Quadratic Equations Meet the Real World

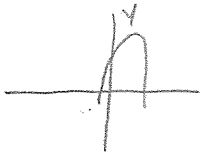
① $h = -16t^2 + vt + h_0$

$4 = -16t^2 + 25t + 5$

$0 = -16t^2 + 25t + 1$

$t = -0.039$ extraneous

$t = 1.601$



② $S = 0.2t^2 - 2t + 5.3$

$2.1 = 0.2t^2 - 2t + 5.3$

$0 = 0.2t^2 - 2t + 3.2$

$(2, 2.1)$ $(8, 2.1)$

↑ Ignore b/c says model applies to 1985 - 1990.

1988

③ $m = 0.337t^2 - 2.265t + 3.962$

$2.5 = 0.337t^2 - 2.265t + 3.962$

$0 = 0.337t^2 - 2.265t + 1.462$

$(1.063, -0.56618)$

$(5.9977, \text{———})$

$1980 \rightarrow 1985.9977$

end of 1986

④ $h = -16t^2 + 18t + 6$

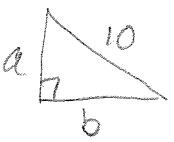
$0 = -16t^2 + 18t + 6$

$t = \dfrac{-18 \pm \sqrt{256 - 4(-16)(6)}}{2(-16)}$

$\dfrac{-18 \pm \sqrt{640}}{-32}$

$t = -0.228$ $\quad$ $t = 1.353$

calculator gives ≈ 1.39

⑤ 

$a^2 + b^2 = 100$

$b^2 = 100 - a^2$

$b = \sqrt{100 - a^2}$

$\frac{1}{2}ab = 15$

$\frac{1}{2}a(\sqrt{100 - a^2}) = 15$

$a(\sqrt{100 - a^2}) = 30$

$a^2(100 - a^2) = 900$

$100a^2 - a^4 = 900$

$0 = a^4 - 100a^2 + 900$

$0 = (a^2 - 90)(a^2 - 10)$

$a^2 = 90$

$a = \pm 3\sqrt{10}$ $\quad$ $a = \pm\sqrt{10}$

Lengths:
$3\sqrt{10}$
$\sqrt{10}$

⑥ $h = -16t^2 + vt + h_0$

$0 = -16t^2 - 1.4t + 4$

$t \approx 0.4581$

0.458 sec.