

Review for Test #10 - Quadratic Equations

Name: _____ Class: _____

For 1 - 2, solve the following quadratic equations by taking square roots. If necessary, leave each answer in simplest radical form.

$$\begin{aligned}
 1.) \quad -10 - 5n^2 &= -330 \\
 +10 \quad +10 & \\
 \hline
 -5n^2 &= -320 \\
 -5 \quad -5 & \\
 n^2 &= 64 \\
 n &= \pm 8 \quad \boxed{\{8, -8\}}
 \end{aligned}$$

$$\begin{aligned}
 2.) \quad 3(x-2)^2 - 17 &= 19 \\
 +17 \quad +17 & \\
 \hline
 3(x-2)^2 &= 36 \\
 (x-2)^2 &= 12 \\
 x-2 &= \pm\sqrt{12} \\
 x &= 2 \pm \sqrt{12} \\
 x &= 2 \pm 2\sqrt{3} \\
 x &= 2 \pm 2\sqrt{3} \quad \boxed{\{2+2\sqrt{3}, 2-2\sqrt{3}\}}
 \end{aligned}$$

For 3 - 4, solve the following quadratic equations by factoring.

$$\begin{aligned}
 3.) \quad -2v^2 - v + 12 &= -3v^2 + 6v \\
 +3v^2 - 6v \quad +3v^2 - 6v & \\
 \hline
 v^2 - 7v + 12 &= 0 \\
 (v-3)(v-4) &= 0 \\
 v-3=0 \quad | \quad v-4=0 & \\
 v=3 \quad | \quad v=4 & \\
 & \quad \quad \quad \boxed{\{3, 4\}}
 \end{aligned}$$

$$\begin{aligned}
 4.) \quad 16n^2 - 114n &= -14 \\
 16n^2 - 114n + 14 &= 0 \\
 2(8n^2 - 57n + 7) &= 0 \\
 2(8n - 1)(n - 7) &= 0 \\
 8n-1=0 \quad | \quad n-7=0 & \\
 8n=1 \quad | \quad n=7 & \\
 n=1/8 & \\
 & \quad \quad \quad \boxed{\{1/8, 7\}}
 \end{aligned}$$

For 5 - 6, find the value c that completes the square.

$$\begin{aligned}
 5.) \quad x^2 - 36x + c & \\
 \left(\frac{-36}{2}\right)^2 &= (-18)^2 = \boxed{324}
 \end{aligned}$$

$$\begin{aligned}
 6.) \quad x^2 + \frac{11}{8}x + c & \\
 \left(\frac{11}{8}\right)^2 &= \left(\frac{11}{16}\right)^2 = \boxed{\frac{121}{256}}
 \end{aligned}$$

For 7 - 8, solve each quadratic equation by completing the square. If necessary, leave each answer in simplest radical form.

$$\begin{aligned}
 7.) \quad m^2 + 6m + 24 &= 15 \\
 m^2 + 6m + 9 &= -9 + 9 \\
 (m+3)^2 &= 0 \\
 m+3 &= 0 \\
 m &= -3 \\
 & \quad \quad \quad \boxed{\{-3\}}
 \end{aligned}$$

$$\begin{aligned}
 8.) \quad \frac{4x^2}{4} - \frac{2x}{4} &= \frac{5}{4} \\
 x^2 - \frac{1}{2}x + \frac{1}{16} &= \frac{5}{4} + \frac{1}{16} \\
 \left(x - \frac{1}{4}\right)^2 &= \frac{21}{16} \\
 x - \frac{1}{4} &= \pm\sqrt{\frac{21}{16}} \\
 x &= \frac{1}{4} \pm \frac{\sqrt{21}}{4} \rightarrow \boxed{\left\{\frac{1+\sqrt{21}}{4}, \frac{1-\sqrt{21}}{4}\right\}}
 \end{aligned}$$

For 9 - 10 solve each quadratic equation using the quadratic formula. If necessary, leave each answer in simplest radical form.

9.) $x^2 - 10x + 18 = 0$

$$x = \frac{10 \pm \sqrt{(-10)^2 - 4(1)(18)}}{2(1)}$$

$$x = \frac{10 \pm \sqrt{28}}{2}$$

$$x = \frac{10 \pm \sqrt{4}\sqrt{7}}{2} \rightarrow x = \frac{10 \pm 2\sqrt{7}}{2}$$

$$\boxed{\{5 + \sqrt{7}, 5 - \sqrt{7}\}}$$

Solve the following word problems.

11.) If the second of three positive consecutive integers is added to the product of the first and the third, the result is 71. Find the three integers. Only an algebraic solution will be accepted.

Let 1st cons. int = x

Let 2nd cons. int = $x + 1$

Let 3rd cons. int = $x + 2$

10.) $3x^2 - 2x = 4$

$$3x^2 - 2x - 4 = 0$$

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

$$x = \frac{2 \pm \sqrt{52}}{6} \rightarrow x = \frac{2 \pm \sqrt{4}\sqrt{13}}{6}$$

$$\rightarrow x = \frac{2 \pm 2\sqrt{13}}{6} \rightarrow x = \frac{1 \pm \sqrt{13}}{3}$$

$$\boxed{\left\{ \frac{1 + \sqrt{13}}{3}, \frac{1 - \sqrt{13}}{3} \right\}}$$

$$x + 1 + x(x + 2) = 71$$

$$x + 1 + x^2 + 2x = 71$$

$$x^2 + 3x + 1 = 71$$

$$x^2 + 3x - 70 = 0$$

$$(x + 10)(x - 7) = 0$$

$$\{-10, 7\}$$

↑
omit

$$\boxed{7, 8, 9}$$

12.) The rectangular front of a birdhouse has an area of 18 square inches. If the base of the front piece is 3 inches longer than the height, find the length of the base and the height. Only an algebraic solution will be accepted.

Let height = x

Let base = $x + 3$

$$x(x + 3) = 18$$

$$x^2 + 3x = 18$$

$$x^2 + 3x - 18 = 0$$

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

$$\{-6, 3\}$$

↑
omit

$$\boxed{\begin{array}{l} \text{height} = 3\text{in} \\ \text{base} = 6\text{in} \end{array}}$$

- 13.) If the squares of positive consecutive even integers are added, the result is 100. Find the integers.

Let 1st cons. even int = x
Let 2nd " " " = $x+2$

$$\begin{aligned} x^2 + (x+2)^2 &= 100 \\ x^2 + x^2 + 4x + 4 &= 100 \\ 2x^2 + 4x - 96 &= 0 \\ 2(x^2 + 2x - 48) &= 0 \\ 2(x+8)(x-6) &= 0 \\ x &= -8 \quad | \quad x = 6 \\ &\uparrow \\ &\text{omit} \end{aligned}$$

6, 8

- 14.) The ratio of the length to width of a rectangle is 2:7 and the area is 896 square yards. What is the perimeter of the rectangle?

Let length = $2x$
Let width = $7x$

$$\begin{aligned} (2x)(7x) &= 896 \\ 14x^2 &= 896 \\ x^2 &= 64 \\ x &= \pm 8 \\ \{8, -8\} \end{aligned}$$

length = 16
width = 56
 $P = 2(16) + 2(56) = 144$

144 yd

- 15.) Solve the following quadratic equation using the quadratic formula. Express the answer in simplest radical form.

$$\begin{aligned} 4x^2 - 4 &= -8x \\ 4x^2 + 8x - 4 &= 0 \end{aligned}$$

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

$$\begin{aligned} x &= \frac{-8 \pm \sqrt{128}}{8} \\ x &= \frac{-8 \pm \sqrt{64}\sqrt{2}}{8} \end{aligned}$$

$$\begin{aligned} x &= \frac{-8 \pm 8\sqrt{2}}{8} \\ x &= -1 \pm \sqrt{2} \end{aligned}$$

$\{-1 + \sqrt{2}, -1 - \sqrt{2}\}$

- 16.) Solve the following quadratic equation by factoring.

$$\begin{aligned} x^2 &= 13x \\ x^2 - 13x &= 0 \\ x(x-13) &= 0 \end{aligned}$$

$\{0, 13\}$

- 17.) Find a quadratic equation that has a solution of $\{-7, 4\}$.

$$\begin{aligned} (x+7)(x-4) &= 0 \\ x^2 - 4x + 7x - 28 &= 0 \\ x^2 + 3x - 28 &= 0 \end{aligned}$$

$x^2 + 3x - 28 = 0$

18.) Solve for x.

$$\frac{x+2}{3} = \frac{8}{x+4}$$

$$(x+2)(x+4) = 24$$

$$x^2 + 4x + 2x + 8 = 24$$

$$x^2 + 6x + 8 = 24$$

$$x^2 + 6x - 16 = 0$$

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

$$\{-8, 2\}$$

19.) Solve for all values of x by completing the square. Express the answer in simplest radical form.

$$2 \cdot \frac{1}{2}x^2 = 5x + 10 \cdot 2$$

$$x^2 = 10x + 20$$

$$x^2 - 10x = 20$$

$$\left(\frac{-10}{2}\right)^2 = (-5)^2 = 25$$

$$x^2 - 10x + 25 = 20 + 25$$

$$(x-5)^2 = 45$$

$$x-5 = \pm\sqrt{45}$$

$$x = 5 \pm \sqrt{45}$$

$$x = 5 \pm \sqrt{9 \cdot 5}$$

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

$$\{5+3\sqrt{5}, 5-3\sqrt{5}\}$$

20.) Solve the following quadratic equation using all three methods.

Factoring	Completing the Square	Quadratic Formula
$3x^2 - 16x - 7 = 5$ $3x^2 - 16x - 12 = 0$ $(3x+2)(x-6) = 0$ $\begin{array}{l l} 3x+2=0 & x-6=0 \\ 3x=-2 & x=6 \\ x=-\frac{2}{3} & \end{array}$	$3x^2 - 16x = 12$ $x^2 - \frac{16}{3}x = 4$ $\left(\frac{-16}{2}\right)^2 = \left(\frac{-16}{6}\right)^2 = \left(\frac{-8}{3}\right)^2 = \frac{64}{9}$ $x^2 - \frac{16}{3}x + \frac{64}{9} = 4 + \frac{64}{9}$	$3x^2 - 16x - 12 = 0$ $x = \frac{16 \pm \sqrt{(-16)^2 - 4(3)(-12)}}{2(3)}$
$\frac{36}{6}$ \downarrow 6	$(x - \frac{8}{3})^2 = \frac{100}{9}$ $x - \frac{8}{3} = \pm \frac{10}{3}$ $x = \frac{8}{3} \pm \frac{10}{3}$	$x = \frac{16 \pm \sqrt{400}}{6}$ $x = \frac{16 \pm 20}{6}$ $\frac{36}{6}$ $\frac{-4}{6}$ \downarrow \downarrow 6 $-\frac{2}{3}$

$$\frac{18}{3}$$

$$\text{or } -\frac{2}{3}$$

$$\{6, -\frac{2}{3}\}$$

$$\{6, -\frac{2}{3}\}$$