1 Chapter Task

Modelling with Functions

In 1950, a team of chemists led by Dr. W. F. Libby developed a method for determining the age of any natural specimen, up to approximately 60 000 years of age. Dr. Libby's method is based on the fact that all living materials contain traces of carbon-14. His method involves measuring the percent of carbon-14 that remains when a specimen is found.

The percent of carbon-14 that remains in a specimen after various numbers of years is shown in the table below.

Years	Carbon-14 Remaining (%)
5 730	50.0
11 460	25.0
17 190	12.5
22 920	6.25
28 650	3.125
34 380	1.5625

? How can you use the function $P(t) = 100(0.5)^{\frac{t}{5730}}$ to model this situation and determine the age of a natural specimen?

A. What percent of carbon is remaining for $t = 0$? What does this mean in the context of Dr. Libby's method?

B. Draw a graph of the function $P(t) = 100(0.5)^{\frac{t}{5730}}$, using the given table of values.

C. What is a reasonable domain for $P(t)$? What is a reasonable range?

D. Determine the approximate age of a specimen, given that $P(t) = 70$.

E. Draw the graph of the inverse function.

F. What information does the inverse function provide?

G. What are the domain and range of the inverse function?

Task Checklist

- ✔ Did you show all your steps?
- ✔ Did you draw and label your graphs accurately?
- ✔ Did you determine the age of the specimen that had 70% carbon-14 remaining?
- ✔ Did you explain your thinking clearly?