Exponential Functions – Creating a Rule

$$y = ac^x$$

a – initial value (the amount you start with)

$c - 1 \pm (\frac{\% \ change}{100})$ ***unless you have a word like "double", "triple", "quadruple" or "half"

x – independent variable (time periods – usually in days, weeks, months, years)

y – dependent variable (total amount after "x" time periods)

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1) Satish leaves his uneaten sandwich in his locker overnight. The population of the bacteria triples every hour. If his sandwich originally had 20 bacteria, how many bacteria are there after 24 hours?

   x:

   y:

   Rule:

2) A new Mac Pro is purchased for $6 500.
   Unfortunately, computers depreciate at the rate of 14% every year.
   How much will the computer be worth in 5 years?

   x:

   y:

   Rule:

3) A baseball card bought for $50 increases by 3% in value each year. How much will it be worth in 50 years?

   x:

   y:

   Rule:

4) The bear population in Quebec decreases at a rate of 2.5% per year.
   There were 1 571 bears in Quebec in 2012. How many bears should there be in 2030?

   x:

   y:

   Rule:

5) Each year the loyal country club sponsors a tennis tournament.
   Play starts with 128 participants.
   During each round, half the players are eliminated.
   How many players remain after 5 rounds?

   x:

   y:

   Rule:

6) The population of Huntingdon can be modeled by $y = 6191(1.04)^x$, where x is the number of years since 2014.
   a) What was the population in 2014? _____
   b) By what percent should the population increase by each year? _____
   c) What might the population of Huntington be in 2030?

7) A lab technician notes that the number of type A bacteria doubles every hour whereas the number of type B bacteria triples every hour.
   At the outset there are 1000 of type A bacteria and 500 of type B bacteria.
   Which of the two bacterial will be more numerous after five hours?
   x:
   y:

   Rule A: Rule B:

8) The value of a $60 000 car diminishes at a rate of 20% a year and the value of a $40 000 truck diminishes at a rate of 10% a year.
   The two vehicles are going to be sold after 5 years.
   At resale time, which vehicle will be worth the most?

9) The growth of a certain number of bacteria is under laboratory observation. The growth can be modelled by the function $f(x) = 250(4)^x$ where f(x) represents the number of bacteria and x represents the number of hours which have passed since the observation began.
   a) How many bacteria were there at the beginning of the observation period? _____
   b) Explains what happens to the bacteria every hour.
   c) How many bacteria were there after 30 minutes?
   d) How many bacteria were there after 2h and 15 minutes?

10) You deposit $1600 in a bank account.
   Find the balance after 3 years for each of the following situations, and indicate which choice gives you the greatest account balance.

   a) The account pays 0.25% interest monthly.
   b) The account pays 3% interest yearly

Situation A: Situation B:

x: x:

y: y: