To calculate the mass of an object, you'll need to know either:

1. **Weight and Gravitational Acceleration**:
   If you know the weight of the object (the force due to gravity), you can calculate mass as:
   $ m = \frac{W}{g} $ where:

   - (m) is the mass,
   - (W) is the weight (in newtons),
   - (g) is the acceleration due to gravity, typically (9.8 , \text{m/s}^2) on Earth's surface.

   Example:
   If an object weighs $98N$ on Earth, then: $ m = \frac{98 , \text{N}}{9.8 , \text{m/s}^2} = 10 , \text{kg} $

2. **Density and Volume**:
   If you know the density $ \rho $ and volume $ V $ of the object, you can calculate its mass using:
   $ m = \rho \times V $ where:

   - $ \rho $ is the density (in $ \frac{kg}{m}^3 $),
   - $ V $ is the volume (in $\text{m}^3 $).

   Example:
   For an object with a density of $ 500 , \text{kg/m}^3 $ and a volume of $ 0.2 , \text{m}^3 $: To present the mass calculation in the format you specified:

$ m = 500 , \text{kg/m}^3 \times 0.2 , \text{m}^3 = 100 , \text{kg} $

3. calculate the weight of an object:

$ W = m \times g $

where:

- W is the weight (in newtons),
- m is the mass of the object (in kilograms),
- g is the acceleration due to gravity (on Earth, $ g \approx 9.8 , \text{m/s}^2 $).

Example Calculation

If an object has a mass of $ 10 , \text{kg} $, its weight on Earth would be:

$ W = 10 , \text{kg} \times 9.8 , \text{m/s}^2 = 98 , \text{N} $

So, the weight of a $10 , \text{kg}$ object on Earth is $98 , \text{N}$. Note that the weight changes if the object is on a planet with a different gravitational force.

4 To calculate the escape velocity ($ v_e $) of an object, we use the formula:

$ v_e = \sqrt{\frac{2GM}{R}} $

where:

- G is the gravitational constant ($ 6.674 \times 10^{-11} , \text{Nm}^2/\text{kg}^2 $),
- M is the mass of the object being escaped from (e.g., Earth),
- R is the radius of the object being escaped from.

For example, on Earth:

- $ M_{\text{Earth}} = 5.97 \times 10^{24} , \text{kg} $
- $ R_{\text{Earth}} = 6.371 \times 10^6 , \text{m} $

The escape velocity is calculated for the Earth, not directly based on the mass of the object (10 kg) that's escaping. Here's the calculation for Earth:

$ v_e = \sqrt{\frac{2 \times 6.674 \times 10^{-11} \times 5.97 \times 10^{24}}{6.371 \times 10^6}} $

Evaluating this gives an escape velocity for Earth of approximately:

$ v_e \approx 11,186 , \text{m/s} $

The object mass itself (10 kg) doesn't affect the escape velocity, as it depends on the properties of the larger mass (e.g., Earth) being escaped from.