Honors Math 2 Name_____

Unit 4 day 6 Period_____Date_____

Problems #3-29 odd, 31-39, 41-47odd, 52-58

EQUATIONS IN STANDARD FORM **Use the quadratic formula to solve the equation.**

3. $x^2 - 4x - 5 = 0$
4. $x^2 - 6x + 7 = 0$
5. $t^2 + 8t + 19 = 0$
6. $x^2 - 16x + 7 = 0$
7. $8w^2 - 8w + 2 = 0$
8. $5p^2 - 10p + 24 = 0$
9. $4x^2 - 8x + 1 = 0$
10. $6u^2 + 4u + 11 = 0$
11. $3r^2 - 8r - 9 = 0$

12. ★ **MULTIPLE CHOICE** What are the complex solutions of the equation $2x^2 - 16x + 50 = 0$?

Ⓐ $4 + 3i, 4 - 3i$
Ⓑ $4 + 12i, 4 - 12i$
Ⓒ $16 + 3i, 16 - 3i$
Ⓓ $16 + 12i, 16 - 12i$

EQUATIONS NOT IN STANDARD FORM **Use the quadratic formula to solve the equation.**

13. $3w^2 - 12w = -12$
14. $x^2 + 6x = -15$
15. $s^2 = -14 - 3s$
16. $-3y^2 = 6y - 10$
17. $3 - 8v - 5v^2 = 2v$
18. $7x - 5 + 12x^2 = -3x$
19. $4x^2 + 3 = x^2 - 7x$
20. $6 - 2t^2 = 9t + 15$
21. $4 + 9n - 3n^2 = 2 - n$

SOLVING USING TWO METHODS **Solve the equation using the quadratic formula. Then solve the equation by factoring to check your solution(s).**

22. $z^2 + 15z + 24 = -32$
23. $x^2 - 5x + 10 = 4$
24. $m^2 + 5m - 99 = 3m$
25. $s^2 - s - 3 = s$
26. $r^2 - 4r + 8 = 5r$
27. $3x^2 + 7x - 24 = 13x$
28. $45x^2 + 57x + 1 = 5$
29. $5p^2 + 40p + 100 = 25$
30. $9n^2 - 42n - 162 = 21n$

USING THE DISCRIMINANT **Find the discriminant of the quadratic equation and give the number and type of solutions of the equation.**

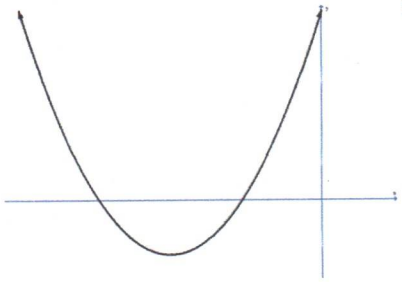
31. $x^2 - 8x + 16 = 0$
32. $s^2 + 7s + 11 = 0$
33. $8p^2 + 8p + 3 = 0$
34. $-4w^2 + w - 14 = 0$
35. $5x^2 + 20x + 21 = 0$
36. $8z - 10 = z^2 - 7z + 3$
37. $8n^2 - 4n + 2 = 5n - 11$
38. $5x^2 + 16x = 11x - 3x^2$
39. $7r^2 - 5 = 2r + 9r^2$

SOLVING QUADRATIC EQUATIONS **Solve the equation using any method.**

40. $16t^2 - 7t = 17t - 9$
41. $7x - 3x^2 = 85 + 2x^2 + 2x$
42. $4(x - 1)^2 = 6x + 2$
43. $25 - 16v^2 = 12v(v + 5)$
44. $\frac{3}{2}y^2 - 6y = \frac{3}{4}y - 9$
45. $3x^2 + \frac{9}{2}x - 4 = 5x + \frac{3}{4}$
46. $1.1(3.4x - 2.3)^2 = 15.5$
47. $19.25 = -8.5(2r - 1.75)^2$
48. $4.5 = 1.5(3.25 - s)^2$

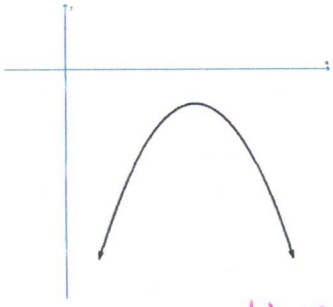
Visual Thinking. In Exercises 52-54, the graph of a quadratic function $y = ax^2 + bx + c$ is shown. Tell whether the discriminant of $ax^2 + bx + c = 0$ is *positive, negative* or *zero.*

52.



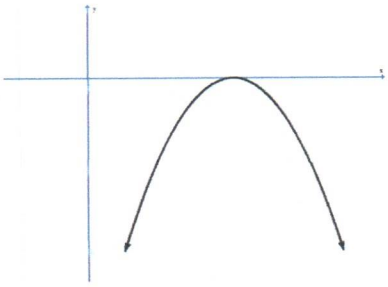
positive

53.



negative

54.



zero

Write a quadratic equation in the form $ax^2 + bx + c = 0$ such that c = 4 and the equation has the given solutions.

55. -4 and 3

$y = -\frac{1}{4}x^2 - \frac{1}{4}x + 4$

56. $\frac{-4}{3}$ and -1

$y = 3x^2 + 7x + 4$

57. $-1 + i$ and $-1 - i$

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

58. For the period of 1990-2002, the number S (in thousands) of cellular telephone subscribers in the United States can be modeled by $S = 858t^2 + 1412t + 4982$ where t is the number of years since 1990. In what year did the number of subscribers reach 50 million?

a) 1991 b) 1992 c) 1996 d) 2000

Unit 4 day 6 WS

3) x^2-4x-5

$$x = \frac{4 \pm \sqrt{(-4)^2-4(1)(-5)}}{2(1)} = \frac{4 \pm \sqrt{36}}{2} = \frac{4 \pm 6}{2} =$$

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

5) $t^2+8t+19=0$

$$t = \frac{-8 \pm \sqrt{(8)^2-4(1)(19)}}{2(1)} = \frac{-8 \pm \sqrt{-12}}{2} = \frac{-8 \pm 2i\sqrt{3}}{2}$$

$$\boxed{t = -4 \pm i\sqrt{3}}$$

7) $8w^2-8w+2=0$

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

$$\boxed{w = 1/2}$$

9) $4x^2-8x+1=0$

$$x = \frac{8 \pm \sqrt{(-8)^2-4(4)(1)}}{2(4)} = \frac{8 \pm \sqrt{48}}{8} = \frac{8 \pm 4\sqrt{3}}{8} = \frac{2 \pm \sqrt{3}}{2}$$

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

11) $3r^2 - 8r - 9 = 0$

$$r = \frac{8 \pm \sqrt{(-8)^2 - 4(3)(-9)}}{2(3)} = \frac{8 \pm \sqrt{172}}{6} = \frac{8 \pm 2\sqrt{43}}{6}$$

$$\boxed{r = \frac{4 \pm \sqrt{43}}{3}}$$

13) $3w^2 - 12w = -12$

$3w^2 - 12w + 12 = 0$

$$w = \frac{12 \pm \sqrt{(-12)^2 - 4(3)(12)}}{2(3)} = \frac{12}{6} \pm \sqrt{0} = 2$$

$$\boxed{w = 2}$$

15) $s^2 + 3s + 14 = 0$

$$s = \frac{-3 \pm \sqrt{(3)^2 - 4(1)(14)}}{2(1)} = \frac{-3 \pm \sqrt{-47}}{2}$$

$$\boxed{s = \frac{-3 \pm i\sqrt{47}}{2}}$$

17) $3 - 8v - 5v^2 = 2v$

$-5v^2 - 10v + 3 = 0$

$$v = \frac{10 \pm \sqrt{(-10)^2 - 4(-5)(3)}}{2(-5)} = \frac{10 \pm \sqrt{160}}{-10} = \frac{10 \pm 4\sqrt{10}}{-10}$$

$$\boxed{v = \frac{-5 \pm 2\sqrt{10}}{5}}$$

19) $4x^2+3=x^2-7x$

$3x^2+7x+3=0$

$$x=\frac{-7\pm\sqrt{(7)^2-4(3)(3)}}{2(3)}=\frac{-7\pm\sqrt{13}}{6}$$

$$\boxed{x=\frac{-7\pm\sqrt{13}}{6}}$$

21) $4+9n-3n^2=2-n$

$-3n^2+10n+2=0$

$$n=\frac{-10\pm\sqrt{(10)^2-4(-3)(2)}}{2(-3)}=\frac{-10\pm\sqrt{124}}{-6}=\frac{-10\pm2\sqrt{31}}{-6}=\frac{5\pm\sqrt{31}}{3}$$

$$\boxed{n=\frac{5\pm\sqrt{31}}{3}}$$

23) $x^2-5x+6=0$

$(x-2)(x-3)=0$

$x=2 \quad x=3$

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

$$x=\frac{5\pm\sqrt{1}}{2}=\frac{5\pm1}{2} \qquad \frac{(5+1)}{2}=3 \qquad \frac{5-1}{2}=2$$

$x=2,3$

25) $s^2 - s - 3 = s$

$s^2 - 2s - 3 = 0$

$(s-3)(s+1) = 0$

$s = 3 \quad s = -1$

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

$$s = \frac{2 \pm \sqrt{16}}{2} = \frac{2 \pm 4}{2}$$

$\boxed{s = 3, -1}$

27) $3x^2 + 7x - 24 = 13x$

$3x^2 - 6x - 24 = 0$

$3(x^2 - 2x - 8) = 0$

$3(x-4)(x+2) = 0$

$x = 4 \quad x = -2$

$$x = \frac{6 \pm \sqrt{(-6)^2 - 4(3)(-24)}}{2(3)}$$

$$x = \frac{6 \pm \sqrt{324}}{6} \qquad \frac{6 \pm 18}{6}$$

$\boxed{x = 4 \quad x = -2}$

29) $5p^2 + 40p + 100 = 25$

$5p^2 + 40p + 75 = 0$

$5(p^2 + 8p + 15) = 0$

$5(p+5)(p+3) = 0$

$p = -5 \quad p = -3$

$$p = \frac{-40 \pm \sqrt{(40)^2 - 4(5)(75)}}{2(5)} = \frac{-40 \pm \sqrt{100}}{10} = \frac{-40 \pm 10}{10}$$

$\boxed{p = -3 \text{ or } p = -5}$

31) $x^2 - 8x + 16 = 0$

$(-8)^2 - 4(1)(16) = 0$ 1 Real solution

32) $s^2 + 7s + 11 = 0$

$(7)^2 - 4(1)(11) = 5$ 2 Real solutions

33) $8p^2 + 8p + 3 = 0$

$(8)^2 - 4(8)(3) = -32$ 2 imaginary

34) $-4w^2 + w - 14 = 0$

$(1)^2 - 4(-4)(-14) = -223$ 2 imaginary

35) $5x^2 + 20x + 21 = 0$

$(20)^2 - 4(5)(21) = -20$ 2 imaginary

36) $8z - 10 = z^2 - 7z + 3$

$-8z \quad +10 \qquad -8z \quad +10$

$0 = z^2 - 15z + 13$

$(15)^2 - 4(1)(13) = 173$ 2 Real solutions

37) $8n^2 - 4n + 2 = 5n - 11$

$-5n \quad +11 \qquad -5n \quad +11$

$8n^2 - 9n + 13 = 0$

$(-9)^2 - 4(8)(13) = -335$ 2 imaginary solutions

38) $5x^2 + 16x = 11x - 3x^2$

$3x^2 \quad -11x \quad -11x \quad +3x^2$

$8x^2 + 5x = 0$

$(5)^2 - 4(8)(0) = 25$ 2 real solutions

39) $7r^2 - 5 = 2r + 9r^2$

$2r^2 + 2r + 5 = 0$

$(2)^2 - 4(2)(5) = -36$ 2 imaginary solutions

41) $7x - 3x^2 = 85 + 2x^2 + 2x$

$-7x \quad +3x^2 \qquad 3x^2 \quad -7x$

$0 = 85 + 5x^2 - 5x$

$5x^2 - 5x + 85 = 0$

$x = \dfrac{5 \pm \sqrt{25 - 4(5)(85)}}{2(5)} \qquad \dfrac{5 \pm \sqrt{-1675}}{10} = \dfrac{5 \pm 5i\sqrt{67}}{10} = \boxed{\dfrac{1 \pm i\sqrt{67}}{2}}$

43) $25 - 16v^2 = 12v(v+5)$

$25 - 16v^2 = 12v^2 + 60v$

$28v^2 + 60v - 25 = 0$

$x = \dfrac{-60 \pm \sqrt{(60)^2 - 4(28)(-25)}}{2(28)} \qquad \dfrac{-60 \pm \sqrt{6400}}{56} = \dfrac{-60 \pm 80}{56}$

$\boxed{x = 5/14 \ ; \ -5/2}$

45) $3x^2 + 9/2\,x - 4 = 5x + 3/4$

$-5x \quad -3/4 \quad -5x \quad -3/4$

$3x^2 - 1/2\,x - 4\,3/4 = 0$

$3x^2 - 1/2\,x - 19/4 = 0$

$x = \dfrac{1/2 \pm \sqrt{(-1/2)^2 - 4(3)(-19/4)}}{2(3)}$

$x = \dfrac{1/2 \pm \sqrt{57.25}}{6}$

$x \approx 1.34$

$x \approx -1.18$

or multiply everything by 4 to eliminate fractions

$12x^2 + 18x - 16 = 20x + 3$

$-20x \quad -3 \quad -20x \quad -3$

$12x^2 - 2x - 19 = 0$

$x = \dfrac{2 \pm \sqrt{4 - 4(12)(-19)}}{2(12)}$

$x = \dfrac{2 \pm \sqrt{916}}{24} = \dfrac{-2 \pm 2\sqrt{229}}{24}$

$x = \dfrac{1 \pm \sqrt{229}}{12}$

$x \approx 1.34$

$x \approx -1.18$

look different but are equal

47) $19.25 = -8.5\,(2r - 1.75)^2$

$\dfrac{19.25}{-8.5} = (2r - 1.75)^2$

$(2r - 1.75)^2 = -2.264705882$

$(2r - 1.75) = \pm\sqrt{-2.264705882}$

$2r = 1.75 \pm \sqrt{-2.264705882}$

$r = .875 \pm .75244i$

52) positive
53) negative
54) zero

63) $(x+4)(x-3)=0$

$x^2-3x+4x-12$

x^2+x-12

suppose to be +4

$-\frac{1}{3}(x^2+x-12)$

$-\frac{1}{3}x^2-\frac{1}{3}x+4=0$

64) $-\frac{4}{3}$ and -1

$(x+4/3)(x+1)$

$(3x+4)(x+1)$

$3x^2+3x+4x+4$

$3x^2+7x+4=0$

69) 50,000,000 formula in thousand so divide by 1000

$50{,}000 = 858t^2+1412t+4982$

$0 = 858t^2+1412t-45018$

$$x = \frac{-1412 \pm \sqrt{(1412)^2-4(858)(-45018)}}{2(858)}$$

$x = 6.46$

$1990 + 6.46$ 1996