

### Exponential Function Worksheet

1. Give a formula for the exponential function  $f(x)$  has the values in the next table. .

x	0	1	2	3	4
$f(x)$	5	15	45	135	405

2. A population of 100 bacteria increases by a factor of 3 every day. Write a function that gives the population at any time  $t$  in days. Ans:  $P(t) = 100 \cdot 3^t$
3. Under ideal conditions the number of rabbits in a certain area doubles every 3 month. Write a function that gives the population at any time  $t$  in month, if originally there were 40 rabbits. Ans:  $P(t) = 40 \cdot 2^{t/3}$
4. A population of 200 bacteria triples every 12 hours. a) Write a function that gives the population at any time  $t$  in hours. b) Write a function that gives the population at any time  $t$  in days. Ans:  $P(t) = 200 \cdot 3^{t/12}$ ,  $P(t) = 200 \cdot 3^{2t}$
5. Find the growth factor, per day, of a population that triples every four days. What is the growth rate? Ans:  $3^{1/4}$ ,  $r = 3^{1/4} - 1$
6. A sum of \$1000 is invested in an account that pays 4% annually. How much is in the account after 6 years if the money is a) compounded monthly, b) compounded continuously? Assume that no deposits or withdraws are made in that period. Ans: \$1270.74; \$1271.25
7. An SUV that is originally worth \$50,000 depreciates at a rate of 29.5% every two years. Find a function for the depreciation of the SUV, and how much will it be worth after 3 years? Ans: \$29,597.41
8. Scuba divers find that the water at a certain lake filters out 15% of the sunlight for each 4 feet they descend. How much sunlight  $S$  penetrates at a depth  $d$  of 20 feet? (Hint: Use the initial amount of sunlight to be 100% or 1.) Ans: 44.37%
9. In an exponential model of atmospheric pressure, it is assumed that the air pressure is 1035 grams per square centimeter on the surface of the earth and is halved for every 5.2 kilometers of vertical ascent.

- (a) Give a formula for air pressure  $p(h)$  (grams per square centimeter) with this model as a function of height  $h$  (kilometers) above the earth.

$$\text{Ans: } p(h) = 1035 \left(\frac{1}{2}\right)^{h/5.2} \text{ gm/cm}^2$$