

## Additional Practice

1. Complete the following table.

	Variable used	Units measure in	Unit symbol
Force	F	newtons	F
Mass	m	g or kg	M
Gravitational Field Strength	a or g	m/s <sup>2</sup>	a or g

2. What is the force of gravity on a 1050 kg cow?

$$F = ma \text{ or } F = mg$$

$$F = 1050 \text{ kg} \times 9.8 \text{ N/kg} = 10,290 \text{ N}$$

3. The gravitational field on the surface of Mars is 3.7 N/kg. What is the weight of a 12 kg chunk of ice on the Mars?

$$\begin{aligned} F &= mg \\ &= 12 \text{ kg} \times 3.7 \text{ N/kg} \\ &= 44.4 \text{ N} \end{aligned}$$

4. A 450 kg probe travels from the surface of the Earth to the surface of the Moon. What is the difference in the force of gravity on the probe between these two locations?

Earth

$$\begin{aligned} F &= mg \\ &= 450 \text{ kg} \times 9.8 \text{ N/kg} \\ &= 4410 \text{ N} \end{aligned}$$

Moon

$$\begin{aligned} F &= mg \\ &= 450 \text{ kg} \times 1.62 \text{ N/kg} \\ &= 729 \text{ N} \end{aligned}$$

difference is 3681 N

5. A 5.4 kg space probe is moved to different parts of the solar system.  
a) What is the force of gravity on the probe on the surface of the Earth?

$$F = mg = 5.4 \text{ kg} \times 9.8 \text{ N/kg} \\ = 52.92 \text{ N}$$

- b) What is the weight of the probe on the surface of the Moon?

$$F = mg \\ = 5.4 \text{ kg} \times 1.62 \text{ N/kg} \\ = 8.75 \text{ N}$$

- c) What is the mass of the probe on the surface of Mars?

$$F = mg = 5.4 \text{ kg} \times 3.7 \text{ N/kg} = 20 \text{ N}$$

6. A dog has a weight of 230 N. What is its weight?

Its weight, on earth, is 230 N.

Its mass ...  $F = mg \quad m = \frac{F}{g} = \frac{230 \text{ N}}{9.8 \text{ N/kg}} = 23.5 \text{ kg}$

7. A space probe lands on the surface of a small asteroid. The force of gravity pulling down on the probe is 150 N and its mass is 102 kg. What is the gravitational field strength on the surface of the asteroid?

$$F = mg \quad g = \frac{F}{m} = \frac{150 \text{ N}}{102 \text{ kg}} = 1.47 \text{ N/kg}$$