09-14

Note Title 9/14/2007

Ex Plutonium has half-life of 24,000 years.

With an initial sample of 10 kg, what is the rate of decay after 6000 yrs?

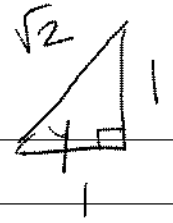
$$\text{rate of decay} = \frac{dM}{dt} = \frac{d}{dt}\left(10\left(\frac{1}{2}\right)^{t/24000}\right)\Big|_{t=6000}$$

$$= 10\left(\frac{1}{2}\right)^{t/24000} \ln\left(\frac{1}{2}\right)\frac{1}{24000}\Big|_{t=6000}$$

$$= -10\ln(2)\left(\frac{1}{2}\right)^{1/4}\cdot\frac{1}{24000} = -0.000243 \text{ kg/yr}$$

$$= -0.243 \text{ g/yr}$$

**Ex** $\sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$



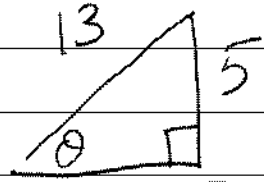

$y = \frac{\pi}{4}$

**Ex** $\sin^{-1}\left(\sin\frac{3\pi}{2}\right) = \cancel{\frac{3\pi}{2}}$ not in the range of $\sin^{-1}$

$\left(\sin^{-1}(\sin x) = x \text{ for all } x \text{ in domain } \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]\right)$

$\sin^{-1}(-1) = -\frac{\pi}{2}$

**Ex** $\cos\left(\sin^{-1}\frac{5}{13}\right)$ $\quad \theta = \sin^{-1}\left(\frac{5}{13}\right)$ $\quad \sin\theta = \frac{5}{13}$




$\sqrt{13^2 - 5^2} = 12$

$\cos\theta = \frac{12}{13}$