Applications with Logarithms!!

1. Amy bought a diamond ring for \$6000. If the value of the ring increases at a constant rate of 3.83% per year, how much will the ring be worth in 21 years?

$y = a(1+r)^x$

$y = 6000(1.0383)^{21}$

$y = \$13210.86$

2. It is known that 12% (rate) of a certain drug is removed from the body each hour. If 30 mg (a) is given at 9:00 am, at what time will exactly 10 mg (y) remain?

$y = (1-.12)$

$\frac{10}{30} = \frac{30(.88)^x}{30}$

$\frac{1}{3} = 0.88^x$

$\log_{.88} 1/3 = x$

$\frac{\log 1/3}{\log 0.88} = x$

8.594 hrs = x

1. exp equation
2. $b^x = \#$
3. in log form
4. change base

3. The population of a certain city was 600,000 in 1980. If the population grows at a constant rate of 2% a year, in what year will the population reach 1,000,000?

$1{,}000{,}000 = 600{,}000(1+.02)^x$ ← equation

$1.67 = 1.02^x$ ← divided by 600,000

$\log_{1.02} 1.67 = x$ ← put into log form

$\frac{\log 1.67}{\log 1.02} = x$ ← change of base, exact

$25.9 = x$ ← approx

$1980 + 25.9 = 2005.9$

$\boxed{2005}$