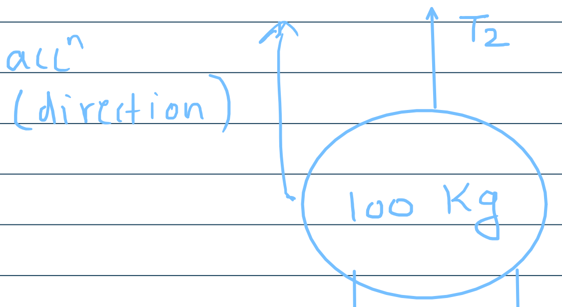
$T_1 - mg = ma$

$T_1 = ma + mg$

$T_1 = (12.5 \times 56.\overline{66}) + 125$

After Solving

$T_1 = 833.\overline{33}\ N$




$1000\,N = mg$ $\quad T_1 = 833.\overline{33}\ N$

again, we use $F = ma$

So,

$$T_2 - T_1 - mg = ma$$

$$T_2 = ma + mg + T_1$$

$$T_2 = (100 \times 56.\overline{66}) + (100 \times 10) + 833.\overline{3}$$

After Solving

$$T_2 = 7499.\overline{99}\ N$$