$A(t) = Ae^{kt}$, A = initial amount, k = is decay rate

$A(t_p) = \frac{A}{p}, \Rightarrow \frac{A}{p} = Ae^{kt_p} \Rightarrow \frac{1}{p} = e^{kt_p}$

$A(t_q) = \frac{A}{q}, \Rightarrow \frac{A}{q} = Ae^{kt_q} \Rightarrow \frac{1}{q} = e^{kt_q}$

$\frac{1}{p} = e^{kt_p} \Rightarrow \ln\frac{1}{p} = \ln(e^{kt_p}) \Rightarrow \ln 1 - \ln p = kt_p$

$\Rightarrow -\ln p = kt_p \Rightarrow \boxed{k = -\ln p / t_p}$

$\frac{1}{q} = e^{kt_q} \Rightarrow \ln\frac{1}{q} = \ln(e^{kt_q}) \Rightarrow -\ln q = kt_q$

$\Rightarrow \boxed{k = \frac{-\ln q}{t_q}}$

Therefore

$$\frac{t_p}{t_q} = \frac{\ln p}{\ln q}$$