Lesson 7.7 Extra Practice

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1. a) For each of the following exponential decay models, identify the initial amount, the decay rate, and the number of decay periods.

i) $A(n) = 32(0.65)^{13}$

ii) $N(n) = 100(0.5)^{3}$

iii) $P(n) = 5(0.91)^{24}$

iv) $H(n) = 10(0.8)^{9}$

b) Use a calculator to evaluate the equations in part (a) to three decimal places.

2. Recall that the model for the decay of carbon-14 is $A(n) = 100(0.5)^{n}$, where $A(n)$ is the percentage of carbon-14 remaining after n half-life periods. The half-life of carbon-14 is 5730 years.

a) To the nearest percent, how much of the original carbon-14 is left after 9168 years?

b) Graph the function $A(n)$.

c) Use the graph to estimate the age of an object with 30% of its original carbon-14.

3. As light shines in a lake, its intensity decreases with the depth of the lake. This can be modelled by the equation $I(d) = 100(0.89)^{d}$, where $I(d)$ is the percentage of the original intensity at a depth of d metres.

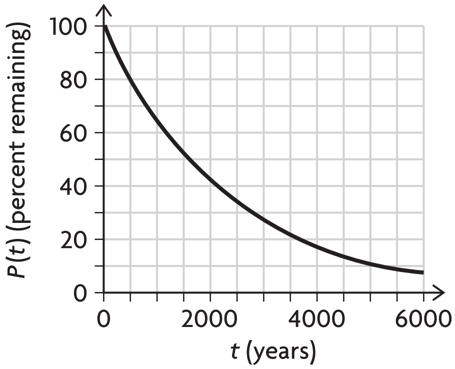
a) What is the decay rate of the intensity per metre?

b) To the nearest percent, what is the intensity at a depth of 15 metres?

c) Graph the function $I(d)$.

d) Use the graph to estimate the depth at which the light is 50% as intense as it is at the surface.

4. Examine the graph below of the decay of a radioactive substance over time.



a) Estimate the half-life of this element.

b) Use your answer from part (a) to find a formula for $P(t)$.

c) Use the formula from part (b) to determine to the nearest percent the amount of the element left after 9000 years.

5. The value of a \$21 000 car depreciates in value by 2.3% every month after it was purchased.

a) Write a function $V(n)$ that tells how much the car is worth after a period of n months.

b) Evaluate $V(12)$. What does this number represent?

c) Graph the function on a graphing calculator and use the intersect feature to determine to the nearest month the "half-life" of the car (that is, how long it takes the car to be worth half of its original value).

d) The answer from part (c) suggests that the value of the car can also be written in the form $A(n) = 21\,000(0.5)^{\frac{n}{H}}$, where H is the half-life from part (c). Use a graphing calculator to verify that $A(n)$ is equivalent to the formula you found for $V(n)$ in part (a).