Algebra 1 Name Key

Solving Quadratics Review WS

Find the roots of each quadratic function.

1) $\sqrt{r^2} = \sqrt{9}$

$r = \pm 3$

2) $n^2 - 8 = 17$

$+8 \quad +8$

$\sqrt{n^2} = \sqrt{25}$

$n = \pm 5$

3) $4p^2 + 5 = 89$

$-5 \quad -5$

$\frac{4p^2}{4} = \frac{84}{4}$

$\sqrt{p^2} = \sqrt{21}$

$p = \pm\sqrt{21}$ or $p = \pm 4.58$

4) $-3 + 4n^2 = 13$

$+3 \quad +3$

$\frac{4n^2}{4} = \frac{16}{4}$

$\sqrt{n^2} = \sqrt{4}$

$n = \pm 2$

Solve each quadratic function by factoring.

5) $x^2 - 5x + 4 = 0$

4: $-1, -4$; $2, -2$

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

$x - 1 = 0 \quad x - 4 = 0$

$+1 \quad +1 \quad +4 \quad +4$

$x = 1 \quad x = 4$

6) $2x^2 + 18x + 36 = 0$

18: $3, 6$

$2(x^2 + 9x + 18) = 0$

$2(x+3)(x+6) = 0$

$x + 3 = 0 \quad x + 6 = 0$

$-3 \quad -3 \quad -6 \quad -6$

$x = -3, -6$

7) $a^2 - 2a - 41 = 7$

$-48 \quad -7 \quad -7$

$a^2 - 2a - 48 = 0$

-48: $6, -8$

$(a+6)(a-8) = 0$

$a + 6 = 0 \quad a - 8 = 0$

$-6 \quad -6 \quad +8 \quad +8$

$a = -6, 8$

8) $5n^2 + 33n + 48 = 8$

$-8 \quad -8$

$5n^2 + 33n + 40 = 0$

200: $8, 25$

$(5n^2 + 8n) + (25n + 40) = 0$

$n(5n+8) + 5(5n+8)$

$n + 5 = 0$

$-5 \quad -5$

$n = -5$

9) $5b^2 + 42b + 14 = -2$

$+2 \quad +2$

$5x^2 + 42x + 16 = 0$

80: $2, 40$; $5, 16$

$(5x^2 + 2x) + (40x + 16) = 0$

$x(5x+2) + 8(5x+2) = 0$

$x + 8 = 0$

$-8 \quad -8$

$x = -8$

$5x + 2 = 0$

$-2 \quad -2$

$\frac{5x}{5} = \frac{-2}{5}$

$x = -\frac{2}{5}$

10) $32a^2 - 44a - 38 = 2$

$-2 \quad -2$

$32x^2 - 44x - 40 = 0$

-80: $-5, 16$

$4(8x^2 - 11x - 10) = 0$

$(8x^2 + 5x) + (-16x - 10) = 0$

$x(8x+5) - 2(8x+5) = 0$

$5n + 8 = 0$

$-8 \quad -8$

$\frac{5n}{5} = \frac{-8}{5}$

$n = -\frac{8}{5}$

$x - 2 = 0$

$+2 \quad +2$

$x = 2$

$8x + 5 = 0$

$-5 \quad -5$

$\frac{8x}{8} = \frac{-5}{8}$

$x = -\frac{5}{8}$

Find the zeros by completing the square.

11) $v^2 + 16v + 55 = 0$

$-55 \quad -55$

$x^2 + 16x + 64 = -55 + 64$

$\sqrt{(x+8)^2} = \sqrt{9}$

$x + 8 = \pm 3$

$-8 \quad -8$

$x = -8 + 3 \quad x = -8 - 3$

$x = -5, -11$

12) $\frac{4x^2}{4} + \frac{8x}{4} - \frac{38}{4} = 0$

$x^2 + 2x - 9.5 = 0$

$+9.5 \quad +9.5$

$x^2 + 2x + 1 = 9.5 + 1$

$\sqrt{(x+1)^2} = \sqrt{10.5}$

$x + 1 = \pm 3.24$

$-1 \quad -1$

$x = -1 + 3.24 \quad x = -1 - 3.24$

$x = 2.24, -4.24$

13) $x^2 - 16x - 43 = -7$

$+43 \quad +43$

$x^2 - 16x + 64 = 36 + 64$

$\sqrt{(x-8)^2} = \sqrt{100}$

$x - 8 = \pm 10$

$+8 \quad +8$

$x = 8 + 10 \quad x = 8 - 10$

$x = 18, -2$

14) $n^2 - 2n - 76 = 4$

$+76 \quad +76$

$n^2 - 2n + 1 = 80 + 1$

$\sqrt{(n-1)^2} = \sqrt{81}$

$n - 1 = \pm 9$

$+1 \quad +1$

$n = 1 + 9 \quad n = 1 - 9$

$n = 10, -8$

15) $9v^2 - 18v - 22 = 5$

$+22 \quad +22$

$\frac{9x^2}{9} - \frac{18x}{9} + \_ = \frac{27}{9} + \_$

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

$\sqrt{(x-1)^2} = \sqrt{4}$

$x - 1 = \pm 2$

$+1 \quad +1$

$x = 1 \pm 2$

$1 - 2$

$x = 3, -1$

16) $2x^2 + 8x - 86 = 4$

$+86 \quad +86$

$\frac{2x^2}{2} + \frac{8x}{2} + \_ = \frac{90}{2} + \_$

$x^2 + 4x + 4 = 45 + 4$

$\sqrt{(x+2)^2} = \sqrt{49}$

$x + 2 = \pm 7$

$-2 \quad -2$

$x = -2 \pm 7$

$-2 - 7$

$x = 5, -9$

17) The function $y = -16x^2 + 96x$ represents the height y (in feet) of a model rocket x seconds after it has been launched.

a) What is the maximum height of the rocket?

$x = \frac{-b}{2a} = \frac{-96}{2(-16)} = \frac{-96}{-32} = 3$

$-16(3)^2 + 96(3) = 144$

max = 144 ft

b) How long did it take for the rocket to hit its maximum height?

3 sec

c) How long is the rocket in the air?

$-16x^2 + 96x = 0$

$-16x(x - 6) = 0$

$-16x = 0 \qquad x - 6 = 0$

$x = 0 \qquad x = 6$

6 sec

18) You throw a stone from a height of 16 ft with an initial velocity of 32 feet per second. The function $h = -16x^2 + 32x + 16$ represents the height h, in feet, of the stone after x seconds.

a) How long until the stone hits the ground?

$-16(x^2 - 2x - 1)$

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

$\sqrt{(x-1)^2} = \sqrt{2}$

$x - 1 = \pm 1.41$

$+1 \quad +1$

$x = 1 \pm 1.41$

$1 - 1.41$

$x = 2.41, -0.41$

2.41 sec

b) What is the maximum height of the stone?

$\frac{-b}{2a} = \frac{-32}{2(-16)} = \frac{-32}{-32} = 1$

$-16(1)^2 + 32(1) + 16 = 32$

32 ft

c) How long does it take for the stone to reach its maximum height?

1 sec

19) Determine whether the quadratic function has a maximum or minimum value. Then find the value by completing the square.

a) $y = x^2 - 4x - 2$ min

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

$(x-2)^2 = 6$

$-6 \quad -6$

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

$V: (2, -6)$

min = -6

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

$-(x^2 + 10x - 30)$

$x^2 + 10x + 25 = 30 + 25$

$\sqrt{(x+5)^2} = \sqrt{55}$

$x + 5 = \pm 7.42$

$-5 \quad -5$

$x = -5 \pm 7.42$

$-5 + 7.42$

$-5 - 7.42$

$x = 2.42, -12.42$