Activity One: The Refrigerator: How much does it really cost?

Suppose the cost of electricity per year to run a refrigerator is $92.

a) If we assume that a new refrigerator costs $550, determine the total annual cost for a refrigerator that lasts for 15 years. Assume the only costs associated with the refrigerator are its purchase cost and electricity.
b) Develop a function that gives the annual cost of a refrigerator as a function of the number of years you own the refrigerator.
c) Sketch a graph of that function. What is an appropriate window?
d) Since this is a rational function, determine the asymptotes of this function.
e) Explain the meaning of the horizontal asymptote in the context of the problem.
f) If a company offers a refrigerator that costs $900, but says that it will last at least twenty years, is the refrigerator worth the difference in cost, assuming that it is more energy efficient and the cost of operating it is still $92?

Activity Two: Drug Concentration

The function \( C(t) = \frac{5t}{0.01t^2 + 3.3} \) describes the concentration of a drug in the bloodstream over time.

In this case, the medication was taken orally. \( C \) is measured in micrograms per milliliter and \( t \) is measured in minutes.

a) Sketch a graph of the function over the first two hours after the dose is given. Label axes.
b) Determine when the maximum amount of the drug is in the body and the amount at that time.
c) Explain within the context of the problem the shape of the graph between taking the medication orally \( (t = 0) \) and the maximum point.
d) What are the asymptotes of the rational function \( C(t) \)?

What is the meaning of the asymptotes within the context of the problem?