Exponential Functions Practice

Complete the problems below using an equation, graph, or table. You must show your work. No WORK=NO CREDIT!

it takes 4 hours to double

1. A bacteria culture grows according to the formula: $N = 12{,}000 \times 2^{\frac{t}{4}}$, where t is in hours. How many bacteria are present

(a) at the beginning of the experiment?

$12{,}000$

(b) after 12 hours?

$N = 12{,}000 \times 2^{\frac{12}{4} = 3} = 96{,}000$

(c) after 1 day?

$N = 12{,}000 \times 2^{\frac{24}{4} = 6} = 768{,}000$

(d) after 19 hours?

$N = 12{,}000 \times 2^{\left(\frac{19}{4}\right)} = 322{,}904$

2. A bacteria culture doubles every 0.25 hours. At time 1.25 hours, there are 40 000 bacteria present. How many bacteria were present initially?

$40{,}000 \searrow 20{,}000 \searrow 10{,}000 \searrow 5{,}000 \searrow 2{,}500 \searrow \underline{1{,}250}$

3. A bacteria culture starts with 3000 bacteria. After 3 hours there are 48 000 bacteria present. What is the length of the doubling period?

$3{,}000 \nearrow 6{,}000 \nearrow 12{,}000 \nearrow 24{,}000 \nearrow 48{,}000 \qquad \dfrac{3}{4} \text{ hour}$

4. A bacteria culture starts with 6500 bacteria. After 2.5 hours, there are 208 000 bacteria present. What is the length of the doubling period?

5. A bacteria culture triples every 4 hours and starts with 10 000 bacteria. Find the number of bacteria in the culture after 30 hours.

6. The world population doubles every 35 years. In 1980 the population was 4.5 billion. Assuming that the doubling period remains at 35 years, estimate the population in the year 2120.

Common mult $= \dfrac{1}{2}$

7. A sodium isotope, Na-24 , has a half-life of 15 hours. Determine the amount of sodium that remains from a 4 g sample after: