Let’s go through some examples of exponential functions.

This first example has a population of bacteria that grows according to an exponential function f of t equals 200 times 1.0202 to the t power.

The first part asks for the initial population of bacteria.

The general exponential function has the form f of t equals P times a to the t power. P is the initial condition and a is the growth factor or decay factor. For this exponential function, P is 200. So there are initially 200 bacteria for the population.

The second part asks for the growth factor of the population.

Going back to the general exponential function, we see that a is 1.0202 for this function. That means that to multiply the last population by 1.0202 to get the population in the next minute.

The third part asks for the hourly growth factor for the population.

The problem is asking to find the number we need to multiply the current population to find the population in one hour. That means taking 60 minutes in a row.

Use exponents to do repeated multiplications. 1.0202 to the sixty power is 3.31986, rounded to five decimal places. That means the population increases by a factor of 3.31986 from one hour to the next.

The fourth part asks to find the population after 5 hours.

To do this calculation, we will use the original formula and substitute 300 for t. This is a direct calculation. The population after 300 minutes is 80654, rounded to the nearest bacteria.

The last part asks us to find when the population reaches 100,000 bacteria. To do this, we will use the crossing-graphs method.

For Y1, type in the exponential function. Remember to use x in the calculator instead of t. For Y2, type in the constant 100,000.

For the window, use 0 for Xmin. For Xmax, try 400 since we know there will be about 80,000 bacteria in 300 minutes. For Ymin and Ymax, we'll go 1000 on either side of 100,000.

Press 2nd and trace to get to the calculate menu. Use 5 for the intersect function. Press Enter three times. The x-coordinate of the intersection is 310.75. We can conclude that the population of bacteria reaches 100,000 after 311 minutes, to the nearest minute.