

# Unit 5

## Solving Quadratic Equations

Name: \_\_\_\_\_

Date: \_\_\_\_\_ Block: \_\_\_\_\_

### Topic 1: Complex Numbers

Simplify each expression below.

1.  $\sqrt{-324}$

$$\sqrt{324} i$$

$$18i$$

2.  $2\sqrt{-147}$

$$2i\sqrt{147}$$

$$2i\sqrt{49 \cdot 3} \rightarrow 2 \cdot 7i\sqrt{3}$$

$$14i\sqrt{3}$$

3.  $(-4+7i)+(-3-8i)$

$$-7 - i$$

4.  $(21+9i)-(13-2i)$

$$21+9i-13+2i$$

$$8+11i$$

5.  $(1+5i)(4-2i)$

$$4 - 2i + 20i - 10i^2$$

$$4 + 18i + 10$$

$$14 + 18i$$

6.  $(7-i)^2$

$$49 - 14i + i^2$$

$$49 - 14i - 1$$

$$48 - 14i$$

7.  $\frac{8}{-12i}$

$$\frac{-8}{12i}$$

$$\frac{-2i}{3i \cdot i}$$

$$\frac{-2i}{3i^2}$$

$$\frac{-2i}{3(-1)}$$

$$\frac{2i}{3}$$

8.  $\frac{3-6i}{4-3i} \cdot \frac{(4+3i)}{(4+3i)}$

$$\frac{12+9i-24i-18i^2}{16-9i^2}$$

$$\frac{12-15i+18}{16+9}$$

$$\frac{30-15i}{25}$$

$$\frac{30}{25} - \frac{15}{25}i$$

$$\frac{6}{5} - \frac{3}{5}i$$

### Topic 2: Solving Quadratics by Factoring

9.  $x^2 - 11x + 18 = 0$

$$(x-9)(x-2) = 0$$

$$x-9=0 \quad x-2=0$$

$$x=9 \quad x=2$$

10.  $2x^2 - 32x + 128 = 0$

$$2(x^2 - 16x + 64) = 0$$

$$2(x-8)(x-8) = 0$$

$$x=8$$

### Topic 1

Simplify

$$i^{41} i$$

simplify

$$i^{32} = 1$$

simplify

$$\sqrt{40} = 2\sqrt{10}$$

11.  $8x^2 + 10x = 0$

$2x(4x + 5) = 0$

$x = 0$      $4x + 5 = 0$   
                  $4x = -5$   
                  $x = -5/4$

$x = 0, -5/4$

12.  $7x^2 - 19x - 6 = 0$

~~$-4z$   
 $-21 \times 2$   
 $-19$~~

$7x^2 - 21x + 2x - 6 = 0$   
 $7x(x - 3) + 2(x - 3) = 0$   
 $(7x + 2)(x - 3) = 0$   
 $7x + 2 = 0$              $x - 3 = 0$   
 $7x = -2$                  $x = 3$   
 $x = -2/7, 3$

Topic 3: Solving Quadratics by Square Roots

13.  $16x^2 - 1 = 0$

$16x^2 = 1$   
 $x^2 = 1/16$   
 $x = \pm \sqrt{1/16}$   
 $x = \pm 1/4$

14.  $-3x^2 + 11 = 17$

$-3x^2 = 6$   
 $x^2 = -2$   
 $x = \pm \sqrt{-2} = \pm \sqrt{2}i$

15.  $(x + 5)^2 = 4$

$x + 5 = \pm \sqrt{4}$   
 $x + 5 = \pm 2$   
 $x + 5 = 2$              $x + 5 = -2$   
 $x = -3$                  $x = -7$

16.  $(x - 8)^2 - 7 = 25$

$(x - 8)^2 = 32$   
 $x - 8 = \pm \sqrt{32}$   
                  $= \pm \sqrt{16 \cdot 2}$   
 $x - 8 = \pm 4\sqrt{2}$   
 $x = 8 \pm 4\sqrt{2}$

17.  $x^2 = -15$

$x = \pm \sqrt{-15}$   
 $x = \pm i\sqrt{15}$

18.  $4x^2 - 6 = 90$

$4x^2 = 96$   
 $x^2 = 24$   
 $x = \pm \sqrt{24} = \pm 2\sqrt{6}$   
 $x = \pm 2\sqrt{6}$



Topic 4: Solving Quadratics by Completing the Square

19.  $x^2 - 8x - 10 = 0$

$$x^2 - 8x + \frac{16}{1} = 10 + \frac{16}{1}$$

$$\left(\frac{-8}{2}\right)^2 = (-4)^2$$

$$(x - 4)^2 = 26$$

$$x - 4 = \pm \sqrt{26}$$

$$x = 4 \pm \sqrt{26}$$

20.  $-4x^2 - 48x - 20 = 0$

$$-4x^2 - 48x = 20$$

$$\frac{-4(x^2 + 12x)}{-4} = \frac{20}{-4}$$

$$x^2 + 12x + 36 = -5 + 36$$

$$\left(\frac{+12}{2}\right)^2 = (+6)^2$$

$$(x + 6)^2 = 31$$

$$x + 6 = \pm \sqrt{31}$$

$$x = -6 \pm \sqrt{31}$$

Topic 5: Solving Quadratics by the Quadratic Formula

21.  $-x^2 + 3x - 21 = 0$

$$a = -1 \quad b = 3 \quad c = -21$$

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

$$= \frac{-3 \pm \sqrt{9 - 84}}{-2}$$

$$= \frac{-3 \pm \sqrt{-75}}{-2}$$

$$= \frac{-3 \pm 5\sqrt{3}i}{-2}$$

$$= \frac{-3}{-2} \pm \frac{5\sqrt{3}i}{-2}$$

$$x = \frac{3}{2} \pm \frac{5\sqrt{3}i}{2}$$

22.  $10x^2 + 8x - 1 = 0$

$$a = 10 \quad b = 8 \quad c = -1$$

$$x = \frac{-8 \pm \sqrt{(8)^2 - 4(10)(-1)}}{2(10)}$$

$$= \frac{-8 \pm \sqrt{64 + 40}}{20}$$

$$= \frac{-8 \pm \sqrt{104}}{20} = \frac{-8 \pm 2\sqrt{26}}{20}$$

$$= \frac{-8}{20} \pm \frac{2\sqrt{26}}{20}$$

$$x = \frac{-2}{5} \pm \frac{\sqrt{26}}{10}$$

Compl. Sq or  
Does not factor - Quad form.

Topic 6: Choosing the Best Method

Solve using the most appropriate method. Use each method once only.

23.  $-x^2 + 2x - 8 = 0$

$-x^2 + 2x = 8$   
 $-1(x^2 - 2x) = 8$

$x^2 - 2x = -8$

$x^2 - 2x + \frac{\quad}{\quad} = -8 + \frac{\quad}{\quad}$   
 $(\frac{-2}{2})^2 = (-1)^2$

$x^2 - 2x + 1 = -8 + 1$

$(x-1)^2 = -7$

$x-1 = \pm \sqrt{-7} = \pm i\sqrt{7}$

$x = 1 \pm i\sqrt{7}$

- F
- SR
- CS
- QF

24.  $-2x^2 + 8 = x^2 - 28$  no x term

$-x \quad -x$

$-3x^2 + 8 = -28$

$-3x^2 = -36$

$x^2 = 12$

$x = \pm \sqrt{12}$

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

- F
- SR
- CS
- QF

25.  $-2x^2 - 5x - 4 = 0$

$a = -2 \quad b = -5 \quad c = -4$

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

$= \frac{5 \pm \sqrt{25 - 32}}{-4}$

$= \frac{5 \pm \sqrt{-7}}{-4} = \frac{5 \pm i\sqrt{7}}{-4}$

$x = \frac{-5}{4} \pm \frac{\sqrt{7}}{4}i$

- F
- SR
- CS
- QF

26.  $4x^2 + 32x - 36 = 0$

$4(x^2 + 8x - 9) = 0$

$4(x+9)(x-1) = 0$

$x+9=0 \quad x-1=0$

$x = -9 \quad x = 1$

- F
- SR
- CS
- QF

Does not factor