Solving Verbal Quadratic Problems

Do Now: Find the zeros of the following quadratic equation.

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

-35
$7 \quad -5$

$(x+7)(x-5)$

$x+7=0$ | $x-5=0$
$-7 \quad -7$ | $+5 \quad +5$
$x=-7$ | $x=5$

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Solving Verbal Quadratic Problems

1. If 18 is subtracted from twice the square of an integer, the result is equal to nine times the integer. Find the integer.

Let: x = the integer

$2x^2 - 18 = 9x$
$-9x \quad -9x$
$2x^2 - 9x - 18 = 0$
-36

$(2x^2 - 12x)(+3x - 18) = 0$
$2x(x-6) + 3(x-6) = 0$
$(x-6)(2x+3) = 0$
$x-6=0$ | $2x+3=0$
$\boxed{x=6}$ | $x = -\frac{3}{2}$ reject

2. The smaller of two positive integers is 3 less than the larger. If twice the square of the larger is increased by three time the smaller, the result is 56. Find the smaller integer.

Let: x = larger positive integer = 5
$x-3$ = smaller positive integer = $\boxed{2}$

$2x^2 + 3(x-3) = 56$
$2x^2 + 3x - 9 = 56$
$-56 \quad -56$
$2x^2 + 3x - 65 = 0$
-130
$(2x^2 + 13x)(-10x - 65) = 0$
$x(2x+13) - 5(2x+13) = 0$
$(x-5)(2x+13) = 0$
$x-5=0$ | $2x+13=0$
$\boxed{x=5}$ | $x = -\frac{13}{2}$ reject

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Solving Verbal Quadratic Problems

3. Find two consecutive integers whose product is 132.

4. Find two consecutive positive even integers whose product is 224.

Let: x = 1st positive Even Consecutive Integer $\boxed{14}$
$x+2$ = 2nd positive Even Cons. Integer = $\boxed{16}$

$x(x+2) = 224$
$x^2 + 2x = 224$
$-224 \quad -224$
$x^2 + 2x - 224 = 0$
$(x+16)(x-14) = 0$
$x+16=0$ | $x-14=0$
reject $x=-16$ | $x=14$

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5. A foul ball leaves the end of a baseball bat and travels according to the formula $h(t) = 64t - 16t^2$, where h is the height of the ball in feet and t is the time in seconds. How long will it take for the ball to hit the ground?

$0 = 64t - 16t^2$
$-64t + 16t^2 \quad -64t + 16t^2$
$-64t + 16t^2 = 0$
$\frac{16t^2}{16t} - \frac{64t}{16t} = 0$

$16t(t-4) = 0$
$\frac{16t}{16} = \frac{0}{16}$ | $t-4=0$
$t=0$ | $+4 \quad +4$
$t=4$
$\boxed{4 \text{ seconds}}$

6. The height, h, in feet of an object above the ground is given by $h = -16t^2 + 64t + 190$, $t \geq 0$ where t is the time in seconds. Find the time it takes for the object to reach 254 feet.

$254 = -16t^2 + 64t + 190$
$+16t^2 - 64t - 190 \quad +16t^2 - 64t - 190$
$\frac{16t^2}{16} - \frac{64t}{16} + \frac{64}{16} = 0$
$16(t^2 - 4t + 4) = 0$
$16(t-2)(t-2) = 0$
$\cancel{16=0}$ | $t-2=0$ | $t-2=0$
$t=2$ | $t=2$
$\boxed{2 \text{ seconds}}$

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7. Emma hits a golf ball off of the tee. The height of the ball is given by $h = 5 + 25t - 16t^2$, where t is in seconds. When will the ball hit the ground?

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