

**A.REI.B.4: Solving Quadratics 8**

- 1 The solution to the equation  $4x^2 + 98 = 0$  is
  - 1)  $\pm 7$
  - 2)  $\pm 7i$
  - 3)  $\pm \frac{7\sqrt{2}}{2}$
  - 4)  $\pm \frac{7i\sqrt{2}}{2}$
  
- 2 What is the solution when the equation  $wx^2 + w = 0$  is solved for  $x$ , where  $w$  is a positive integer?
  - 1)  $-1$
  - 2)  $0$
  - 3)  $6$
  - 4)  $\pm i$
  
- 3 The roots of the equation  $x^2 + 2x + 5 = 0$  are
  - 1)  $-3$  and  $1$
  - 2)  $-1$ , only
  - 3)  $-1 + 2i$  and  $-1 - 2i$
  - 4)  $-1 + 4i$  and  $-1 - 4i$
  
- 4 The roots of the equation  $0 = x^2 + 6x + 10$  in simplest  $a + bi$  form are
  - 1)  $-3 \pm 2i$
  - 2)  $-6 \pm i$
  - 3)  $-3 \pm i$
  - 4)  $-3 \pm i\sqrt{2}$
  
- 5 The roots of the equation  $x^2 - 4x = -13$  are
  - 1)  $2 \pm 3i$
  - 2)  $2 \pm 6i$
  - 3)  $2 \pm \sqrt{17}$
  - 4)  $2 \pm \sqrt{13}$
  
- 6 The solutions to the equation  $-\frac{1}{2}x^2 = -6x + 20$  are
  - 1)  $-6 \pm 2i$
  - 2)  $-6 \pm 2\sqrt{19}$
  - 3)  $6 \pm 2i$
  - 4)  $6 \pm 2\sqrt{19}$
  
- 7 A solution of the equation  $2x^2 + 3x + 2 = 0$  is
  - 1)  $-\frac{3}{4} + \frac{1}{4}i\sqrt{7}$
  - 2)  $-\frac{3}{4} + \frac{1}{4}i$
  - 3)  $-\frac{3}{4} + \frac{1}{4}\sqrt{7}$
  - 4)  $\frac{1}{2}$
  
- 8 The roots of the equation  $3x^2 + 2x = -7$  are
  - 1)  $-2, -\frac{1}{3}$
  - 2)  $-\frac{7}{3}, 1$
  - 3)  $-\frac{1}{3} \pm \frac{2i\sqrt{5}}{3}$
  - 4)  $-\frac{1}{3} \pm \frac{\sqrt{11}}{3}$

9 The solutions to the equation  $5x^2 - 2x + 13 = 9$  are

- 1)  $\frac{1}{5} \pm \frac{\sqrt{21}}{5}$
- 2)  $\frac{1}{5} \pm \frac{\sqrt{19}}{5}i$
- 3)  $\frac{1}{5} \pm \frac{\sqrt{66}}{5}i$
- 4)  $\frac{1}{5} \pm \frac{\sqrt{66}}{5}$

10 The solution to the equation  $18x^2 - 24x + 87 = 0$  is

- 1)  $-\frac{2}{3} \pm 6i\sqrt{158}$
- 2)  $-\frac{2}{3} \pm \frac{1}{6}i\sqrt{158}$
- 3)  $\frac{2}{3} \pm 6i\sqrt{158}$
- 4)  $\frac{2}{3} \pm \frac{1}{6}i\sqrt{158}$

11 The solutions to the equation  $3x^2 - 4x + 2 = 2x - 3$  are

- 1)  $\frac{2}{3} \pm \frac{\sqrt{2}}{3}i$
- 2)  $1 \pm \frac{\sqrt{6}}{3}i$
- 3)  $1 \pm \frac{\sqrt{12}}{3}$
- 4)  $1 \pm 2\sqrt{6}i$

12 If a solution of  $2(2x - 1) = 5x^2$  is expressed in simplest  $a + bi$  form, the value of  $b$  is

- 1)  $\frac{\sqrt{6}}{5}i$
- 2)  $\frac{\sqrt{6}}{5}$
- 3)  $\frac{1}{5}i$
- 4)  $\frac{1}{5}$

13 Solve the equation  $x^2 + 3x + 11 = 0$  algebraically. Express the answer in  $a + bi$  form.

14 Solve the equation  $2x^2 + 5x + 8 = 0$ . Express the answer in  $a + bi$  form.

15 Solve the equation  $3x^2 + 5x + 8 = 0$ . Write your solution in  $a + bi$  form.

16 a) Algebraically determine the roots, in simplest  $a + bi$  form, to the equation below.

$$x^2 - 2x + 7 = 4x - 10$$

b) Consider the system of equations below.

$$y = x^2 - 2x + 7$$

$$y = 4x - 10$$

The graph of this system confirms the solution from part a is imaginary. Explain why.

## A.REI.B.4: Solving Quadratics 8

### Answer Section

1 ANS: 4

$$4x^2 = -98$$

$$x^2 = -\frac{98}{4}$$

$$x^2 = -\frac{49}{2}$$

$$x = \pm \sqrt{-\frac{49}{2}} = \pm \frac{7i}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \pm \frac{7i\sqrt{2}}{2}$$

REF: 061707aaii

2 ANS: 4

$$wx^2 + w = 0$$

$$w(x^2 + 1) = 0$$

$$x^2 = -1$$

$$x = \pm i$$

REF: 061912aaii

3 ANS: 3

$$x^2 + 2x + 1 = -5 + 1$$

$$(x + 1)^2 = -4$$

$$x + 1 = \pm 2i$$

$$x = -1 \pm 2i$$

REF: 081703aaii

4 ANS: 3

$$x^2 + 6x + 9 = -10 + 9$$

$$(x + 3)^2 = -1$$

$$x + 3 = \pm i$$

$$x = -3 \pm i$$

REF: 012416aaii

5 ANS: 1

$$x^2 - 4x + 4 = -13 + 4$$

$$(x-2)^2 = -9$$

$$x-2 = \pm 3i$$

$$x = 2 \pm 3i$$

REF: 062312aai

6 ANS: 3

$$-2\left(-\frac{1}{2}x^2 = -6x + 20\right)$$

$$x^2 - 12x = -40$$

$$x^2 - 12x + 36 = -40 + 36$$

$$(x-6)^2 = -4$$

$$x-6 = \pm 2i$$

$$x = 6 \pm 2i$$

REF: fall1504aai

7 ANS: 1

$$x = \frac{-3 \pm \sqrt{3^2 - 4(2)(2)}}{2(2)} = \frac{-3 \pm \sqrt{-7}}{4} = -\frac{3}{4} \pm \frac{i\sqrt{7}}{4}$$

REF: 061612aai

8 ANS: 3

$$x = \frac{-2 \pm \sqrt{2^2 - 4(3)(7)}}{2(3)} = \frac{-2 \pm \sqrt{-80}}{6} = \frac{-2 \pm i\sqrt{16}\sqrt{5}}{6} = -\frac{1}{3} \pm \frac{2i\sqrt{5}}{3}$$

REF: 081809aai

9 ANS: 2

$$x = \frac{2 \pm \sqrt{(-2)^2 - 4(5)(4)}}{2(5)} = \frac{2 \pm \sqrt{-76}}{10} = \frac{2 \pm i\sqrt{4}\sqrt{19}}{10} = \frac{1}{5} \pm \frac{i\sqrt{19}}{5}$$

REF: 011905aai

10 ANS: 4

$$x = \frac{8 \pm \sqrt{(-8)^2 - 4(6)(29)}}{2(6)} = \frac{8 \pm \sqrt{-632}}{12} = \frac{8 \pm i\sqrt{4}\sqrt{158}}{12} = \frac{2}{3} \pm \frac{1}{6}i\sqrt{158}$$

REF: 011711aai

11 ANS: 2

$$3x^2 - 4x + 2 = 2x - 3 \quad x = \frac{6 \pm \sqrt{(-6)^2 - 4(3)(5)}}{2(3)} = \frac{6 \pm \sqrt{-24}}{6} = \frac{6 \pm 2i\sqrt{6}}{6} = 1 \pm \frac{i\sqrt{6}}{3}$$

$$3x^2 - 6x + 5 = 0$$

REF: 062410aai

12 ANS: 2

$$5x^2 - 4x + 2 = 0 \quad \frac{4 \pm \sqrt{(-4)^2 - 4(5)(2)}}{2(5)} = \frac{4 \pm \sqrt{-24}}{10} = \frac{4 \pm 2i\sqrt{6}}{10} = \frac{2 \pm i\sqrt{6}}{5}$$

REF: 012020aai

13 ANS:

$$x = \frac{-3 \pm \sqrt{3^2 - 4(1)(11)}}{2(1)} = \frac{-3 \pm \sqrt{-35}}{2} = -\frac{3}{2} \pm \frac{i\sqrt{35}}{2}$$

REF: 082432aai

14 ANS:

$$x = \frac{-5 \pm \sqrt{5^2 - 4(2)(8)}}{2(2)} = -\frac{5}{4} \pm \frac{i\sqrt{39}}{4}$$

REF: 061827aai

15 ANS:

$$x = \frac{-5 \pm \sqrt{5^2 - 4(3)(8)}}{2(3)} = -\frac{5}{6} \pm \frac{i\sqrt{71}}{6}$$

REF: 082327aai

16 ANS:

$$x^2 - 6x = -17 \quad \text{The solution is imaginary because the parabola and line do not intersect.}$$

$$x^2 - 6x + 9 = -17 + 9$$

$$(x - 3)^2 = -8$$

$$x - 3 = \pm 2i\sqrt{2}$$

$$x = 3 \pm 2i\sqrt{2}$$

REF: 081936aai