Revenue *The revenue from the sale of a product is given by the function* $R = 12{,}000x - 0.003x^3$. [1]

a. *Use factoring and the root method to find the numbers of units that must be sold to give zero revenue.*

From your book...

> **Root Method**
>
> The real solutions of the equation $x^n = C$ are found by taking the nth root of both sides:
>
> $$x = \sqrt[n]{C} \text{ if } n \text{ is odd} \quad \text{and} \quad x = \pm\sqrt[n]{C} \text{ if } n \text{ is even and } C \geq 0$$

To find the number of units that must be sold to give zero revenue, we set $R = 0$ and solve for x.

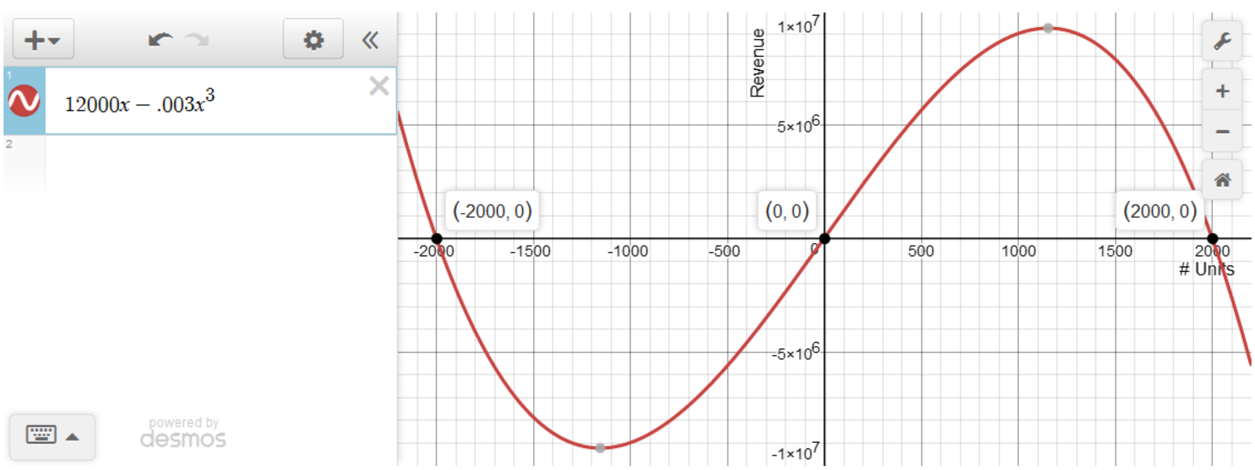
$R = 12{,}000x - 0.003x^3$	
$0 = 12{,}000x - 0.003x^3$	Rearrange into descending order.
$0 = -0.003x^3 + 12{,}000x$	Divide each term by -0.003 to simplify the factoring.
$0 = x^3 - 4{,}000{,}000x$	Factor.
$0 = x(x^2 - 4{,}000{,}000)$	Set each factor equal to 0.

$$x = 0 \qquad \text{or} \qquad x^2 - 4{,}000{,}000 = 0$$
$$x^2 = 4{,}000{,}000$$
$$x = \pm 2000$$

The three algebraic solutions are $x = -2000,\ 0,\ 2000$ but in the context of this problem, where x is the number of products sold, negative values of x must be omitted.

So the solutions are $x = 0, 2000$ and we can say that if either 0 units or 2000 units of this product are sold the revenue will be \$0.

b. *Does the graph of the revenue function verify this solution.*



Yes, looking at the points where the graph crosses the x-axis, the graph verifies the algebraic solution.

[1] Harshbarger/Yocco, *College Algebra In Context*, 5e, p. 464, #34.