Name: _____

IM2 Semester 1 Final Exam Review E
(Study Guide Questions 4-6, 46-48 & 61-63)

Determining Quadratic Solutions

To solve a quadratic using the quadratic formula when standard form is not equal to 0 (problems 46–48):

Start by putting it in standard form: move the number to the right of the equal sign by adding or subtracting.

You want the equation to look like this: $ax^2 + bx + c = 0$

Next, identify a, b & c, and plug them into the quadratic formula.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Simplify one piece at a time.

First, each small piece: $-b = ?,\ b^2 = ?,\ -4(a)(c) = ?,\ 2a = ?$

Second, what's under the root: $b^2 - 4ac = ?$

Third, the root: $\sqrt{b^2 - 4ac}$

Fourth, add the top and subtract the top (there are two answers)

Fifth, divide each of your two possible numerators (fraction tops) by $2a$.

1. Solve the quadratic equation by factoring, completing the square or by using the Quadratic Formula. ~~Round to the nearest tenth if necessary~~. $8x^2 - 38x = 10$ a. $\left\{5, \frac{1}{4}\right\}$ b. $\left\{-5, \frac{1}{4}\right\}$ c. $\left\{5, -\frac{1}{4}\right\}$ d. $\left\{-5, -\frac{1}{4}\right\}$	2. Solve the quadratic equation by factoring, completing the square or by using the Quadratic Formula. ~~Round to the nearest tenth if necessary.~~ $-4x^2 - 19x = -5$ a. $\left\{5, \frac{1}{4}\right\}$ b. $\left\{-5, \frac{1}{4}\right\}$ c. $\left\{5, -\frac{1}{4}\right\}$ d. $\left\{-5, -\frac{1}{4}\right\}$	3. Solve the quadratic equation by factoring, completing the square or by using the Quadratic Formula. ~~Round to the nearest tenth if necessary~~. $12x^2 - 63x = -15$ a. $\left\{5, \frac{1}{4}\right\}$ b. $\left\{-5, \frac{1}{4}\right\}$ c. $\left\{5, -\frac{1}{4}\right\}$ d. $\left\{-5, -\frac{1}{4}\right\}$
4. Solve the quadratic equation by factoring, completing the square or by using the Quadratic Formula. ~~Round to the nearest tenth if necessary~~. $5x^2 + 14x = -8$ a. $\left\{2, \frac{4}{5}\right\}$ b. $\left\{2, -\frac{4}{5}\right\}$ c. $\left\{-2, \frac{4}{5}\right\}$ d. $\left\{-2, -\frac{4}{5}\right\}$	5. Solve the quadratic equation by factoring, completing the square or by using the Quadratic Formula. ~~Round to the nearest tenth if necessary~~. $10x^2 - 28x = -16$ a. $\left\{2, \frac{4}{5}\right\}$ b. $\left\{2, -\frac{4}{5}\right\}$ c. $\left\{-2, \frac{4}{5}\right\}$ d. $\left\{-2, -\frac{4}{5}\right\}$	6. Solve the quadratic equation by factoring, completing the square or by using the Quadratic Formula. ~~Round to the nearest tenth if necessary~~. $-5x^2 - 6x = -8$ a. $\left\{2, \frac{4}{5}\right\}$ b. $\left\{2, -\frac{4}{5}\right\}$ c. $\left\{-2, \frac{4}{5}\right\}$ d. $\left\{-2, -\frac{4}{5}\right\}$

7. Solve the quadratic equation by factoring, completing the square or by using the Quadratic Formula. ~~Round to the nearest tenth if necessary~~. $-3x^2 + 16x = -12$ a. $\{-6, -\frac{2}{3}\}$ b. $\{6, \frac{2}{3}\}$ c. $\{-6, \frac{2}{3}\}$ d. $\{6, -\frac{2}{3}\}$	8. Solve the quadratic equation by factoring, completing the square or by using the Quadratic Formula. ~~Round to the nearest tenth if necessary~~. $6x^2 + 40x = -24$ a. $\{-6, -\frac{2}{3}\}$ b. $\{6, \frac{2}{3}\}$ c. $\{-6, \frac{2}{3}\}$ d. $\{6, -\frac{2}{3}\}$	9. Solve the quadratic equation by factoring, completing the square or by using the Quadratic Formula. ~~Round to the nearest tenth if necessary~~. $-9x^2 + 60x = 36$ a. $\{-6, -\frac{2}{3}\}$ b. $\{6, \frac{2}{3}\}$ c. $\{-6, \frac{2}{3}\}$ d. $\{6, -\frac{2}{3}\}$

To solve a quadratic using the quadratic formula when standard form is equal to 0 (problems 46–48):

To start, identify a, b & c, and plug them into the quadratic formula.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Simplify one piece at a time.

First, each small piece: $-b = ?, b^2 = ?, -4(a)(c) = ?, 2a = ?$

Second, what's under the root: $b^2 - 4ac = ?$

Third, the root: $\sqrt{b^2 - 4ac}$

Fourth, add the top and subtract the top (there are two answers)

Fifth, divide each of your two possible numerators (fraction tops) by $2a$.

10. Use the quadratic formula to solve. $x^2 - 6x - 7 = 0$ a. -1 and 7 b. $-3 \pm 4i$ c. $3 \pm 4i$ d. 1 and -7	11. Use the quadratic formula to solve. $x^2 - 6x + 25 = 0$ a. -1 and 7 b. $-3 \pm 4i$ c. $3 \pm 4i$ d. 1 and -7	12. Use the quadratic formula to solve. $x^2 + 10x + 29 = 0$ a. $5 \pm 2i$ b. $-5 \pm 2i$ c. -3 and -7 d. 3 and 7

13. Use the quadratic formula to solve.

$x^2 + 10x + 21 = 0$

a. $5 \pm 2i$
b. $-5 \pm 2i$
c. -3 and -7
d. 3 and 7

14. Use the quadratic formula to solve.

$x^2 - 12x + 45 = 0$

a. $-6 \pm 3i$
b. $6 \pm 3i$
c. -3 and 9
d. 3 and 9

15. Use the quadratic formula to solve.

$x^2 + 4x - 12 = 0$

a. -2 and 6
b. $-2 \pm 4i$
c. 2 and -6
d. $2 \pm 4i$

16. Use the quadratic formula to solve.

$x^2 - 2x + 10 = 0$

a. $1 \pm 3i$
b. $-1 \pm 3i$
c. 2 and -4
d. -2 and 4

17. Use the quadratic formula to solve.

$x^2 + 14x + 58 = 0$

a. 4 and 10
b. $7 \pm 3i$
c. $-7 \pm 3i$
d. -4 and -10

18. Use the quadratic formula to solve.

$x^2 - 5x - 24 = 0$

a. 3 and -8
b. -3 and 8
c. $\frac{5}{2} \pm \frac{11i}{2}$
d. $-\frac{5}{2} \pm \frac{11i}{2}$

To determine quadratic solutions by completing the square (problems 61-63):

You can using the quadratic formula to solve, as in #1-9 on this worksheet, but it is easier to complete the square.

Start by rewriting $x^2 + bx = -c$ as $\left(x + \frac{b}{2}\right)^2 = -c + \left(\frac{b}{2}\right)^2$

Divide the number in front of the x-term by 2. Write that number in squared parentheses on the left:

$\left(x \boxed{same\ sign} \boxed{number\ divided\ by\ 2}\right)^2 =$

Whatever number you put on the left, square it and add that number to the number on the right.

For example: $x^2 - 100x = 8$ $\quad 100 \div 2 = \boxed{50}$ *&* $(50)^2 = \boxed{\boxed{2500}}$

$\left(x - \boxed{50}\right)^2 = 8 + \boxed{\boxed{2500}}$

Then simplify the right side.

Next, cancel the square (^{2}) by putting $\pm\sqrt{\ }$ on the right side (simplify the square root, if you can).

Next, move the number next to *x* by adding or subtracting it to both sides (put it in front of $\pm$).

19. Determine the solutions to the equation (use the form $j \pm \sqrt{k}$, where j and k are integers). $x^2 - 18x = -8$	20. Determine the solutions to the equation (use the form $j \pm \sqrt{k}$, where j and k are integers). $x^2 - 20x = 1$	21. Determine the solutions to the equation (use the form $j \pm \sqrt{k}$, where j and k are integers). $x^2 + 8x = 3$
22. Determine the solutions to the equation (use the form $j \pm \sqrt{k}$, where j and k are integers). $x^2 - 6x = -4$	23. Determine the solutions to the equation (use the form $j \pm \sqrt{k}$, where j and k are integers). $x^2 + 2x = 46$	24. Determine the solutions to the equation (use the form $j \pm \sqrt{k}$, where j and k are integers). $x^2 + 12x = -5$
25. Determine the solutions to the equation (use the form $j \pm \sqrt{k}$, where j and k are integers). $x^2 + 10x = -4$	26. Determine the solutions to the equation (use the form $j \pm \sqrt{k}$, where j and k are integers). $x^2 - 8x = 23$	27. Determine the solutions to the equation (use the form $j \pm \sqrt{k}$, where j and k are integers). $x^2 + 14x = -8$

Answers

1. C	2. B	3. A	4. D	5. A	6. C
7. D	8. A	9. B	10. A	11. C	12. B
13. C	14. B	15. C	16. A	17. C	18. B
19. $9 \pm \sqrt{73}$	20. $10 \pm \sqrt{101}$	21. $-4 \pm \sqrt{19}$	22. $3 \pm \sqrt{5}$	23. $-1 \pm \sqrt{47}$	24. $-6 \pm \sqrt{31}$
25. $-5 \pm \sqrt{21}$		26. $4 \pm \sqrt{39}$		27. $-7 \pm \sqrt{41}$	