Measuring Planck's Constant *Solutions*

1. The sample result of $h = 7.6 \times 10^{-34}$ J·s is 15% greater than the known value.
2. The frequency of green light is given by the following:

$$f = \frac{c}{\lambda}$$

$$= \frac{3.00 \times 10^{8} \ \frac{\text{m}}{\text{s}}}{530 \times 10^{-9} \ \text{m}}$$

$$f = 5.66 \times 10^{14} \ \text{Hz}$$

The energy of a green photon is given by the following:

$$E = hf$$

$$= (6.63 \times 10^{-34} \ \text{J·s}) \ (5.66 \times 10^{14} \ \text{Hz})$$

$$E = 3.75 \times 10^{-19} \ \text{J}$$

The number of photons emitted by the laser each second is as follows:

$$\frac{\text{Energy emitted each second}}{\text{Energy of a single photon}} = \frac{1.00 \times 10^{-3} \ \text{J}}{3.75 \times 10^{-19} \ \text{J}} = 2.66 \times 10^{15}$$

3. Ultraviolet light has a higher frequency than visible light, so using the formula $E = hf$, ultraviolet photons have more energy than photons of visible light. Thus, ultraviolet photons can cause more damage to the cells in our bodies when they impact on them.