57. BURNING RATE A burning candle has a radius of r inches and was initially h_0 inches tall. After t minutes, the height of the candle has been reduced to h inches. These quantities are related by the formula

$$r = \sqrt{\frac{kt}{\pi(h_0 - h)}}$$

where k is a constant. How long will it take for the entire candle to burn if its radius is 0.875 inch, its initial height is 6.5 inches, and $k = 0.04$?

58. CONSTRUCTION The length ℓ (in inches) of a standard nail can be modeled by $\ell = 54d^{3/2}$ where d is the diameter (in inches) of the nail. What is the diameter of a standard nail that is 3 inches long?

(59.) ⭐ **SHORT RESPONSE** Biologists have discovered that the shoulder height h (in centimeters) of a male African elephant can be modeled by

$$h = 62.5\sqrt[3]{t} + 75.8$$

where t is the age (in years) of the elephant. *Compare* the ages of two elephants, one with a shoulder height of 150 centimeters and the other with a shoulder height of 250 centimeters.
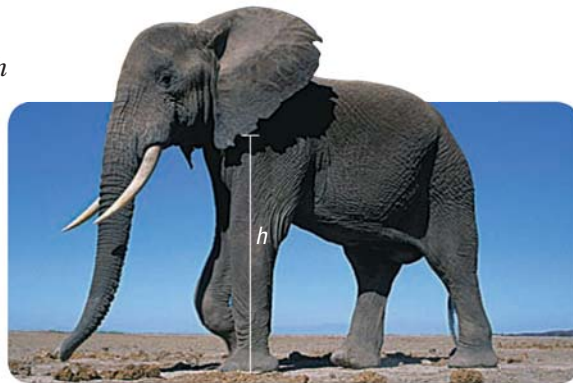
60. ⭐ **EXTENDED RESPONSE** "Hang time" is the time you are suspended in the air during a jump. Your hang time t (in seconds) is given by the function $t = 0.5\sqrt{h}$ where h is the height of the jump (in feet). A basketball player jumps and has a hang time of 0.81 second. A kangaroo jumps and has a hang time of 1.12 seconds.

a. **Solve** Find the heights that the basketball player and the kangaroo jumped.

b. **Calculate** Double the hang times of the basketball player and the kangaroo and calculate the corresponding heights of each jump.

c. **Interpret** If the hang time doubles, does the height of the jump double? *Explain*.

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61. MULTI-STEP PROBLEM The Beaufort wind scale was devised to measure wind speed. The Beaufort numbers B, which range from 0 to 12, can be modeled by

$$B = 1.69\sqrt{s + 4.25} - 3.55$$

where s is the speed (in miles per hour) of the wind.

a. Find the wind speed that corresponds to the Beaufort number $B = 0$.

b. Find the wind speed that corresponds to the Beaufort number $B = 12$.

c. Write an inequality that describes the range of wind speeds represented by the Beaufort model.

Beaufort Wind Scale	
Beaufort number	**Force of wind**
0	Calm
3	Gentle breeze
6	Strong breeze
9	Strong gale
12	Hurricane

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