Honors Math II
After 4.1-4.9 Test Part 1

Name Key
Period_____ Date_____

No Calculator

1. **Solve for x three times**: by factoring completely, by completing the square, and by the quadratic formula.

$\mathbf{12x^2 + 24x + 9 = 0}$

Factoring	Completing the Square	Quadratic Formula
$12x^2+24x+9=0$ $3(4x^2+8x+3)=0$ $3(2x+1)(2x+3)=0$ $x=-1/2, -3/2$	$12x^2+24x+9=0$ $12(x^2+2x+\_\_\_)=-9+\_\_\_$ $12(x^2+2x+\underline{1})=-9+\underline{12}$ $12(x+1)^2=3$ $(x+1)^2=\frac{3}{12}$ $(x+1)^2=\frac{1}{4}$ $x+1=\pm\sqrt{1/4}$ $x=-1\pm 1/2$ → $x=-\frac{1}{2}, -3/2$	$3(4x^2+8x+3)=0$ $x=\frac{-8\pm\sqrt{64-4(4)(3)}}{2(4)}$ $x=\frac{-8\pm\sqrt{16}}{8}$ $x=\frac{-8\pm 4}{8}$ $x=\frac{-2\pm 1}{2}$ $x=-1/2, -3/2$

2. A bottle rocket is shot from a bridge into the lake below. The height of the rocket is modeled by $h(t) = -16t^2 + 96t + 112$ where t represents time in seconds and h is the height above the water.

a. What is the height of the rocket after 2 seconds?

$h(t) = -16(2)^2+96(2)+112$
$= -64+192+112$

$h(t) = 240$ ft

b. What is the maximum height reached by the rocket?

$h(t) = -16(t^2-6t+\_\_\_)+112+\_\_\_$
$= -16(t^2-6t+\underline{9})+112+\underline{144}$

$h(t) = -16(t-3)^2+256$

Max height 256 ft

c. How long does it take to reach its maximum height?

3 sec

d. How long will it take for the rocket to hit 87 feet?

Use vertex form from part b.
Easier numbers than quadratic formula

$87 = -16(t-3)^2+256$
$\frac{-169}{-16} = \frac{-16(t-3)^2}{-16}$
$\frac{169}{16} = (t-3)^2$
$t-3 = \pm\sqrt{\frac{169}{16}}$
$t = 3 \pm \frac{13}{4}$
$t = 3 + 13/4$
$t = 25/4 = 6.25$ sec

e. When will the rocket hit the lake?

$0 = -16t^2+96t+112$
$0 = -16(t^2-6t-7)$
$0 = -16(t-7)(t+1)$

$t = 7$ sec