Solutions

Each answer shows the steps, then the **result**.

2.1

- $F_W = mg$

$$F_W = mg = (6.0\text{ kg})(10\text{ N/kg}) = \mathbf{60}\text{ N}$$

2.2

- weight in newtons (N); mass in kilograms (kg)

2.3

- the force of gravity on each kilogram of mass (the weight per unit mass), in N/kg

2.4

- known: $m = 70$ kg, $g = 3.7$ N/kg; weight is $F_W = mg$

$$F_W = mg = (70\text{ kg})(3.7\text{ N/kg}) = \mathbf{259}\text{ N}$$

3.1 B

- mass is unchanged; weight is less because the Moon's gravity is weaker

3.2

(a) $m = F_W/g$

$$m = \frac{F_W}{g} = \frac{48\text{ N}}{10\text{ N/kg}} = \mathbf{4.8}\text{ kg}$$

(b) $F_W = mg$

$$F_W = mg = (4.8\text{ kg})(1.6\text{ N/kg}) = \mathbf{7.7}\text{ N}$$

3.3

- mass is the amount of matter, which does not change with location
- weight is the force of gravity, which is smaller on the Moon because its gravitational field strength is weaker

3.4

(a)

- $F_W = mg$, so $m = \dfrac{F_W}{g} = \dfrac{15\text{ N}}{10\text{ N/kg}} = \mathbf{1.5}\text{ kg}$

(b)

- the mass is the same on planet X; rearrange $F_W = mg$ to $g = \dfrac{F_W}{m}$

$$g = \frac{F_W}{m} = \frac{6.0\text{ N}}{1.5\text{ kg}} = \mathbf{4.0}\text{ N/kg}$$

3.5

- gravity on the Moon is weaker, so the spring balance, which measures weight, reads less
- the beam balance compares masses: gravity is weaker on both sides equally, so it still balances and reads the same