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31- a)  $A = (1, 6)$   
 $f(1) = 6$   
 $b \cdot a = 6$

$B = (0, 2)$   
 $f(0) = 2$   
 $b \cdot a = 2$   
 $b = 2$

$2 \cdot a = 6$   
 $a = 3$

$f(x) = 3 \cdot 2^x$

b)  $A = (0, 6)$   
 $f(0) = 6$   
 $b \cdot a = 6$   
 $b = 6$

$B = (1, 3)$   
 $f(1) = 3$   
 $b \cdot a = 3$   
 $6 \cdot a = 3$

$a = \frac{3}{6} = 0,5$

$f(x) = 6 \cdot 0,5^x$

54-  $N(t) = N_0 \left(\frac{1}{2}\right)^{\frac{t}{T}}$

TEMPO  
 inicial  $\rightarrow t=0$   
 $t=1$  (20 min)  
 $t=2$  (40 min)

QUANTIDADE  
 100g  
 50g (1/2)  
 25g (1/4)

letra d (10 min)

55-  $A(t) = A_0 \left(\frac{1}{2}\right)^{\frac{t}{5730}}$

$A(t) = 7$

$A_0 \left(\frac{1}{2}\right)^{\frac{t}{5730}} = 7$

$896 \left(\frac{1}{2}\right)^{\frac{t}{5730}} = 7$

$\left(\frac{1}{2}\right)^{\frac{t}{5730}} = \frac{7}{896}$

$\left(\frac{1}{2}\right)^{\frac{t}{5730}} = \frac{7}{896} : 7 \rightarrow \left(\frac{1}{2}\right)^{\frac{t}{5730}} = \frac{1}{128}$

$\left(\frac{1}{2}\right)^{\frac{t}{5730}} = \left(\frac{1}{2}\right)^7 \rightarrow \frac{t}{5730} = 7 \quad t = 5730 \cdot 7$   
 $t = 40101 \text{ anos}$

letra d (40 mil anos)

56-  $N_{\text{inicial}} = 1000$  ( $t=0$ ) após 10 min = 4000

$P(0) = 1000$

$P(0) = 4000$

$P = P_0 \cdot e^{kt} \rightarrow P(t) = P_0 \cdot e^{kt}$

$P(0) = 1000$

$P_0 \cdot e^{k \cdot 0} = 1000$

$P_0 \cdot 1 = 1000$

$P_0 = 1000$

$P(60) =$

$P_0 \cdot e^{k \cdot 60} =$

$1000 \cdot e^{k \cdot 60} =$

$1000 \cdot e^{k \cdot 10 \cdot 6} =$

$1000 (e^{k \cdot 10})^6 =$

$1000 \cdot 4^6 =$

$P(10) = 4000$

$P_0 \cdot e^{k \cdot 10} = 4000$

$1000 \cdot e^{k \cdot 10} = 4000$

$e^{k \cdot 10} = \frac{4000}{1000} = 4$

$16000$

$4$

$1000 \cdot 2048 = 2048000 \text{ bactérias}$

57 - inicialmente  $\rightarrow 2000$

$$\text{após } 30 \text{ min} \rightarrow 2000 \cdot 2 = 4000$$

$$\text{após } 30 + 30 = 60 \text{ min} (1k) \rightarrow 4000 \cdot 2 = 8000$$

$$\text{após } 60 + 30 \text{ min} \rightarrow 8000 \cdot 2 = 16000$$

$$\text{após } 90 + 30 \text{ min} (2k) \rightarrow 16000 \cdot 2 = 32000 \text{ bactérias}$$

58- a)  $t = 12 \rightarrow Q(12) = 50 \cdot \left(\frac{1}{2}\right)^{\frac{12}{3}} = 50 \left(\frac{1}{2}\right)^4$

$$\frac{50 \cdot 1}{16} = \frac{50}{16} = 3,125 \text{ mg}$$

b)  $Q(t) = a \cdot b^t$  ( $a$  = valor inicial /  $b$   $\rightarrow$  taxa)

$$50 \text{ mg} \rightarrow a = 50 / \text{taxa (metade)} = \frac{1}{2} \rightarrow b = \frac{1}{2}$$

$$Q(t) = a \cdot b^t \rightarrow Q(t) = 50 \cdot \left(\frac{1}{2}\right)^t$$

59 - altura

$$h(x) = 79,041 + 6,39 - 3,261 - 0,993x$$

$$h(1) = 79,041 + 6,39 - 3,261 - 0,993 \cdot 1$$

$$h(1) = 79,041 + 6,39 - 2,268$$

$$h(1) = 85,431 - 9,7$$

$$h(1) = 75,7 \text{ cm}$$

Taxa de Crescimento

$$v(1) = 6,39 + 0,993 \cdot e^{3,261 - 0,993 \cdot 1}$$

$$v(1) = 6,39 + 0,993 \cdot 9,7$$

$$v(1) = 6,39 + 9,6321$$

$$v(1) = 16,0221 \text{ cm/ano}$$