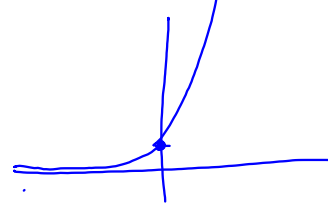


2.7 Doubling and Halving

$$y = a \cdot 2^x, y = a \cdot \left(\frac{1}{2}\right)^x$$

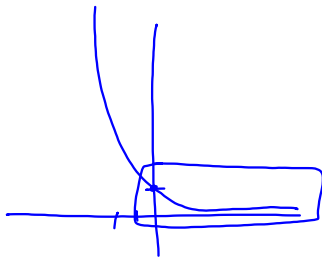
exponential equations

graphically



$$y = 2^x$$

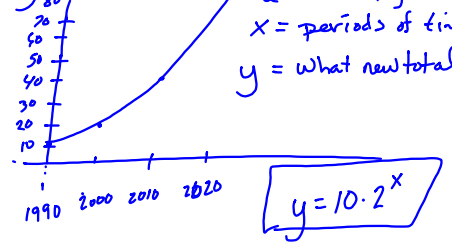
x	y
-1	1/2 0.5
-2	1/4 0.25
0	1
1	2
2	4
3	8



$$y = \left(\frac{1}{2}\right)^x$$

x	y
-2	4
-1	2
0	1
1	1/2
2	1/4
3	1/8

$$y = a \cdot 2^x$$



a = starting amount
 x = periods of time
 y = what new total is

$$y = \frac{2}{3} (2)^x, x = 2$$

$$y = \frac{2}{3} (2)^2$$

$$y = \frac{2}{3} (4)$$

$$y = \frac{8}{3} = 2\frac{2}{3} = 2.667$$

carbon dating
 half-life

Half refers to $\frac{1}{2}$ ← how many half-lives

$y = a \cdot \left(\frac{1}{2}\right)^x$
 y ← starting point
 x ← whats left

Car depreciates by half every year. If a car was 15000 now how much is it worth after 10 years

$$\begin{aligned}
 a &= 15000 \quad x = 10 \\
 y &= 15000 \left(\frac{1}{2}\right)^{10} \\
 &= 15000 (0.00098) \\
 &= 14.65 \\
 &\$14.65
 \end{aligned}$$

Doubling occurs every 9.9 years

if 400 put into account
How long will it take to
for the account to equal
\$1800

$$\begin{aligned}
 1800 &= 400(2)^x \\
 \log_2 \frac{1800}{400} &= x \quad \text{find } x \\
 &\quad \text{then multiply} \\
 &\quad \text{by } 9.9
 \end{aligned}$$

Half-life is different

$$\begin{aligned}
 \log_{\frac{1}{2}} 5 &= x & z &= 10 \left(\frac{1}{2}\right)^x \\
 \rightarrow \frac{\log_{10} 5}{\log_{10} \frac{1}{2}} &= x
 \end{aligned}$$