

PROBLEM 1-15

Statement: Express a 18-blob mass in units of slugs, kilograms, and lbm. How much does this mass weigh?

Units: $\text{blob} := \frac{\text{lbf} \cdot \text{sec}^2}{\text{in}}$

Given: $M := 18 \cdot \text{blob}$

Assumptions: The mass is at sea-level and the gravitational acceleration is

$$g = 32.174 \cdot \frac{\text{ft}}{\text{sec}^2} \quad \text{or} \quad g = 386.089 \cdot \frac{\text{in}}{\text{sec}^2} \quad \text{or} \quad g = 9.807 \cdot \frac{\text{m}}{\text{sec}^2}$$

Solution: See Mathcad file P0115.

1. Convert mass units by assigning different units to the units place-holder when displaying the mass value.

The mass, in *slugs*, is $M = 216 \cdot \text{slug}$

The mass, in *kilograms*, is $M = 3152.3 \cdot \text{kg}$

The mass, in *lbm*, is $M = 6949.6 \cdot \text{lb}$

Note: Mathcad uses *lbf* for pound-force, and *lb* for pound-mass.

2. To determine the weight of the given mass, multiply the mass value by the acceleration due to gravity, *g*.

The weight, in *lbf*, is $W := M \cdot g \quad W = 6949.6 \cdot \text{lbf}$

The weight, in *kN*, is $W := M \cdot g \quad W = 30.91 \cdot \text{kN}$