

<p>x(half-life) The half-life of a certain radioactive substances is 521 days. If 1.12 grams remain after 134 days, (a) What is the initial amount of the radioactive substance. (b) Now the school is going into summer vacation, how much will the radio substance remain when next school years started? (Assume the summer is 10 weeks long)[Round your answer to hundredth of a gram]</p>	<p>(a) 1.34 gram (b) 1.02 gram</p>
<p>(Transparency) Ms. King uses transparencies in her art class to show students how to draw a painting in different layers. However, light intensity will decrease as the transparency overlaid. If there is a 0.5% deduction of intensity as light passes through a transparency. What would the maximum numbers of layers (every layer per transparency) Ms. King can use for the art project if the light intensity should not be less than 80% of the original when it passes through all layers?</p>	<p>44 transparencies</p>
<p>(Richter scale) The Richter scale is used for measuring the magnitude of an earth quake. The Richter scale is given by</p> $R = \frac{2}{3} \log(0.37E) + 1.46$ <p>Where E is the energy in (Kwh). (a)What Is the energy released by an earth quake if its Richter scale is 7.2? (b)If two successive quakes are recorded with 0.1 difference on the scale, what is the ratio (bigger quake to the smaller quake) of the energy released between these two quakes?</p>	<p>(a) 1.101×10^9 Kwh (b) 1.41</p>
<p>(Yeast Growth) Following model represents a yeast population when a sour dough bread was rising:</p> $Y(t) = \frac{80}{1 + 20e^{-.75t}}, 0 \leq t \leq 10$ <p>Where t represents the time (in hours), Y(t) represent the numbers of yeast in millions. (a) What is the initial population when the yeast was just added into the dough? (b) Define that “fully risen of a dough” with this type of yeast growth is when the yeast is at 90% of its final population. Find the hour when a bread dough is fully risen?</p>	<p>(a) 3.81 Million (b) 6.92 hr</p>
<p>(Pollution) The concentration of a pollutant from a source can be modelled by the following function:</p> $C(x) = 2000e^{-\left(\frac{x^2}{25}\right)}$ <p>where x is the distances from the pollution source in km and C is the concentration of pollutant at ground level in ppm. (a) what is the concentration of the pollutant when it is just out of the source? (b) if the pollutant is considered as undetectable when its concentration is lower than 10 ppm, than how far away from the source of pollution is considered to be undetectable?</p>	<p>(a) 2000 ppm (b) 11.51 Km</p>
<p>(Altitude) The altitude h (in meters) above the sea level is related to the atmospheric pressure at the level. It can be modeled by</p> $h = -8000 \ln \left(\frac{P}{P_0} \right)$ <p>Where P_0 is the reference pressure (in Kpa). (a) Given that the pressure is 65Kpa at the altitude of 3,500 m, What is the height if the pressure is 57Kpa? (b) Near the sea level of the earth the air pressure is usually at 101.3 Kpa, estimate the air pressure at the top of the Mt. Everest (8,848 m)?</p>	<p>(a) 4,551 m (b) 33.52 Kpa</p>

VD 3.5.2

<p>(Frappuccino) The temperature of a frappuccino and time after it was made can be modelled by the following relationship,</p> $t = 4.35 \ln \left(\frac{36}{68 - T(t)} \right)$ <p>Where $T(t)$ is the frappuccino's temperature, and t is time in minutes.</p> <p>(a) what is the frappuccino's temperature when it was made?</p> <p>(b) When will the temperature of the drink be raised to at least $40^\circ F$?</p>	<p>(a) 32 F</p> <p>(b) 1.09 min</p>
<p>(Funnel) A funnel is 4" tall. The diameter of the outlet(the smaller opening) is $\frac{1}{2}$ ", and the diameter of the inlet is 5" (the bigger opening). A horizontal cross section of the funnel is a circle parallel to the inlet and outlets. Let the distance between the any horizontal cross section to the outlet be d and the radius of any cross section be r. The relationship between the r and d can be modeled by the following expression,</p> $d(r) = a + b \ln r$ <p>where a and b are constants.</p> <p>(a) what is the valid domain of the function $d(r)$?</p> <p>(b) what is the diameter of the midway cross section? (midway is defined as equidistant from both ends of the funnel)?</p>	<p>(a) $r \in [\frac{1}{4}, \frac{5}{2}]$</p> <p>(b) $\frac{\sqrt{10}}{4}$ inches</p>