

Activity: Modeling with Radicals

The population of a small town can be modeled by the function $P(x) = 5,250\sqrt[4]{x - 1975}$, where 'x' is the years. Answer these questions based upon the model:

- A. Rewrite the model $P(x) = 5,250\sqrt[4]{x - 1975}$ in rational exponent form.

$$P(x) = 5,250(x - 1975)^{\frac{1}{4}}$$

- B. State the domain and range, in interval notation of the model.

Domain: $[1975, \infty)$

Range: $[0, \infty)$

$$P(x) = 5250 \sqrt[4]{x - 1975}$$

$$P(1975) = 5250 \sqrt[4]{1975 - 1975}$$

$$P(1975) = 5250 \cdot 0 = 0$$

- C. Based on the model, what will be the population of the small town in 2050?

$$P(2050) = 5250 \sqrt[4]{2050 - 1975}$$

$$= 5250 \sqrt[4]{75}$$

$$\approx 15,449.863$$

Evaluate using Nspire

∴ The population of a small town in 2050 will be approximately

- D. In what year would the population of the small town reach 15,000?

15,449 people.

Graph $f_1(x) = 15,000$ and $f_2(x) = 5250\sqrt[4]{x - 1975}$. Find intersection. (You will need to adjust window). The population will reach 15,000 people in the year 2042, approximately. See next page.

One possible window...

