FoM11 Lesson 7.4

Tuesday, May 30, 2017 10:56 AM

FOM 11 **7.4 Factored Form of a Quadratic Function**

Remember, any quadratic equation can be written in the standard form of a quadratic $ax^2 + bx + c = 0$ where $a \neq 0$. If this factors easily, we can use the **zero product theorem** to extract the roots (ie. x-intercepts).

Zero Product Theorem: If $a \times b = 0$, then $a = 0$ or $b = 0$.

Eg. $(x+5)(x-2)=0$ means $x+5=0 \Rightarrow x=-5$ or $x-2=0 \Rightarrow x=2$.

We can use factoring or partial factoring to help us sketch a quadratic function given in standard form.

Example 1: Sketch the graph of $y = 2x^2 + 12x + 10$ and state the domain and range of the function.

solve

$y = 2x^2 + 12x + 10$

$1 \times 5 = 5$

$1, 5$ $-1, -5$

$0 = 2x^2 + 12x + 10$

$0 = 2(x^2 + 6x + 5)$

$0 = 2(\underbrace{x^2 + 1x} + 5x + 5)$

$0 = 2[x(x+1) + 5(x+1)]$

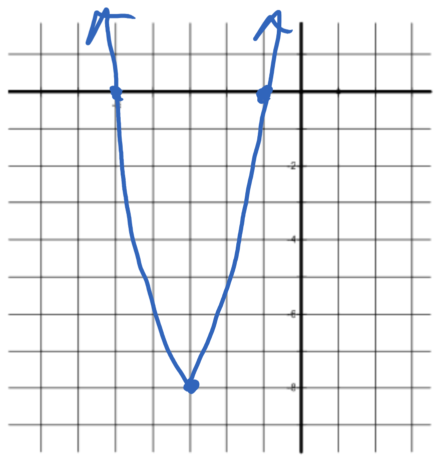
$0 = 2(x+1)(x+5)$

$\div 2$ $\div 2$

$0 = (x+1)(x+5)$

$x+1=0$ $x+5=0$

$\boxed{x=-1}$ $\boxed{x=-5}$



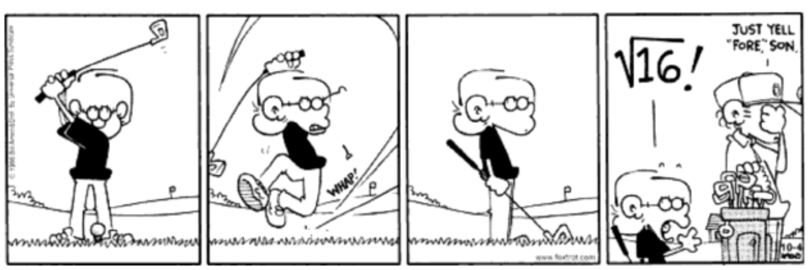
D: $x \in \mathbb{R}$

R: $y \geq -8$

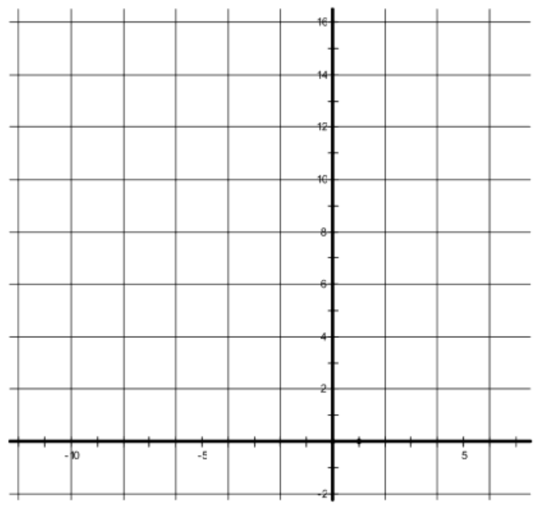
vertex half

$x = \frac{(-1)+(-5)}{2} = -3$ $(-3, -8)$

$y = 2(-3)^2 + 12(-3) + 10 = -8$

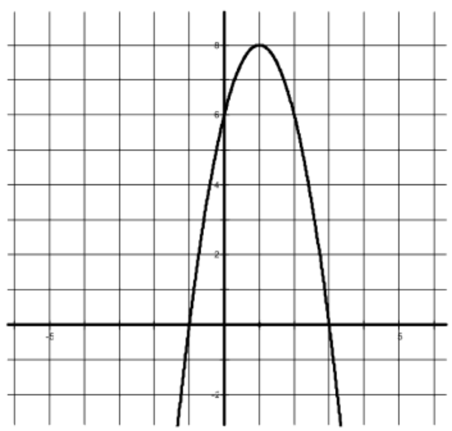


Example 2: Sketch the graph of $f(x) = -x^2 - 3x + 12$ and state the domain and range.

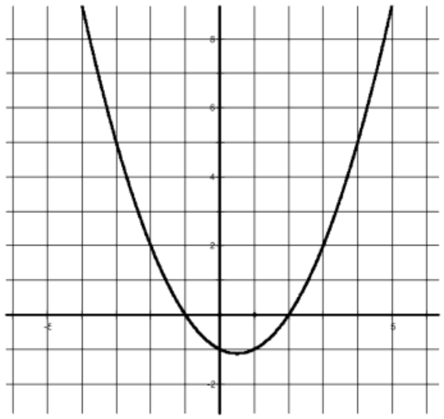


Example 3: Determine the equation of the function that defines each graph. Write each function in standard form.

a.



b.



Example 4: A career and technology class at a high school in British Columbia operates a small T-shirt business out of the school. Over the last few years, the shop has had monthly sales of 300 T-shirts at a price of $15 per T-shirt. The students have learned that for every $2 increase in price, they will sell 20 fewer T-shirts each month. What should they charge for their T-shirts to maximize their monthly revenue?

Assignment: pg. 391 #2, 3, 8, 9, 10ace, 11, 16