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

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

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

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

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

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

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

$\div 2 \quad \div 2$

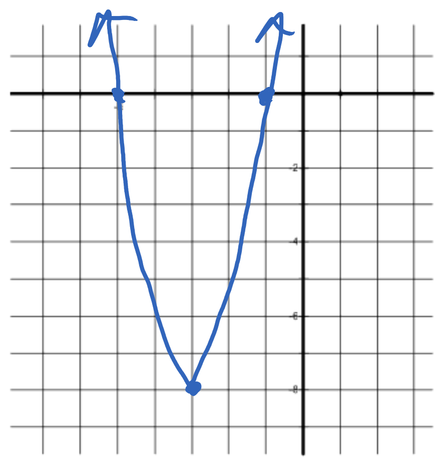
$0=(x+1)(x+5)$

$x+1=0 \quad x+5=0$

$x=-1 \quad x=-5$

$1\times 5=5$

$1,5 \quad -1,-5$



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

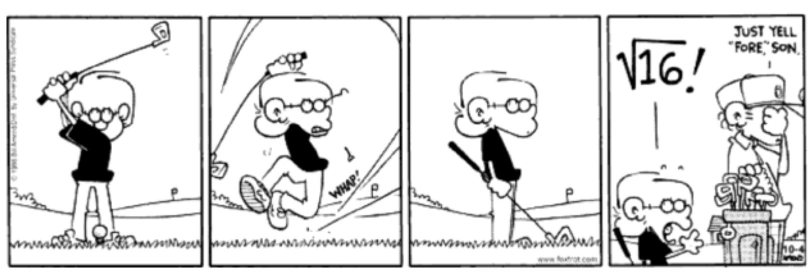
R: $y\geq -8$

vertex half

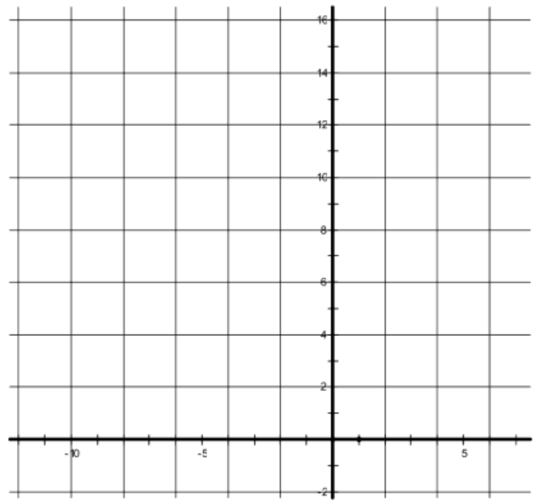
$x=\frac{(-1)+(-5)}{2}=-3$

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

$(-3,-8)$

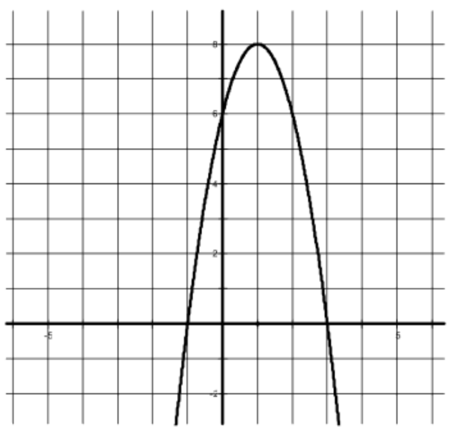


Example 2: Sketch the graph of $f(x) = -x^2 - 3x + 12$ and state the domain and range.

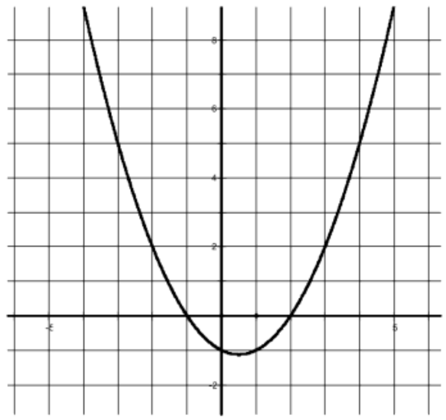


Example 3: Determine the equation of the function that defines each graph. Write each function in standard form.

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