CW#____ Name:_____

7.1.3 How can I write an exponential function?

Writing Equations of Exponential Functions

#31 DUE DATE

Brad's mother has just learned that she is pregnant! Brad is very excited that he will soon become a big brother. Brad's mother says she was tested for HCG during her last two doctor visits. On March 21, her HCG level was 200 mIU/ml (milli-international units per milliliter). Two days later, her HCG level was 392 mIU/ml.

a. Assuming that the model for HCG levels is of the form $y = ab^x$, write an equation that models the growth of HCG for Brad's mother's pregnancy.

i. The doctor visits provide two data points that can help you write an exponential model: (21, 200) and (23, 392). Use each of these points to substitute for x and y into $y = ab^x$. You should end up with two equations in terms of a and b.

ii. Discuss a way to solve your system from part (*i*) for a and b with your team then solve and write the equation modeling the situation. Be ready to share your method with the class.

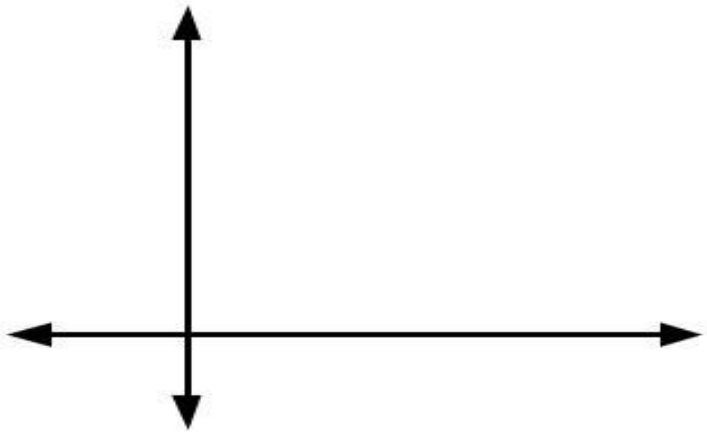
b. Most women maintain an HCG level of 5 mIU/ml before becoming pregnant. Assuming that Brad's mother's level of HCG on the day of implantation was 5 mIU/ml, on what day did the embryo most likely become implanted? How many days after implantation was his mother's first doctor visit?

c. Brad learned that a baby is born approximately 38 weeks after implantation. When can Brad expect his new sibling to be born?

#33 The situation in problem 7-31 required you to assume that the exponential model had an asymptote at $y = 0$ to write the equation of the model. But what if the asymptote is not at the x-axis? Consider the situation below.

a. Assume the graph of an exponential function passes through the points (3, 12.5) and (4, 11.25). Is the exponential function increasing or decreasing? Justify your answer.

b. If the horizontal asymptote for this function is the line $y = 10$, make a sketch of its graph showing the horizontal asymptote.

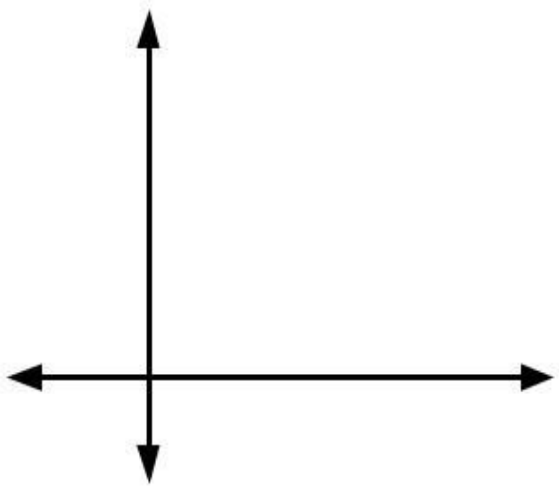


c. If this function has the equation $y = ab^x + k$, what is the value of k? Use what you know about this function to write its equation. Verify that as x increases, the values of y get closer to $y = 10$.

d. What is the y-intercept of the function? What is the connection between the y-intercept and the asymptote?

Julie has a fresh cup of hot coffee that has a temperature of 180º F. The temperature of the room is 70º F.

a. Sketch a graph of the temperature of the coffee over time.



b. Let t = number of minutes after Julie pours her coffee, and let y = the temperature of the coffee in ºF. Five minutes after Julie pours her coffee, its temperature is 160º F. Write an equation to model this situation.

c. Julie thinks her coffee is the perfect temperature when it is 130^{O}. When will the coffee be Julie's ideal temperature?

d. What is the temperature of the coffee 10 minutes after it was poured?