Quadratic Homework – Sample Test: Quadratic Equations I*

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Abstract

A first sample test on quadratics equations.

Exercise 1
Multiply:

a. $\left(x-\frac{3}{2}\right)^2$
b. $\left(x-\sqrt{3}\right)^2$
c. $(x-7)(x+7)$
d. $(x-2)\left(x^2-4x+4\right)$
e. $(x+3)(2x-5)$
f. Check your answer to part (e) by substituting in the number 1 for x into both the original expression, and your resultant expression. Do they come out the same? (**No credit** here for just saying "yes"—I have to be able to see your work!)

Exercise 2
Here is a formula you probably never saw, but it is true: for any x and a, $(x+a)^4 = x^4 + 4x^3a + 6x^2a^2 + 4\text{xa}^3 + a^4$. Use that formula to expand the following.

a. $(x+2)^4 =$
b. $(x-1)^4 =$

Exercise 3
Factor:

a. $x^2 - 36$
b. $2x^2y - 72y$
c. Check your answer to part (b) by multiplying back. (*I have to see your work!)
d. $x^3 - 6x^2 + 9x$
e. $3x^2 - 27x + 24$
f. $x^2 + 5x + 5$
g. $2x^2 + 5x + 2$

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Exercise 4
Geoff has a rectangular yard which is 55' by 75'. He is designing his yard as a big grassy rectangle, surrounded by a border of mulch and bushes. The border will be the same width all the way around. The area of his entire yard is 4125 square feet. The grassy area will have a smaller area, of course—Geoff needs it to come out exactly 3264 square feet. How wide is the mulch border?

Exercise 5
Standing outside the school, David throws a ball up into the air. The ball leaves David's hand 4' above the ground, traveling at 30 feet/sec. Raven is looking out the window 10' above ground, bored by her class as usual, and sees the ball go by. How much time elapsed between when David threw the ball, and when Raven saw it go by? **To solve this problem, use the equation $h(t) = h_0 v_o t - \mathbf{16}t^2$.**

Exercise 6
Solve by factoring: $2x^2 - 11x - 30 = 0$

Exercise 7
Solve by completing the square: $2x^2 + 6x + 4 = 0$

Exercise 8
Solve by using the quadratic formula: $-x^2 + 2x + 1 = 0$

Exercise 9
Solve. (*No credit unless I see your work!) $\mathrm{ax}^2 + \mathrm{bx} + c = 0$

Solve any way you want to:

Exercise 10
$2x^2 + 4x + 10 = 0$

Exercise 11
$\left(\frac{1}{2}\right) x^2 - x + 2\frac{1}{2} = 0$

Exercise 12
$x^3 = x$

Exercise 13
Consider the equation $3x^2 - \mathrm{bx} + 2 = 0$, where b is some constant. **For what values of** b will this equation have...

a. No real answers:
b. Exactly one answer:
c. Two real answers:
d. Can you find a value of b for which this equation will have two rational answers—that is, answers that can be expressed with no square root? (Unlike (a)-(c), I'm not asking for all such solutions, just one.)

Extra Credit:
(5 points) Make up a word problem involving throwing a ball up into the air. The problem should have **one negative answer** and **one positive answer**. Give your problem in words—then show the equation that represents your problem—then solve the equation—then answer the original problem in words.