

## PROBLEM SOLVING

### EXAMPLE 3

on p. 516  
for Exs. 54–58

54. **COOKING** You are cooking beef stew. When you take the beef stew off the stove, it has a temperature of  $200^{\circ}\text{F}$ . The room temperature is  $75^{\circ}\text{F}$  and the cooling rate of the beef stew is  $r = 0.054$ . How long (in minutes) will it take to cool the beef stew to a serving temperature of  $100^{\circ}\text{F}$ ?

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55. **THERMOMETER** As you are hanging an outdoor thermometer, its reading drops from the indoor temperature of  $75^{\circ}\text{F}$  to  $37^{\circ}\text{F}$  in one minute. If the cooling rate is  $r = 1.37$ , what is the outdoor temperature?

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56. **COMPOUND INTEREST** You deposit \$100 in an account that pays 6% annual interest. How long will it take for the balance to reach \$1000 for each given frequency of compounding?

a. Annual                                      b. Quarterly                                      c. Daily

57. **RADIOACTIVE DECAY** One hundred grams of radium are stored in a container. The amount  $R$  (in grams) of radium present after  $t$  years can be modeled by  $R = 100e^{-0.00043t}$ . After how many years will only 5 grams of radium be present?

58. **MAKE REASONING** You deposit \$800 in an account that pays 2.25% annual interest compounded continuously. About how long will it take for the balance to triple?

(A) 24 years                                      (B) 36 years  
(C) 48.8 years                                      (D) 52.6 years

### EXAMPLE 7

on p. 519  
for Ex. 59

59. **MULTIPLE REPRESENTATIONS** The Richter scale is used for measuring the magnitude of an earthquake. The Richter magnitude  $R$  is given by the function

$$R = 0.67 \log (0.37E) + 1.46$$

where  $E$  is the energy (in kilowatt-hours) released by the earthquake.



- a. **Making a Graph** Graph the function using a graphing calculator. Use your graph to approximate the amount of energy released by each earthquake indicated in the diagram above.
- b. **Solving Equations** Write and solve a logarithmic equation to find the amount of energy released by each earthquake in the diagram.