

Problem-Based Task: When Will It Beep?**Coaching**

- a. How is the half-life of the radioactive element related to the original amount of radioactivity of the element?

- b. How can you use the half-life data to find the value of the constant c in the exponent of the exponential term?

- c. How can the inverse of the exponential function be used to simplify finding the answer to part b? Find the value of the constant c .

- d. How can you use the result of part c and the information about when radioactive decay will cause the smoke detector to stop working to find how long this will take?

- e. Write an equation using the information in parts c and d, then use it to determine how long it will take for the smoke detector to stop working.

- f. How does the answer to part e compare to how often the battery should be changed in a smoke detector?

- g. What other factor(s) might explain why the smoke detector's battery needs to be changed annually?