1. Use properties of exponents to write each of the following expressions in a simpler equivalent form.

a. $(y^{10})(y^3)$

b. $(a^4)^3$

c. $(3x^2y^3)(4x^4y^7)$

d. $(2xy^5)^3$

e. $(b^2)^0$

f. $\left(\dfrac{6x}{5}\right)^2$

g. $\dfrac{b^2}{b^8}$

h. $\dfrac{18x^6}{3x^3}$

i. $\dfrac{8}{x^{-2}}$

j. $(3t)^{-2}$

k. $6xy^{-1}$

l. $(5x^{-3})^2$

2. When she was born, Tabitha's aunt put $10,000 in a bank account in Tabitha's name to be saved for her college education. The account earns 6% annual interest.

   a. Make a table showing the value of that account each year for 6 years. ***Round your answer to the nearest dollar.***

Year	0	1	2	3	4	5	6
Balance (in $)	10,000						

   b. Write a $y =$ rule that could be used to calculate the value of the account for any number of years.

   c. What is the value of Tabitha's account after 18 years?

   d. If Tabitha waits to begin college until her account is over $35,000, how old would she be?

3. Coffee, tea, and some soft drinks contain the drug caffeine. One hour after ingestion, 25% of the original amount of caffeine is used up. At the end of each hour after that, 25% of the amount at the beginning of the hour is used. Suppose a person consumes 40 milligrams of caffeine.

   a. How much of that 40 milligrams (mg) will remain after 1, 2, and 3 hours? (Round to the nearest hundredth)

   1 hour: _____   2 hours: _____   3 hours: _____

   b. Write a rule beginning "$y =$ ..." that can be used to calculate the amount of caffeine that will remain x hours after the initial dose.

   c. How much caffeine would remain after one and a half hours?

   d. Estimate the half-life of caffeine. Round to the nearest tenth.

4. The Beta Club at Johnson Mill High School is launching a service project in their school and community. They are going to help out 3 different people in a significant way. Instead of asking for money or something in return, they are asking that those three people that each has helped, do something good for three more people. There are 5 people in the club that are going to start this project.

   a. Write a "$y =$" rule to describe the pattern.

   b. How many new people will be helped out in the 8th stage of the project?

5. Two exponential growth and decay situations are represented by Graphs I and II and also by Tables A and B. For each graph, there is a matching table.

a. Write the number of the graph beside its corresponding table.
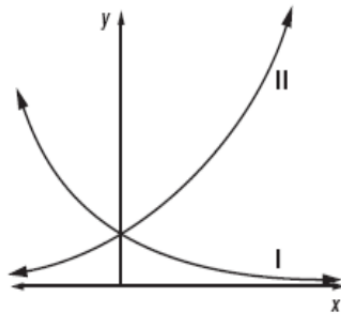
_____ A

x	1	2	3	4
y	6	12	24	48

_____ B

x	1	2	3	4
y	1.5	0.75	0.375	0.1875

b. Using your graphing calculator, find an exponential model for both tables A and B.

    Table A: Table B:

6. Brazil is the most populous country in South America. In 2005, its population was about 186 million people. It was growing at a rate of about 1.1% per year.
Nigeria is the most populous country in Africa. Its 2005 population was about 129 million. It was growing at a rate of about 2.4% per year.

   a. Assuming that these growth rates continue, write a function rule to predict the populations of each country for any number of years x in the future.

        Brazil: ***Nigeria:***

   b. In what year will Brazil's population reach 300 million?

   c. In what year will Nigeria's population reach 200 million?

   d. In what year will Nigeria's population first be greater than Brazil's?

7. For each function, tell whether it is **exponential growth** or **exponential decay**.

   a. $f(x) = 40(1.08)^x$ b. $g(x) = 15(0.80)^x$

   c. $h(x) = 346(0.45)^x$ d. $j(x) = 25(2)^x$

Multiple Choice:

8. Charles plays basketball for his school. He scored 14 points on Monday, and he doubled his score each day thereafter. How many points did he score on Thursday?

   a. 224 points   b. 112 points   c. 56 points   d. 42 points

9. Suppose a population of 250 crickets doubles in size every 6 months. How many crickets will there be after 2 years?

   a. 4,000 crickets   b. 6,000 crickets   c. 2,000 crickets   d. 1,000 crickets

10. What is the function rule that describes the graph?

   a. $y = 4(2^x)$

   b. $y = 10(4^x)$

   c. $y = 4(0.75^x)$

   d. $y = -3(-2^x)$

11. Suppose the population of a town is 2,700 in 2007 and is growing 4% each year. Predict the population in 2019.

   a. 129,600 people   b. 4,323 people   c. 6,327 people   d. 45,298,483 people

12. Megan put $2400 in a savings account earning 2% interest compounded annually 7 years ago. How much money is in her account now?

   a. $2,757   b. $307,200   c. $17,136   d. $2,736

13. A boat costs $15,500 and decreases in value by 10% per year. How much will the boat be worth after 5 years?
    a. $9,153   b. $15,450   c. $8,237   d. $155