

1. $f(x) = (x - 7)(x + 5)$

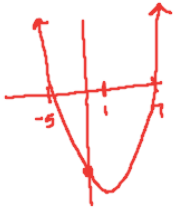
2. $g(x) = -(x - 8)(x - 2)$

3. $h(x) = \frac{1}{3}(x + 9)(x - 3)$

zeros: 7 and -5

zeros: 8 and 2

zeros: -9 and 3



vertex: x falls between the 2 zeros.

vertex: $x = 8 + 2 = 10 \div 2 = 5$

vertex: $-9 + 3 = -6 \div 2 = -3$

$7 + -5 = 2 \div 2 = 1 = x$
 $y = (1 - 7)(1 + 5)$
 $= (-6)(6)$
 $= -36$
 (1, -36)

$y = -(5 - 8)(5 - 2)$
 $= -(-3)(3)$
 $= (3)(3) = 9$
 (5, 9)

$y = \frac{1}{3}(-3 + 9)(-3 - 3)$
 $= \frac{1}{3}(6)(-6)$
 $= 2(-6) = -12$
 (-3, -12)

y-int:

y-int:

y-int:

$\hookrightarrow x = 0$
 $y = (0 - 7)(0 + 5)$
 $y = (-7)(5)$
 $y = -35$
 (0, -35)

$y = -(0 - 8)(0 - 2)$
 $y = -(-8)(-2)$
 $y = (8)(-2)$
 $y = -16$
 (0, -16)

$y = \frac{1}{3}(0 + 9)(0 - 3)$
 $y = \frac{1}{3}(9)(-3)$
 $= 3(-3)$
 $y = -9$
 (0, -9)

Standard Form:

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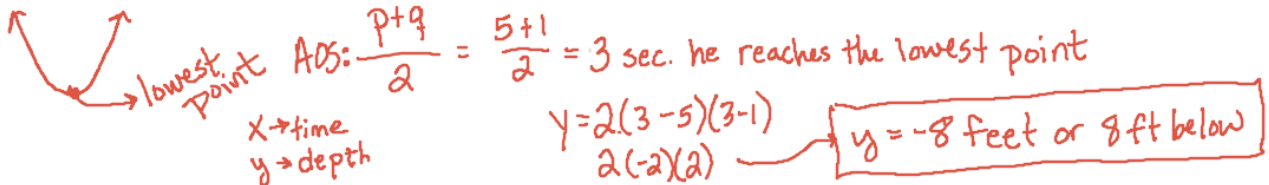
$f(x) = (x - 7)(x + 5)$
 $= x^2 + 5x - 7x - 35$
 $f(x) = x^2 - 2x - 35$

$g(x) = -(x - 8)(x - 2)$
 $= -(x^2 - 2x - 8x + 16)$
 $= -(x^2 - 10x + 16)$
 $g(x) = -x^2 + 10x - 16$

$h(x) = \frac{1}{3}(x + 9)(x - 3)$
 $= \frac{1}{3}(x^2 - 3x + 9x - 27)$
 $= \frac{1}{3}(x^2 + 6x - 27)$
 $h(x) = \frac{1}{3}x^2 + 2x - 9$

Answer the following application problems.

4. The height of a swimmers dive off a 10-foot platform into a diving pool is modeled by the equation $y = 2(x - 5)(x - 1)$, where x represents the number of seconds since the swimmer left the diving board and y represents the number of feet above or below the water's surface. What is the farthest depth below the water's surface that the swimmer will reach?



5. The owner of an auditorium wants to increase the ticket prices to maximize the profit by using function $P(x) = -50(x - 12)(x + 10)$ where P is the profit and x is the number of \$1 price increases. According to this rule, how much should he increase the price in order to maximize the profit, and what will the maximum profit be?

