Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

WHEN AM I EVER

Period \_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

GONNA USE THIS?

You are going to deposit $800 and let it earn interest until it reaches $1000, at which point you will use it to buy a totally awesome… uh, mountain bike? (I don’t know, something cool.) But you’re **smart**, and you want to choose the savings account that will get you to $1000 the fastest! You have a few choices:

Account A pays 2.75% interest, compounded annually.

Account B pays 2.75% interest, compounded quarterly.

Account C pays 2.75% interest, compounded continuously.

**1.** First, determine how much money will be in your account after 2 years if you choose…  
(Hint: Your answers should all be between $825 and $850—if you get anything higher or lower, you have made a mistake!)

**a.** Account A

**b.** Account B

**c.** Account C

**2.** Now write *equations* to tell you how much you’ll have after *t* **years** if you choose…  
(Remember that not every account compounds interest annually!)

**a.** Account A

**b.** Account B

**c.** Account C

**3.** You are trying to figure out how long it will take you to get $1000 in the account. Using what we’ve discussed about solving exponential and logarithmic equations, determine how long it will be before you have $1000 if you choose…

**a.** Account A

**b.** Account B

**c.** Account C

**4.** Which account should you choose? How long will you have to wait until you can buy that mountain bike?

**5.** Aspirin has a *half‑life* of approximately 3**.**1 hours. The *half‑life* means the amount of time it takes before only half of the substance remains. In other words, if you took 100 mg of aspirin, then 3**.**1 hours later you would have only 50 mg of it in your system. The following function models the half life of aspirin:

**a.** What percentage of aspirin decays each hour?

**b.** A doctor cannot safely operate on a patient with more than 100 mg of aspirin in his system, due to the risk of excess bleeding. (Aspirin is a blood thinner.) If a patient just took a 650‑mg dose, how long will it be until the doctor can safely operate?

**6.** In 2000, Atlanta’s population was 4**.**2 million people. In 2010, it was 5**.**2 million.  
In 2000, Las Vegas’ population was 4**.**8 million people. In 2010, it was 5**.**6 million.

**a.** What was the annual rate of growth of Atlanta’s population during the period from 2000 to 2010?

**b.** What was the annual rate of growth of Las Vegas’ population during the period from 2000 to 2010?

**c.** Assuming the rate of growth you found for Atlanta in part a continues, write and solve an equation to determine when (in what year) Atlanta’s population will be 7.2 million.

**7.** You invest $1000 in an account that pays 4.25% compounded continuously. How much will be in the account after 10 years?

**8.** The growth of ants in a colony grows according to the formula P = 400*e*0.3*t*, where *t* is measured in weeks. How many ants will be in the colony after 10 weeks?

**9.** You invest $4,000 in an account that compounds interest continuously. If you want your $4,000 to turn into $5,000 after two years, what interest rate do you need?

**10.** Barometric pressure (measured in pounds per square inch, or psi) decreases as your elevation increases.\* For every 1 km increase in altitude, barometric pressure decreases by 11**.**5%. Today, barometric pressure at sea level is 14**.**8 psi. At what altitude will the barometric pressure be 13**.**0 psi?

*\* That’s why airplanes have pressurized cabins—otherwise you wouldn’t get enough oxygen in the thin air!*