

Key

Unit 8 Test Review WS

Solve each equation by factoring.

1) $x^2 - 3x - 28 = 0$

$$\begin{array}{r} -28 \\ 3 \overline{) -8} \\ \underline{-8} \\ 0 \end{array}$$

$$(x+3)(x-8) = 0$$

$$\begin{array}{r} x+3=0 \\ -3 \quad -3 \\ \hline x=-3 \end{array} \quad \begin{array}{r} x-8=0 \\ +8 \quad +8 \\ \hline x=8 \end{array}$$

2) $n^2 + 7n + 7 = 7$

$$\begin{array}{r} -7 \quad -7 \\ \hline n^2 + 7n = 0 \\ n(n+7) = 0 \\ \boxed{n=0} \quad \begin{array}{r} n+7=0 \\ -7 \quad -7 \\ \hline n=-7 \end{array} \end{array}$$

3) $p^2 - 3p - 13 = 5$

$$\begin{array}{r} -18 \\ 3 \overline{) -6} \\ \underline{-6} \\ 0 \end{array}$$

$$p^2 - 3p - 18 = 0$$

$$(p+3)(p-6) = 0$$

$$\begin{array}{r} p+3=0 \\ -3 \quad -3 \\ \hline p=-3 \end{array} \quad \begin{array}{r} p-6=0 \\ +6 \quad +6 \\ \hline p=6 \end{array}$$

4) $14n^2 + 33n - 8 = -3$

$$\begin{array}{r} -70 \\ -2 \overline{) 35} \\ \underline{-70} \\ 0 \end{array}$$

$$14n^2 + 33n - 5 = 0$$

$$(14n^2 - 2n) + (35n - 5) = 0$$

$$2n(7n-1) + 5(7n-1) = 0$$

$$\begin{array}{r} 2n+5=0 \\ -5 \quad -5 \\ \hline 2n=-5 \\ \frac{2n}{2} = \frac{-5}{2} \end{array} \quad \begin{array}{r} 7n-1=0 \\ +1 \quad +1 \\ \hline 7n=1 \\ \frac{7n}{7} = \frac{1}{7} \end{array} \quad \boxed{n = -\frac{5}{2}} \quad \boxed{n = \frac{1}{7}}$$

Find the roots of each equation by taking square roots.

5) $9x^2 - 10 = 54$

$$\begin{array}{r} +10 \quad +10 \\ \hline 9x^2 = 64 \\ \frac{9x^2}{9} = \frac{64}{9} \\ \sqrt{x^2} = \sqrt{\frac{64}{9}} \\ \boxed{x = \pm 2.67} \end{array}$$

6) $9x^2 + 9 = 45$

$$\begin{array}{r} -9 \quad -9 \\ \hline 9x^2 = 36 \\ \frac{9x^2}{9} = \frac{36}{9} \\ \sqrt{x^2} = \sqrt{4} \\ \boxed{x = \pm 2} \end{array}$$

7) $6n^2 - 9 = 207$

$$\begin{array}{r} +9 \quad +9 \\ \hline 6n^2 = 216 \\ \frac{6n^2}{6} = \frac{216}{6} \\ \sqrt{n^2} = \sqrt{36} \\ \boxed{n = \pm 6} \end{array}$$

8) $9m^2 + 2 = 902$

$$\begin{array}{r} -2 \quad -2 \\ \hline 9m^2 = 900 \\ \frac{9m^2}{9} = \frac{900}{9} \\ \sqrt{m^2} = \sqrt{100} \\ \boxed{m = \pm 10} \end{array}$$

Find the zeros of each equation by completing the square.

$$9) a^2 - 14a - 72 = 0$$

$$\quad \quad \quad +72 \quad +72$$

$$a^2 - 14a + 49 = 72 + 49$$

$$\sqrt{(a-7)^2} = \sqrt{121} \quad 7+11 = 18$$

$$a-7 = \pm 11 \quad 7-11 = -4$$

$$\quad \quad \quad +7 \quad +7$$

$$a = 7 \pm 11$$

$$10) k^2 + 4k - 105 = -8$$

$$\quad \quad \quad +105 \quad +105$$

$$k^2 + 4k + 4 = 97 + 4$$

$$\sqrt{(k+2)^2} = \sqrt{101}$$

$$k+2 = \pm 10.05 \quad -2+10.05 = 8.05$$

$$\quad \quad \quad -2 \quad -2 \quad -2-10.05 = -12.05$$

$$k = -2 \pm 10.05$$

$$11) x^2 + 6x - 13 = -6$$

$$\quad \quad \quad +13 \quad +13$$

$$x^2 + 6x + 9 = 7 + 9$$

$$\sqrt{(x+3)^2} = \sqrt{16} \quad -3+4 = 1$$

$$x+3 = \pm 4 \quad -3-4 = -7$$

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

$$x = -3 \pm 4$$

$$12) 3n^2 - 12n + 9 = 0$$

$$\quad \quad \quad -9 \quad -9$$

$$\frac{3n^2 - 12n + \dots}{3} = \frac{-9 + \dots}{3}$$

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

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

$$n-2 = \pm 1 \quad 2+1 = 3$$

$$\quad \quad \quad +2 \quad +2 \quad 2-1 = 1$$

$$n = 2 \pm 1$$

$$13) 10x^2 + 20x - 30 = 0$$

$$\quad \quad \quad +30 \quad +30$$

$$\frac{10x^2 + 20x + \dots}{10} = \frac{30 + \dots}{10}$$

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

$$\sqrt{(x+1)^2} = \sqrt{4} \quad -1-2 = -3$$

$$x+1 = \pm 2$$

$$\quad \quad \quad -1 \quad -1 \quad x = -1 \pm 2$$

Find the x-intercepts of each equation using the quadratic formula.

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

$$14) 5n^2 + n - 84 = 0$$

a=5
b=1
c=-84

$$x = \frac{-1 \pm \sqrt{(1)^2 - 4(5)(-84)}}{2(5)}$$

$$= \frac{-1 \pm \sqrt{1681}}{10} \quad \frac{-1+41}{10} = 4$$

$$= \frac{-1 \pm 41}{10} \quad \frac{-1-41}{10} = -4.2$$

$$15) k^2 + 10k - 24 = 0$$

a=1
b=10
c=-24

$$x = \frac{-10 \pm \sqrt{(10)^2 - 4(1)(-24)}}{2(1)}$$

$$= \frac{-10 \pm \sqrt{196}}{2} \quad \frac{-10+14}{2} = 2$$

$$= \frac{-10 \pm 14}{2} \quad \frac{-10-14}{2} = -12$$

$$16) 4x^2 - 11x + 8 = 2$$

$$\quad \quad \quad -2 \quad -2$$

a=4
b=-11
c=6

$$4x^2 - 11x + 6 = 0$$

$$x = \frac{11 \pm \sqrt{(-11)^2 - 4(4)(6)}}{2(4)}$$

$$= \frac{11 \pm \sqrt{25}}{8} \quad \frac{11+5}{8} = 2$$

$$= \frac{11 \pm 5}{8} \quad \frac{11-5}{8} = 0.75$$

$$17) 2r^2 + 7r - 70 = -10$$

$$\quad \quad \quad +10 \quad +10$$

$$2r^2 + 7r - 60 = 0$$

a=2
b=7
c=-60

$$x = \frac{-7 \pm \sqrt{(7)^2 - 4(2)(-60)}}{2(2)}$$

$$= \frac{-7 \pm \sqrt{529}}{4} \quad \frac{-7+23}{4} = 4$$

$$= \frac{-7 \pm 23}{4} \quad \frac{-7-23}{4} = -7.5$$

- 18) As Molly dives into her pool, her height above the water can be modeled by the function $f(x) = -16x^2 + 72x$, where x is the time in seconds after she begins diving. How long does it take Molly to reach the pool?

$$0 = -16x^2 + 72x$$

$$= -8x(2x - 9)$$

$$\boxed{4.5 \text{ SEC}}$$

$$\frac{-8x}{-8} = \frac{0}{-8}$$

$$x = 0$$

$$2x - 9 = 0$$

$$\frac{+9}{+9} \quad \frac{+9}{+9}$$

$$\frac{2x}{2} = \frac{9}{2} \quad x = 4.5$$

- 19) An Olympic diver's height can be modeled by the function $h = -3x^2 + 6x + 24$, where x is the time in seconds after he begins the dive.

- a) How long does it take the diver to hit the water?

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

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

$$\boxed{4 \text{ SEC}}$$

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

$$x+2=0 \quad x-4=0$$

$$\frac{-2}{-2} \quad \frac{-2}{-2}$$

$$x = -2$$

$$\frac{+4}{+4} \quad \frac{+4}{+4}$$

$$x = 4$$

- b) What is the initial height of the swimmer?

c value

$$\boxed{24 \text{ ft}}$$

- c) What is the maximum height of the swimmer?

$$x = \frac{-b}{2a}$$

$$x = \frac{-6}{2(-3)}$$

$$-3(1)^2 + 6(1) + 24$$

$$-3 + 6 + 24$$

$$(1, 27)$$

$$= \frac{-6}{-6}$$

$$\boxed{h = 27 \text{ ft}}$$

$$= 1$$

- d) How long does it take for the swimmer to reach its maximum height?

$$\boxed{1 \text{ SEC}}$$

- 20) A diver begins on a platform 11 meters above the surface of the water. The diver's height is given by the equation $h(t) = -2t^2 + t + 11$, where t is the time in seconds after the diver jumps. How long does it take the diver to reach a point 1 meter above the water?

$$\begin{aligned}
 & 1 = -2t^2 + t + 11 \\
 & -1 \qquad \qquad \qquad -1 \\
 \hline
 & -2t^2 + t + 10 = 0 \\
 a = -2 & \quad x = \frac{-1 \pm \sqrt{(1)^2 - 4(-2)(10)}}{2(-2)} \\
 b = 1 & \\
 c = 10 & \\
 & = \frac{-1 \pm \sqrt{81}}{-4} \\
 & = \frac{-1 \pm 9}{-4} \\
 & \frac{-1+9}{-4} = -2 \\
 & \frac{-1-9}{-4} = 2.5
 \end{aligned}$$

2.5 sec

- 21) Use the graph below to answer each question.

- a) What is the initial height of the object?

6 ft

- b) How high is the object after 1 second?

10 ft

- c) How long is the object in the air?

1.5 sec

