$y = a\,4^{kt}$

$y = a(4^k)^t$

$a = 5$

$k = -\frac{1}{6}$

given

$y = 5(0.5)^{t/3}$

$y = 5(0.5^{1/3})^t$

$4^k = \left(2^{-1}\right)^{1/3}$

$4^k = 2^{-1/3}$

$2^{2k} = 2^{-\frac{1}{3}}$

then $2k = -\frac{1}{3}$

$k = -\frac{1}{6}$

C-14 dating.

we have 100g of C^{14} it has a half life of 5730 years.

write an equation with t in years.

$$f(t) = 100\left(\frac{1}{2}\right)^{\frac{t}{5730}}$$

rewrite the model for $\hat{t}$ in millenia.

$$f(\hat{t}) = 100\left(\frac{1}{2}\right)^{\frac{1000\hat{t}}{5730}} = 100\left(\frac{1}{2}\right)^{\frac{\hat{t}}{5.73}}.$$

$$= 100(0.886)^{\hat{t}}.$$

General form of exponentials

$$f(t) = ab^t$$

vs.

$$g(t) = mt + b$$

Defining characteristics: | constant slope lines

exponential: ratio between y-coordinates is constant.

$f(t) = 2^t$

t	$f(t)$
-1	$\frac{1}{2}$
0	1
1	2
2	4
3	8
4	16

common ratio is 2

$\left(\frac{8}{2}\right)^{\frac{1}{\Delta x}}$ $\left(\frac{16}{2}\right)^{\frac{1}{3}}$

$g(t) = 2t$

t	$g(t)$
-1	-2
0	0
1	2
2	4
3	6

$\Delta y = 2$

$m = 2 = \frac{\Delta y}{\Delta x}$

ex Say you have an exponential

containing the points (1, 81)

(5, 1)

find the base (common ratio)

$\Delta x = 4$

$\left(\frac{1}{81}\right)^{1/4} = \frac{1}{3}$

turtles are flourishing in the wetlands at $t=4$ years there 300 turtles

$t=7$ the population is 450 turtles.

First model as linear

2nd model as exponential

$y_2 - y_1 = m(x_2 - x_1)$

$150 = m\ 3$

$50 = m$

$P - 300 = 50(t-4)$

$P(t) = 50t + 100$

$b = \left(\frac{450}{300}\right)^{\frac{1}{3}} = \left(\frac{3}{2}\right)^{1/3}$

$P(t) = a\left(\frac{3}{2}\right)^{1/3 t}$

$P(t) = a\left(\frac{3}{2}\right)^{4/3}$

$300 = a\left(\frac{3}{2}\right)^{4/3}$

$\frac{300}{\left(\frac{3}{2}\right)^{4/3}} = a$

$174.71 \approx a$

$P(t) = 174.71\left(\frac{3}{2}\right)^{\frac{t}{3}}$