11. (*a*) 286.6 mm $286.6\times10^{-3}\,\text{m}$ $\boxed{0.2866\ \text{m}}$

(*b*) $85\,\mu\text{V}$ $85\times10^{-6}\,\text{V}$ $\boxed{0.000\,085\ \text{V}}$

(*c*) 760 mg $760\times10^{-6}\,\text{kg}$ $\boxed{0.000\,76\ \text{kg}}$ (if last zero is not significant)

(*d*) 60.0 ps $60.0\times10^{-12}\,\text{s}$ $\boxed{0.000\,000\,000\,060\,0\ \text{s}}$

(*e*) 22.5 fm $22.5\times10^{-15}\,\text{m}$ $\boxed{0.000\,000\,000\,000\,022\,5\ \text{m}}$

(*f*) 2.50 gigavolts 2.5×10^{9} volts $\boxed{2,500,000,000\ \text{volts}}$

21. (*a*) Find the distance by multiplying the speed times the time.

$$1.00\ \text{ly} = \left(2.998\times10^{8}\ \text{m/s}\right)\left(3.156\times10^{7}\ \text{s}\right) = 9.462\times10^{15}\,\text{m} \approx \boxed{9.46\times10^{15}\,\text{m}}$$

(*b*) Do a unit conversion from ly to AU.

$$\left(1.00\ \text{ly}\right)\left(\frac{9.462\times10^{15}\,\text{m}}{1.00\ \text{ly}}\right)\left(\frac{1\ \text{AU}}{1.50\times10^{11}\,\text{m}}\right) = \boxed{6.31\times10^{4}\,\text{AU}}$$

(*c*) $$\left(2.998\times10^{8}\ \text{m/s}\right)\left(\frac{1\ \text{AU}}{1.50\times10^{11}\,\text{m}}\right)\left(\frac{3600\ \text{s}}{1\ \text{hr}}\right) = \boxed{7.20\,\text{AU/h}}$$

24. (*a*) $2800 = 2.8\times10^{3} \approx 1\times10^{3} = \boxed{10^{3}}$

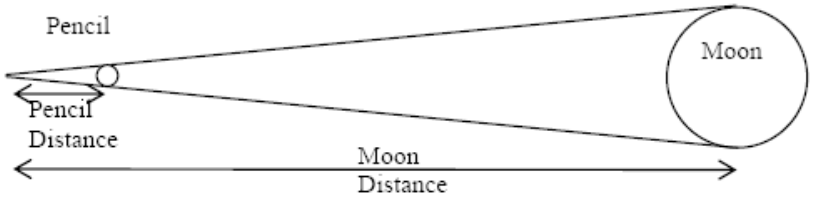
(*b*) $86.30\times10^{2} = 8.630\times10^{3} \approx 10\times10^{3} = \boxed{10^{4}}$

(*c*) $0.0076 = 7.6\times10^{-3} \approx 10\times10^{-3} = \boxed{10^{-2}}$

(*d*) $15.0\times10^{8} = 1.5\times10^{9} \approx 1\times10^{9} = \boxed{10^{9}}$

39. The percentage accuracy is $\dfrac{2\ \text{m}}{2\times10^{7}\,\text{m}}\times100\% = \boxed{1\times10^{-5}\%}$. The distance of 20,000,000 m needs to be distinguishable from 20,000,002 m, which means that $\boxed{8\ \text{significant figures}}$ are needed in the distance measurements.

52. A pencil has a diameter of about 0.7 cm. If held about 0.75 m from the eye, it can just block out the Moon. The ratio of pencil diameter to arm length is the same as the ratio of Moon diameter to Moon distance. From the diagram, we have the following ratios.



$$\frac{\text{Pencil diameter}}{\text{Pencil distance}} = \frac{\text{Moon diameter}}{\text{Moon distance}} \rightarrow$$

$$\text{Moon diameter} = \frac{\text{Pencil diameter}}{\text{Pencil distance}}(\text{Moon distance}) = \frac{7\times10^{-3}\,\text{m}}{0.75\,\text{m}}\left(3.8\times10^{5}\,\text{km}\right) \approx \boxed{3500\ \text{km}}$$

The actual value is 3480 km.

65. The units for each term must be in liters, since the volume is in liters.

$$[\text{units of } 4.1][\text{m}] = [\text{L}] \rightarrow \boxed{[\text{units of } 4.1] = \frac{\text{L}}{\text{m}}}$$

$$[\text{units of } 0.018][\text{y}] = [\text{L}] \rightarrow \boxed{[\text{units of } 0.018] = \frac{\text{L}}{\text{y}}}$$

$$\boxed{[\text{units of } 2.69] = \text{L}}$$