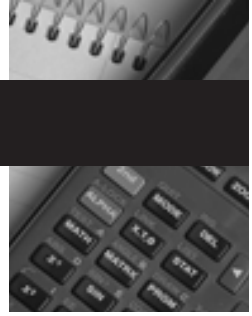

The Science of Physics

Additional Practice A

Givens *Solutions*

1. *distance* = 4.35 light years

$$distance = 4.35\ \text{light years} \times \frac{9.461 \times 10^{15}\ \text{m}}{1\ \text{light year}} = 4.12 \times 10^{16}\ \text{m}$$

a. $distance = 4.12 \times 10^{16}\ \text{m} \times \frac{1\ \text{Mm}}{10^{6}\ \text{m}} = \boxed{4.12 \times 10^{10}\ \text{Mm}}$

b. $distance = 4.12 \times 10^{16}\ \text{m} \times \frac{1\ \text{pm}}{10^{-12}\ \text{m}} = \boxed{4.12 \times 10^{28}\ \text{pm}}$

2. $energy = 1.2 \times 10^{44}\ \text{J}$

a. $energy = 1.2 \times 10^{44}\ \text{J} \times \frac{1\ \text{kJ}}{10^{3}\ \text{J}} = \boxed{1.2 \times 10^{41}\ \text{kJ}}$

b. $energy = 1.2 \times 10^{44}\ \text{J} \times \frac{1\ \text{nJ}}{10^{-9}\ \text{J}} = \boxed{1.2 \times 10^{53}\ \text{nJ}}$

3. $m = 1.0 \times 10^{-16}\ \text{g}$

a. $m = 1.0 \times 10^{-16}\ \text{g} \times \frac{1\ \text{Pg}}{10^{15}\ \text{g}} = \boxed{1.0 \times 10^{-31}\ \text{Pg}}$

b. $m = 1.0 \times 10^{-16}\ \text{g} \times \frac{1\ \text{fg}}{10^{-15}\ \text{g}} = \boxed{0.10\ \text{fg}}$

c. $m = 1.0 \times 10^{-16}\ \text{g} \times \frac{1\ \text{ag}}{10^{-18}\ \text{g}} = \boxed{1.0 \times 10^{2}\ \text{ag}}$

4. *distance* = 152 100 000 km

a. $distance = 152\,100\,000\ \text{km} \times \frac{1000\ \text{m}}{1\ \text{km}} \times \frac{1\ \text{ym}}{10^{-24}\ \text{m}} = \boxed{1.521 \times 10^{35}\ \text{ym}}$

b. $distance = 152\,100\,000\ \text{km} \times \frac{1000\ \text{m}}{1\ \text{km}} \times \frac{1\ \text{Ym}}{10^{24}\ \text{m}} = \boxed{1.521 \times 10^{-13}\ \text{Ym}}$

5. $energy = 2.1 \times 10^{15}\ \text{W} \cdot \text{h}$

a. $energy = 2.1 \times 10^{15}\ \text{W} \cdot \text{h} \times \frac{1\ \text{J/s}}{1\ \text{W}} \times \frac{3600\ \text{s}}{1\ \text{h}} = \boxed{7.6 \times 10^{18}\ \text{J}}$

b. $energy = 7.6 \times 10^{18}\ \text{J} \times \frac{1\ \text{GJ}}{10^{9}\ \text{J}} = \boxed{7.6 \times 10^{9}\ \text{GJ}}$

6. $m = 1.90 \times 10^{5}\ \text{kg}$

$$m = 1.90 \times 10^{5}\ \text{kg} \times \frac{1\ \text{eV}}{1.78 \times 10^{-36}\ \text{kg}} = 1.07 \times 10^{41}\ \text{eV}$$

a. $m = 1.07 \times 10^{41}\ \text{eV} \times \frac{1\ \text{MeV}}{10^{6}\ \text{eV}} = \boxed{1.07 \times 10^{35}\ \text{MeV}}$

b. $m = 1.07 \times 10^{41}\ \text{eV} \times \frac{1\ \text{TeV}}{10^{12}\ \text{eV}} = \boxed{1.07 \times 10^{29}\ \text{TeV}}$

Givens *Solutions*

7. $m = (200)(2 \times 10^{30}\ \text{kg}) = 4 \times 10^{32}\ \text{kg}$

a. $m = 4 \times 10^{32}\ \text{kg} \times \frac{10^3\ \text{g}}{1\ \text{kg}} \times \frac{10^3\ \text{mg}}{1\ \text{g}} = \boxed{4 \times 10^{38}\ \text{mg}}$

b. $m = 4 \times 10^{32}\ \text{kg} \times \frac{10^3\ \text{g}}{1\ \text{kg}} \times \frac{1\ \text{Eg}}{10^{18}\ \text{g}} = \boxed{4 \times 10^{17}\ \text{Eg}}$

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8. $\text{area} = 166\,241\,700\ \text{km}^2$

$\text{depth} = 3940\ \text{m}$

$V = \text{volume} = \text{area} \times \text{depth}$

$V = (166\,241\,700\ \text{km}^2)(3940\ \text{m}) \times \left(\frac{1000\ \text{m}}{1\ \text{km}}\right)^2$

$V = 6.55 \times 10^{17}\ \text{m}^3$

a. $V = 6.55 \times 10^{17}\ \text{m}^3 \times \frac{10^6\ \text{cm}^3}{1\ \text{m}^3} = \boxed{6.55 \times 10^{23}\ \text{cm}^3}$

b. $V = 6.55 \times 10^{17}\ \text{m}^3 \times \frac{10^9\ \text{mm}^3}{1\ \text{m}^3} = \boxed{6.55 \times 10^{26}\ \text{mm}^3}$

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