

### Practice Problem Answers

1. The half-life of beryllium gas is approximately 5 days. What fraction would remain after 3 weeks?

3 weeks = 21 days

0	1
5	$\frac{1}{2}$
10	$\frac{1}{4}$
15	$\frac{1}{8}$
20	$\frac{1}{16}$

$\approx 1/16$  remains

2. A home uses fifty 60 watt bulbs for 6 hours a day. About how many kilowatt-hours are consumed in one year by using the light bulbs?

2.

$$50 \text{ bulbs} \times \frac{60 \text{ watts}}{\text{bulb}} \times \frac{1 \text{ kw}}{1000 \text{ w}} \times \frac{6 \text{ hrs}}{\text{day}} \times \frac{365 \text{ days}}{\text{yr}} =$$

$\frac{60}{1000} = \frac{3}{100}$

$3 \times 6 = 18 \times 365$

$\frac{60}{1000} \times 50 = \frac{3000}{1000} = 3$

$\begin{array}{r} 54 \\ 365 \\ \times 18 \\ \hline 2920 \\ + 3650 \\ \hline 6570 \end{array}$

$6570 \frac{\text{kwh}}{\text{yr}}$

3. If the world has a reserve of 200 billion pounds of coal. How many years would it take to use all of our reserve if we use 75 million pounds per day?

$$200 \times 10^9 \text{ lbs} \times \frac{\text{day}}{75 \times 10^6 \text{ lbs}} \times \frac{1 \text{ yr}}{365 \text{ days}} =$$

$$\frac{200 \times 10^9}{75 \times 10^6} = \frac{2.6 \times 10^3 \text{ days}}{1} \times \frac{1 \text{ yr}}{365} = \approx \boxed{71 \text{ yrs}}$$

$$\begin{array}{r} 2 \overline{) 200.0} \\ \underline{-150} \\ 500 \\ \underline{-450} \\ 50 \end{array}$$

$$\frac{2.6 \times 10^3}{365} = \frac{26,000}{365}$$

$$\begin{array}{r} 71 \\ 365 \overline{) 26000} \\ \underline{-2555} \\ 450 \\ \underline{-365} \\ 85 \end{array}$$

$$\begin{array}{r} 4^3 \\ 365 \\ \times 7 \\ \hline 2555 \end{array}$$

4. In 1990 we used 65 million pounds per day and in 1999 we used 72 million pounds per day? What is the percent increase?

$$\frac{72 \times 10^6 - 65 \times 10^6}{72 \times 10^6} = \frac{72 - 65}{72} \times 100$$

$$\frac{72}{72} \Rightarrow \frac{7}{72}$$

$$\frac{7}{72} \Rightarrow 0.09$$

$$0.09 \times 100 = \boxed{9\%}$$

$$\begin{array}{r} 0.09 \\ 72 \overline{) 700} \\ \underline{-648} \\ 52 \end{array}$$

$$\begin{array}{r} 72 \\ \times 9 \\ \hline 648 \end{array}$$

5. Bromine has a half-life of 65 million years. It is determined to be safe when it has decayed to 0.10% of its original amount. When will it be safe?

The image shows a handwritten calculation on a piece of paper. The main equation is  $\frac{65 \times 10^6 \text{ yrs}}{0.10} = \frac{65 \times 10^6}{10 \times 10^{-2}} = \boxed{6.5 \times 10^8 \text{ yrs}}$ . Below this, there are two smaller calculations:  $10 \overline{) 65}$  and  $\frac{10^4}{10^{-2}} = 10^{4+2}$ .

6. If the net primary productivity of a particular forest is 13,000 kcal/m<sup>2</sup> and the respiration of the trees in that forest is 10,000 kcal/m<sup>2</sup>, what is the gross primary productivity?

The image shows a handwritten calculation on a piece of paper. The first line is the formula  $GPP = NPP + \text{respiration}$ . The second line is  $GPP = 13,000 + 10,000$ . The third line is the final result  $= 23,000 \text{ kcal/m}^2$ .