

# KEY

## 4.4 through 4.6 Quiz Review

Solve each quadratic equation. Be sure to express your answer in terms of  $i$ .

1.  $4x^2 + 25 = 0$

$$\frac{4x^2}{4} = \frac{-25}{4}$$

$$x^2 = \frac{-25}{4}$$

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

3.  $x^2 + 75 = 0$

$$x^2 = -75$$

$$x = \pm i\sqrt{75}$$

$$x = \pm i\sqrt{25 \cdot 3}$$

$$x = \pm i \cdot 5\sqrt{3}$$

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

2.  $x^2 = -98$

$$x = \pm i\sqrt{98}$$

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

$$x = \pm 7i\sqrt{2}$$

4.  $\frac{3x^2}{3} = \frac{-108}{3}$

$$x^2 = -36$$

$$x = \pm \sqrt{-36}$$

$$x = \pm 6i$$

Performing math operations with complex numbers. Write answer in  $a+bi$  form.

5.  $(7+6i) - (-3+8i)$

$$7+6i+3-8i \quad (\text{distribute})$$

$$10-2i$$

6.  $(5+3i) + (-7-9i)$

$$-2-6i$$

7.  $(1+2i)(1-2i)$

$$1 - 2i + 2i - 4i^2$$

$$1 - 4i^2$$

$$1 - 4(-1)$$

$$1 - (-4)$$

$$1 + 4$$

$$5$$

8.  $(9+2i)(4+2i)$

$$36 + 18i + 8i + 4i^2$$

$$36 + 26i + 4(i^2) - 1$$

$$36 + 26i - 4$$

$$32 + 26i$$

9.  $-3i(5-7i)$

$$-15i + 21(i^2)$$

$$-15i + -21$$

$$-21 - 15i$$

10.  $(2+3i)^2$

$$(2+3i)(2+3i)$$

$$4 + 6i + 6i + 9i^2$$

$$4 + 12i - 9$$

$$-5 + 12i$$

Simplify:

$$1. \frac{(2+4i)(-3i)}{(3i)(-3i)} = \frac{-6i - 12i^2}{-9i^2}$$

$$\frac{-6i - 12(-1)}{-9(-1)} = \frac{-6i + 12}{9}$$

$$\frac{-6i}{9} + \frac{12}{9} = -\frac{2i}{3} + \frac{4}{3}$$

$$\frac{4}{3} + -\frac{2}{3}i = \boxed{\frac{4}{3} - \frac{2}{3}i}$$

$$13. -5i^{18}$$

$$4 \overline{)18} \quad 4r.2$$

$$-5i^2 = -5(-1) = \boxed{5}$$

$$15. -6i^{16}$$

$$4 \overline{)16} \quad 4r.0$$

$$-6i^0 = -6(1) = \boxed{-6}$$

$$12. \frac{(1+6i)(1+2i)}{(1-2i)(1+2i)} = \frac{-11+8i}{5} = \boxed{\frac{-11}{5} + \frac{8}{5}i}$$

$$1+2i+6i+12i^2$$

$$1+8i-12$$

$$1-4$$

$$-3$$

$$-3$$

$$14. 3i^{25}$$

$$4 \overline{)25} \quad 6r.1$$

$$3i^1 = \boxed{3i}$$

$$16. \sqrt{-6} * \sqrt{-15}$$

$$i\sqrt{6} \cdot i\sqrt{15}$$

$$i^2 \sqrt{90}$$

$$-1 \cdot \sqrt{90}$$

$$-1 \cdot \sqrt{9} \cdot \sqrt{10}$$

$$-1 \cdot 3 \cdot \sqrt{10}$$

$$\boxed{-3\sqrt{10}}$$

What value of "c" would need to be added to the expression in order for it to be a perfect square trinomial? What will the perfect square factor be?

17)  $x^2 + 4x + c$   $\left(\frac{4}{2}\right)^2 = 4$   
 $x^2 + 4x + 4$   
 $(x+2)(x+2)$   
 $(x+2)^2$

18)  $x^2 - 18x + c$   $(-9)^2 = 81$   
 $x^2 - 18x + 81$   
 $(x-9)(x-9)$   
 $(x-9)^2$

19)  $x^2 + 7x + c$   $\left(\frac{7}{2}\right)^2 = \frac{49}{4}$   
 $x^2 + 7x + \frac{49}{4}$   
 $(x + \frac{7}{2})(x + \frac{7}{2})$   
 $(x + \frac{7}{2})^2$

Solve the following equations using the Square Root Property. SHOW ALL YOUR WORK!

20)  $x^2 + 10x + 25 = 49$   
 $(x+5)(x+5) = 49$   
 $(x+5)^2 = 49$   
 $\sqrt{(x+5)^2} = \sqrt{49}$   
 $x+5 = \pm 7$

$x+5=7$  or  $x+5=-7$   
 $x=2$  or  $x=-12$

21)  $4x^2 - 20x + 25 = 81$   
 $(2x-5)(2x-5) = 81$   
 $(2x-5)^2 = 81$   
 $\sqrt{(2x-5)^2} = \sqrt{81}$   
 $2x-5 = \pm 9$   
 $2x-5=9$  or  $2x-5=-9$   
 $2x=14$   $2x=-4$   
 $x=7$   $x=-2$

Solve the following equations by completing the square. SHOW ALL YOUR WORK!

22)  $x^2 - 8x = -12$   $\left(\frac{-8}{2}\right)^2 = 16$   
 $x^2 - 8x + 16 = -12 + 16$   
 $(x-4)(x-4) = 4$   
 $\sqrt{(x-4)^2} = \sqrt{4}$   
 $x-4 = \pm 2$   
 $x-4=2$  or  $x-4=-2$

23)  $x^2 + 6x - 4 = 5$   $(3)^2 = 9$   
 $x^2 + 6x + 9 = 9 + 9$   
 $(x+3)^2 = 18$   
 $x+3 = \pm \sqrt{18}$   
 $x+3 = \pm 3\sqrt{2}$   
 $x = -3 \pm 3\sqrt{2}$

24)  $x^2 - 12x + 52 = 0$   $x=6$  or  $x=2$   
 $x^2 - 12x = -52$   
 $x^2 - 12x + 36 = -52 + 36$   
 $(x-6)(x-6) = -16$   
 $(x-6)^2 = -16$   
 $\sqrt{(x-6)^2} = \sqrt{-16}$   
 $x-6 = \pm 4i$   
 $x = 6 \pm 4i$

25)  $2x^2 + 5x + 12 = 0$   
 $\frac{5}{2(2)} x^2 + \frac{5}{2}x + 6 = 0$   
 $\left(\frac{5}{4}\right)^2 = \frac{25}{16}$   
 $x^2 + \frac{5}{2}x + \frac{25}{16} = -6 + \frac{25}{16}$   
 $\sqrt{\left(x + \frac{5}{4}\right)^2} = \sqrt{-\frac{71}{16}}$   
 $x + \frac{5}{4} = \pm \frac{i\sqrt{71}}{4}$   
 $x = -\frac{5}{4} \pm \frac{i\sqrt{71}}{4}$

Find the discriminant and use it to find the type and the number of roots. SHOW ALL YOUR WORK! Don't Find the Solutions!

Discriminant =  $b^2 - 4ac$

26)  $x^2 - 10x = 11$

$x^2 - 10x - 11 = 0$

$a=1 \quad b=-10 \quad c=-11$

$b^2 - 4ac = (-10)^2 - 4(1)(-11)$

$100 - (-44)$

$100 + 44$

$144$

2 Real, Rational

28)  $2x^2 + 6x - 5 = 2$

$2x^2 + 6x - 7 = 0$

$a=2 \quad b=6 \quad c=-7$

$b^2 - 4ac = 92$

2 Real, Irrational

27)  $x^2 + 34x + 289 = 0$

$a=1 \quad b=34 \quad c=289$

$b^2 - 4ac = (34)^2 - 4(1)(289) = 0$

1 Real, Rational

29)  $x^2 - 4x = -13$

$x^2 - 4x + 13 = 0$

$a=1 \quad b=-4 \quad c=13$

$b^2 - 4ac = -36$

2 Complex

Solve the following equation using the Quadratic Formula. SHOW ALL YOUR WORK!

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

30)  $2x^2 + 25x + 33 = 0$

$a=2 \quad b=25 \quad c=33$

$\frac{-25 \pm \sqrt{(25)^2 - 4(2)(33)}}{2(2)} = \frac{-25 \pm \sqrt{361}}{4}$

$\frac{-25 \pm 19}{4} = \frac{-25+19}{4} \quad \text{or} \quad \frac{-25-19}{4}$

$= -6/4 \quad \text{or} \quad -44/4$

32)  $3x^2 + 5x = -1$

$3x^2 + 5x + 1 = 0$

$a=3 \quad b=5 \quad c=1$

$\frac{-5 \pm \sqrt{(5)^2 - 4(3)(1)}}{2(3)} = \frac{-5 \pm \sqrt{13}}{6}$

31)  $x^2 + 8x = -16$

$x^2 + 8x + 16 = 0$

$a=1 \quad b=8 \quad c=16$

$\frac{-8 \pm \sqrt{(8)^2 - 4(1)(16)}}{2(1)} = \frac{-8 \pm \sqrt{0}}{2} = \frac{-8}{2}$

$= -4$

Note: (one answer.) Why?

33)  $3x^2 + 5x + 4 = 0$

$a=3 \quad b=5 \quad c=4$

$\frac{-5 \pm \sqrt{(5)^2 - 4(3)(4)}}{2(3)} = \frac{-5 \pm \sqrt{-23}}{6}$

$\frac{-5 \pm \sqrt{23}i}{6}$

$\frac{-5 \pm i\sqrt{23}}{6}$

or