Various Problems for Chapter 7

7.1: 63. A meteor crater in Arizona is 4,150 ft across.
(a) The distance across the crater is is what part of a mile, to the nearest tenth?
4,150 ft $\cdot \frac{1mile}{5{,}280ft} = \frac{4{,}150 \cdot 1mile}{5{,}280} = \frac{4{,}150}{5{,}280} \cdot 1\ mile = .7859\ miles \approx .8\ miles.$

(b) The crater is nearly circular. In a circle, the distance around the outside edge is about 3.14 times the distance across the circle. How far is it to walk around the edge of the crater, as measured in feet?
Draw a picture, and draw a line showing the distance across the circle, which is 4,150ft. The distance to walk around the edge will be 3.14 times that, so it is $3.14 \cdot 4,150ft = 13,031ft$ (to the nearest foot).

(c) How far is it to walk around the edge of the crater in miles, to the nearest tenth?
13,031$\cdot \frac{1mile}{5{,}280ft} = \frac{13{,}031 \cdot 1\ mile}{5{,}280} = \frac{13{,}031}{5{,}280} \cdot 1\ mile \approx 2.5\ miles.$

7.1: 65. On one side of the crater there are a few small juniper trees. The trees are 700 years old but only 18 to 30 inches tall because of the strong winds and lack of rain.
(a) How tall are the trees in feet?
18in $\cdot \frac{1ft}{12in} = \frac{18}{12}ft = 1.5ft$ 30in $\cdot \frac{1ft}{12in} = \frac{30}{12}ft = 2.5ft$
Thus, the trees are $1\frac{1}{2}$ to $2\frac{1}{2}$ft tall.

(b) How many months old are the trees?
700 years $\cdot \frac{12months}{1year} = 700 \cdot 12months = 8,400months$

(c) At this rate of growth, how long would it take a 30-inch tree to reach a height of three feet?
This rate of growth is 30 inches per 700 years. Thus, it is
$\frac{30inches}{700years} = \frac{.04285inches}{1year}$

To get from 30 inches to 3 feet is to go from 30 to 3*12=36 inches, so it is to grow 6 inches.
Thus, if X is the number of years beyond 700 needed: $\frac{.04285inches}{1year} Xyears = 6inches$, which means $X = \frac{6}{.04285} = 140years$, and it takes 700+140=840 years to grow 30 inches.

Another way to solve the problem is to keep the growth rate in its original 30 inches per 700 years form. Then
$\frac{30inches}{700years} Xyears = 6inches$,
so $X = 6 \cdot \frac{700}{30} = \frac{700}{5} = 140$ and the answer is 140 years.

Class problem 1. 1kg = 2.20lb. 300 grams is how many pounds?
First, convert 300g to .3kg by shifting the decimal point 3 places to the left.
$.3kg \cdot \frac{2.20lb}{1kg} = \frac{.3*2.20lb}{1} = .66lb$

Class problem 2. 1kg = 2.20lb. 50 grams is how many ounces?
$50g \cdot \frac{1kg}{1000g} = 0.05kg.$

$.05kg \frac{2.2kg}{1lb} = .11lb$

$.11lb \frac{16oz}{1lb} = 1.76oz$

Class problem 3. 1kg = 2.20lb. 4 pounds is how many kilograms?
First, set up the equation we used in problems 1 and 2: $Xkg \cdot \frac{2.20lb}{1kg} = 4lb.$
Second, solve it for X by dividing both sides by 2.20lb:
$\frac{Xkg}{1kg} \cdot \frac{2.20lb}{2.20lb} = \frac{4lb}{2.20lb}$
$X = \frac{4}{2.20} \approx 1.82$, so the answer is 1.82kg.