

## Algebra II Chapter 6 Review Sheet Solutions

1) (2 points) Simplify the radical expression given below.

$$\sqrt{27x^4y^8z^9}$$

$$\sqrt{9x^4y^8z^8} \sqrt{3z}$$

PERFECT  
SQUARES

$$= 3x^2y^4z^4 \sqrt{3z}$$

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2) (4 points) Simplify the radical expressions given below.

a)  $-2\sqrt[3]{2x^2y^2} \cdot 2\sqrt[3]{15x^5y}$

b)  $\frac{\sqrt{3xy^2}}{\sqrt{5x^2y^3}}$

a)  $-4\sqrt[3]{30x^7y^3} = -4\sqrt[3]{\underbrace{x^6y^3}_{\text{PERFECT CUBES}}}\sqrt[3]{30x}$   
 $= -4x^2y\sqrt[3]{30x}$

b)  $\sqrt{\frac{3}{5xy}} = \frac{\sqrt{3}}{\sqrt{5xy}} \cdot \frac{\sqrt{5xy}}{\sqrt{5xy}} = \frac{\sqrt{15xy}}{5xy}$

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3) (5 points) Simplify the radical expressions given below.

a)  $(2\sqrt{5} + 3\sqrt{2})(5\sqrt{5} + 7\sqrt{2})$

b)  $\frac{4+\sqrt{6}}{\sqrt{2}+\sqrt{3}}$

a)  $(2\sqrt{5} + 3\sqrt{2})(5\sqrt{5} + 7\sqrt{2})$

$$10\sqrt{25} + 14\sqrt{10} + 15\sqrt{10} + 21\sqrt{4}$$

$$50 + 29\sqrt{10} + 42 = 92 + 29\sqrt{10}$$

b)  $\frac{4+\sqrt{6}}{\sqrt{2}+\sqrt{3}} \cdot \frac{\sqrt{2}-\sqrt{3}}{\sqrt{2}-\sqrt{3}} = \frac{4\sqrt{2} - 4\sqrt{3} + \sqrt{12} - \sqrt{18}}{2 - \cancel{\sqrt{6}} + \cancel{\sqrt{6}} - 3}$

$$= \frac{4\sqrt{2} - 4\sqrt{3} + 2\sqrt{3} - 3\sqrt{2}}{-1} = \frac{\sqrt{2} - 2\sqrt{3}}{-1}$$

$$= 2\sqrt{3} - \sqrt{2}$$

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4) (5 points) Simplify each of the expressions given below.

$$\text{a) } \left(x^{\frac{1}{2}}y^{-\frac{2}{3}}\right)^{-6} = x^{-3}y^4 = \frac{y^4}{x^3}$$

$$\text{b) } \frac{64^{\frac{1}{3}}x^{\frac{2}{3}}y^{-\frac{1}{4}}}{x^{\frac{1}{2}}y^{-\frac{1}{2}}}$$

b)  $\sqrt[3]{64} x^{\frac{2}{3}-\frac{1}{2}} y^{-\frac{1}{4}-(-\frac{1}{2})}$

$$4 x^{\frac{1}{6}} y^{-\frac{1}{4}+\frac{1}{2}} = 4x^{\frac{1}{6}}y^{\frac{1}{4}}$$

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5) (8 points) Solve the equation given below.

$$\sqrt{3x+7} + 1 = x$$

$$\sqrt{3x+7} = x - 1$$

$$\left(\sqrt{3x+7}\right)^2 = (x-1)^2$$

$$3x+7 = x^2 - 2x + 1$$

$$x^2 - 5x - 6 = 0$$

$$(x-6)(x+1) = 0$$

$$x = 6, -1$$

$$\checkmark$$

$$x = -1$$

$$\sqrt{4} + 1 = -1$$

NO

$$\checkmark$$

$$x = 6$$

$$\sqrt{25} + 1 = 6$$

YES

$$x = 6$$

## Algebra II Chapter 6 Review Sheet Solutions

6) (8 points) Let  $f(x) = 2x^2 - 3x + 1$  and  $g(x) = x - 4$ . Find the following

a)  $f(g(-3))$

b)  $(f \circ g)(x)$

c)  $g(f(-1))$

d)  $f(x) \cdot g(x)$

e)  $\frac{g(x)}{f(x)}$  and list the domain of the result.

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$$\begin{aligned} \text{a) } f(g(-3)) &= f(-7) = 2(-7)^2 - 3(-7) + 1 \\ &= 2(49) + 21 + 1 \\ &= 98 + 22 = 120 \end{aligned}$$

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$$\begin{aligned} \text{b) } (f \circ g)(x) &= f(g(x)) = f(x-4) \\ &= 2(x-4)^2 - 3(x-4) + 1 \\ &= 2(x^2 - 8x + 16) - 3x + 12 + 1 \\ &= 2x^2 - 16x + 32 - 3x + 12 + 1 \\ &= 2x^2 - 19x + 45 \end{aligned}$$

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$$\text{c) } g(f(-1)) = g(6) = 6 - 4 = 2$$

$$\begin{aligned} f(-1) &= 2(-1)^2 - 3(-1) + 1 \\ &= 2 + 3 + 1 \\ &= 6 \end{aligned} \qquad g(f(-1)) = 2$$

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$$\begin{aligned} \text{d) } (f \cdot g)(x) &= f(x) \cdot g(x) \\ &= (2x^2 - 3x + 1)(x - 4) \\ &= 2x^3 - 8x^2 - 3x^2 + 12x + x - 4 \\ &= 2x^3 - 11x^2 + 13x - 4 \end{aligned}$$

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$$\text{e) } \frac{g(x)}{f(x)} = \frac{x-4}{2x^2-3x+1} = \frac{x-4}{(2x-1)(x-1)}$$

$$\text{Domain } \frac{g(x)}{f(x)}: x \neq \frac{1}{2}, 1$$

## Algebra II Chapter 6 Review Sheet Solutions

7) (10 points) Let  $f(x) = 2\sqrt{x-1} + 3$ . Find  $f^{-1}(x)$  and graph both  $f(x)$  and  $f^{-1}(x)$  on the same coordinate plane.

$$f(x) = 2\sqrt{x-1} + 3$$

$$y = 2\sqrt{x-1} + 3$$

$$x = 2\sqrt{y-1} + 3$$

$$2\sqrt{y-1} = x - 3$$

$$(2\sqrt{y-1})^2 = (x-3)^2$$

$$4(y-1) = (x-3)^2$$

$$y-1 = \frac{1}{4}(x-3)^2$$

$$y = \frac{1}{4}(x-3)^2 + 1$$

$$f^{-1}(x) = \frac{1}{4}(x-3)^2 + 1$$

