

KEY

Algebra II 4.4 - 4.7 TEST REVIEW

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

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

$$\frac{4x^2}{4} = \frac{-25}{4}$$
$$x = \pm \frac{5}{2}i$$

2. $x^2 = -98$

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

3. $x^2 + 75 = 0$

$$x^2 = -75$$
$$x = \pm \sqrt{75}i$$
$$x = \pm 5\sqrt{3}i$$

4. $3x^2 = -108$

$$\frac{3x^2}{3} = \frac{-108}{3}$$
$$x^2 = -36$$
$$x = \pm 6i$$

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

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

$$10 - 2i$$

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

$$-2 - 6i$$

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

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

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

$$36 + 18i + 8i + 4i^2$$
$$36 + 26i + 4(-1)$$
$$32 + 26i$$

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

$$-15i + 21i^2$$
$$-15i + 21(-1)$$
$$-21 - 15i$$

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

$$4 + 6i + 6i + 9i^2$$
$$4 + 12i + 9(-1)$$
$$-5 + 12i$$

Simplify:

11. $\frac{(2+4i)(-3i)}{(3i)(-3i)}$

$$= \frac{12 - 6i}{9} = \frac{12}{9} - \frac{6}{9}i$$

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

12. $\frac{(1+6i)(1+2i)}{(1-2i)(1+2i)}$

$$= \frac{-11+8i}{5} =$$

$$\frac{-11+8i}{5}$$

The find the value of "c" that would make the expression a perfect square trinomial. Then write the perfect square factor.

13) $x^2 + 14x + c$ $(7)^2 = 49$

c- 49

Binomial: $(x+7)^2$

14) $x^2 - 22x + c$ $(-11)^2 = 121$

c- 121

Binomial: $(x-11)^2$

15) $x^2 + 7x + c$ $(7/2)^2 = 49/4$

c- 49/4

Binomial: $(x+7/2)^2$

Use completing the square to solve each quadratic equation.

16) $x^2 + 4x + 11 = 0$

$x^2 + 4x = -11$
 $x^2 + 4x + 4 = -11 + 4$
 $(x+2)^2 = -7$
 $x+2 = \pm i\sqrt{7}$
 $x = \boxed{-2 \pm i\sqrt{7}}$

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

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

18) $x^2 - 6x + 18 = 0$

$x^2 - 6x = -18$
 $x^2 - 6x + 9 = -18 + 9$
 $(x-3)^2 = -9$
 $x-3 = \pm\sqrt{-9}$
 $x-3 = \pm 3i$
 $x = \boxed{3 \pm 3i}$

19) $x^2 - 10x + 24 = 0$

$x^2 - 10x = -24$
 $x^2 - 10x + 25 = -24 + 25$
 $(x-5)^2 = 1$
 $x-5 = \pm\sqrt{1}$
 $x-5 = \pm 1$
 $x = \boxed{6, 4}$

Determine the number and type of solutions using the discriminant.

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

$x^2 + 8x + 16 = 0$
 $64 - 64$
 0

Discriminant: 0

Type of Solutions:

1 Real Rational

21) $x^2 + 3 = 10x$

$x^2 - 10x + 3$
 $100 - 12$
 88

Discriminant: 88

Type of Solutions:

2 Real Irrational

22) $4x^2 + 2x = -9$

$4x^2 + 2x + 9 = 0$
 $4 - 144$
 -140

Discriminant: -140

Type of Solutions:

2 Imaginary

Solve the following using the quadratic formula.

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

23) $f(x) = 2x^2 + x - 3$

24) $f(x) = 3x^2 - 4x - 1$

$$\frac{-1 \pm \sqrt{1 - 4(2)(-3)}}{4}$$

$$\frac{-1 \pm \sqrt{25}}{4} = \frac{-1 \pm 5}{4} = \frac{-1+5}{4} = 1$$

$$\frac{-1-5}{4} = \frac{-6}{4} = -\frac{3}{2}$$

$$\frac{4 \pm \sqrt{16 - 4(3)(-1)}}{6} = \frac{4 \pm \sqrt{16+12}}{6} = \frac{4 \pm \sqrt{28}}{6}$$

$$\frac{4 \pm 2\sqrt{7}}{6} = \frac{2(2 \pm \sqrt{7})}{6} = \frac{2 \pm \sqrt{7}}{3}$$

25) $f(x) = 5x^2 - 4x - 1$

26) $f(x) = x^2 + 2x + 3$

$$\frac{4 \pm \sqrt{16 - 4(5)(-1)}}{10}$$

$$\frac{4 \pm \sqrt{36}}{10} = \frac{4 \pm 6}{10} = \frac{10}{10} \text{ or } \frac{-2}{10}$$

$$x = 1 \text{ or } -\frac{1}{5}$$

$$\frac{-2 \pm \sqrt{4 - 4(1)(3)}}{2} = \frac{-2 \pm \sqrt{-8}}{2} = \frac{-2 \pm 2\sqrt{2}i}{2}$$

$$= \frac{2(-1 \pm i\sqrt{2})}{2} = -1 \pm i\sqrt{2}$$

Write each function in vertex form.

27) $y = x^2 + 6x + 2$

$$(3)^2 = 9$$

$$y - 2 = x^2 + 6x$$

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

$$y + 7 = (x + 3)^2$$

$$y = (x + 3)^2 - 7$$

28) $y = 2x^2 - 4x - 3$

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

$$y + 3 = 2x^2 - 4x$$

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

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

$$y + 5 = 2(x - 1)^2$$

$$y = 2(x - 1)^2 - 5$$

Write each function in vertex form.

29) $y = -4x^2 - 24x - 15$

$(3)^2 = 9$

$$y + 15 = -4x^2 - 24x$$

$$y + 15 = -4(x^2 + 6x)$$

$$y + 15 = -4(x^2 + 6x + 9)$$

$$y - 21 = -4(x + 3)^2$$

$$y = -4(x + 3)^2 + 21$$

Write an equation in vertex form for each parabola.

30) $y = x^2 - 10x + 28$

$(-5)^2 = 25$

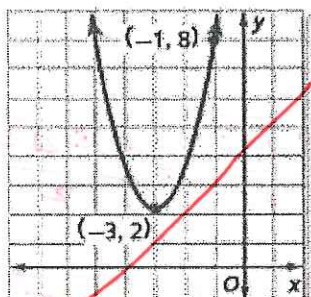
$$y - 28 = x^2 - 10x$$

$$y - 28 = x^2 - 10x + 25$$

$$y - 3 = (x - 5)^2$$

$$y = (x - 5)^2 + 3$$

31)



$$y = a(x + 3)^2 + 2$$

$$8 = a(-1 + 3)^2 + 2$$

$$8 = 4a + 2$$

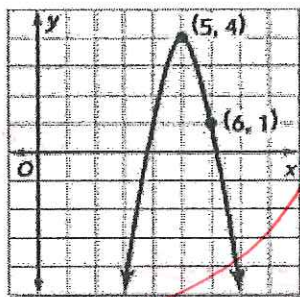
$$6 = 4a$$

$$\frac{6}{4} = a$$

$$\frac{3}{2} = a$$

$$y = \frac{3}{2}(x + 3)^2 + 2$$

32)



$$y = a(x - 5)^2 + 4$$

$$1 = a(6 - 5)^2 + 4$$

$$1 = 1a + 4$$

$$-3 = 1a$$

$$-3 = a$$

$$y = -3(x - 5)^2 + 4$$

33) Write the quadratic function that has a vertex at $(-4, 0)$ and passes through the point $(-2, 6)$.

$$y = a(x + 4)^2 + 0 \implies y = \frac{3}{2}(x + 4)^2$$

$$6 = a(-2 + 4)^2$$

$$6 = a(4)$$

$$\frac{3}{2} = \frac{6}{4} = a$$

34) Write the quadratic function that has a vertex at $(6, 1)$ and passes through the point $(7, 10)$.

$$y = a(x - 6)^2 + 1 \implies y = 9(x - 6)^2 + 1$$

$$10 = a(7 - 6)^2 + 1$$

$$10 = a(1) + 1$$

$$9 = a$$