1-10 HW Answer Key

1 & 2. Look at next page

3. $5\sqrt{3}$
4. -22
5. $2\sqrt{7}$
6. $\sqrt{14}$
7. $\sqrt{3}$
8. $3\sqrt{2}$
9. 64, 8
10. 16, 4
11. 48, $4\sqrt{3}$
12. 117, $3\sqrt{13}$
13. 3x(2x-5)(x+2)
14. {0, 5, -2}
15. (2x+5)($4x^2$-10x+25)

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1. Justify that $\sqrt{a} \bullet \sqrt{b} = \sqrt{ab}$ by letting a=25 and b=4.

$\sqrt{25} \cdot \sqrt{4} \overset{?}{=} \sqrt{25 \cdot 4}$

$5 \cdot 2 = \sqrt{100}$

$10 = 10$ ✓

2. Justify that $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$ by letting a=100 and b=4.

$\sqrt{\frac{100}{4}} \overset{?}{=} \frac{\sqrt{100}}{\sqrt{4}}$

$\sqrt{25} = \frac{10}{2}$

$5 = 5$ ✓

Express in simplest radical form.

3. $\sqrt{75} = \sqrt{25}\sqrt{3} = 5\sqrt{3}$

4. $-2\sqrt{121} = -2(11) = -22$

5. $\frac{\sqrt{56}}{\sqrt{2}} = \sqrt{28} = \sqrt{4}\sqrt{7} = 2\sqrt{7}$

6. $\frac{\sqrt{56}}{2} = \frac{\sqrt{4}\sqrt{14}}{2} = \frac{2\sqrt{14}}{2} = \sqrt{14}$

7. $\sqrt{\frac{36}{12}} = \sqrt{3}$

8. $\frac{3}{4}\sqrt{32} = \frac{3}{4}\sqrt{16}\sqrt{2} = 3\sqrt{2}$

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Find the discriminant and then take its square root. b^2-4ac

9. $5x^2 + 2x - 3 = 0$

$b^2-4ac = (2)^2-4(5)(-3) = 4+60 = 64$

$\sqrt{64} = 8$

10. $3x^2 - 10x + 7 = 0$

$b^2-4ac = (-10)^2-4(3)(7) = 100-84 = 16$

$\sqrt{16} = 4$

11. $2x^2 - 4x = 4$

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

$b^2-4ac = (-4)^2-4(2)(-4) = 16+32 = 48$

$\sqrt{48} = \sqrt{16}\sqrt{3} = 4\sqrt{3}$

12. $9x^2 + 3x = 3$

$9x^2+3x-3=0$

$b^2-4ac = 3^2-4(9)(-3) = 9+108 = 117$

$\sqrt{117} = \sqrt{9}\sqrt{13} = 3\sqrt{13}$

13. Factor completely: $6x^3 - 3x^2 - 30x$ $= 3x(2x^2-x-10)$ P: -20, S: -1; -5, 4

$= 3x[2x^2-5x+4x-10]$

$= 3x[x(2x-5)+2(2x-5)]$

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

14. Solve by factoring: $3x^3 - 9x^2 = 30x$

$3x^3-9x^2-30x=0$

$3x(x^2-3x-10)=0$ P: -10, S: -3; -5, 2

$3x(x-5)(x+2)=0$

$x=0$ / $x=5$ / $x=-2$ {0, 5, -2}

15. Factor and check: $8x^3 + 125$.

$8x^3+125 = (2x+5)(4x^2-10x+25)$

check $(2x+5)(4x^2-10x+25)$

$= 8x^3 - \cancel{20x^2} + \cancel{50x} + \cancel{20x^2} - \cancel{50x} + 125$

$= 8x^3+125$ ✓

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1-11: Solve Quadratic Equations Using the Quadratic Formula

If we have a quadratic equation that is not easily factorable, we can solve it by using the quadratic formula. Try solving this by factoring: $3x^2 + 5x - 1 = 0$ P: -3 S: 5

What do you notice? You cannot use long product sum.

The Quadratic Formula

If $ax^2 + bx + c = 0$ ($a \neq 0$), then the solutions, or roots, are

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

https://www.youtube.com/watch?v=2lbABbfU6Zc (To music)

http://www.youtube.com/watch?v=O8ezDEk3qCg

http://www.youtube.com/watch?v=z6hCu0EPs-o

You should recognize the expression under the radical = b^2-4ac.

We call that the discriminant and will find it first.

Let's use the quadratic formula to solve the following equation. Find the discriminant first.

1. $3x^2 + 5x - 1 = 0$

① Standard form $ax^2+bx+c:0$

② a:3 b:5 c:-1

$b^2-4ac : (5)^2-4(3)(-1)$

$: 25+12 : 37$

③ Use the formula $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$x = \frac{-5 \pm \sqrt{37}}{2(3)} = \frac{-5 \pm \sqrt{37}}{6}$

④ $\left\{\frac{-5 \pm \sqrt{37}}{6}\right\}$

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Find the zeros of the functions or the roots of the equations using the quadratic formula. Leave all solutions in simplest radical form.

Note: Some can be solved by factoring, but we will use the quadratic formula.

2. $f(x) = x^2 + 8x + 7$

① $x^2+8x+7:0$

② a:1 b:8 c:7

$b^2-4ac : (8)^2-4(1)(7)$

$: 36$

③ $x : \frac{-8 \pm \sqrt{36}}{2(1)}$ {-7, -1}

$x : \frac{-8 \pm 6}{2}$

$x : \frac{-8+6}{2}$ $x : \frac{-8-6}{2}$

$x : -1$ $x : -7$

3. $-9 = x^2 + 6x$ (+9 +9)

① $x^2+6x+9:0$

② a:1 b:6 c:9

$b^2-4ac : (6)^2-4(1)(9)$

$: 0$

③ $x = \frac{-6 \pm \sqrt{0}}{2(1)} : \frac{-6}{2} : -3$

④ {-3}

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4. $3(x-2)^2 - 4 = 0$

① $3(x-2)(x-2)-4:0$ $(x-2)(x-2)$

$3(x^2-4x+4)-4:0$ $x^2-2x-2x+4$

$3x^2-12x+12-4:0$ x^2-4x+4

$3x^2-12x+8:0$

② a:3 b:-12 c:8

$b^2-4ac : (-12)^2-4(3)(8)$

$: 48$

③ $x : \frac{-(-12) \pm \sqrt{48}}{2(3)}$

$x : \frac{12 \pm \sqrt{16}\sqrt{3}}{6}$

$x : \frac{12 \pm 4\sqrt{3}}{6} \div 2$

$x : \frac{6 \pm 2\sqrt{3}}{3}$ $\left\{\frac{6 \pm 2\sqrt{3}}{3}\right\}$

5. $f(x) = 2x^2 - 16x + 27$

① $2x^2-16x+27:0$

② a:2 b:-16 c:27

$(-16)^2-4(2)(27) : 40$

③ $x : \frac{+16 \pm \sqrt{40}}{2(2)} : \frac{+16 \pm \sqrt{4}\sqrt{10}}{4}$

$\div 2$ $: \frac{16 \pm 2\sqrt{10}}{4} : \frac{8 \pm \sqrt{10}}{2}$ or $4 \pm \frac{\sqrt{10}}{2}$

④ $\left\{\frac{8 \pm \sqrt{10}}{2}\right\}$

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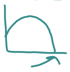
You can use the quadratic formula to solve real-world problems modeled by quadratic functions.

6. In a shot put event, Jenna tosses her last shot from a position of about 6' above the ground with an initial vertical and horizontal velocity of 20 ft/sec. The height of the shot is modeled by the function $h(t) = -16t^2 + 20t + 6$, where t is the time in seconds after the toss. How long does it take the shot to reach the ground? Round to the nearest tenth.

① $h(t) = -16t^2 + 20t + 6$

$\frac{-16t^2}{-2} + \frac{20t}{-2} + \frac{6}{-2} = \frac{0}{-2}$

$8t^2 - 10t - 3 = 0$



calculator

do not need to be in simplest form!

② $a = 8$ $b = -10$ $c = -3$

$b^2 - 4ac = (-10)^2 - 4(8)(-3) = 196$

③ $t = \frac{-(-10) \pm \sqrt{196}}{2(8)} = \frac{10 \pm \sqrt{196}}{16}$

1.5 seconds

④ $t = 1.5$ $t = -.25$

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