

Chapter 5 Review

#1. Simplify the following radicals. (/6)

a) $\sqrt{175}$

$$\frac{\sqrt{25 \cdot 7} \cdot \sqrt{3}}{5\sqrt{3}}$$

b) $7\sqrt[3]{32}$

$$7\sqrt[3]{8} \cdot \sqrt[3]{4}$$

$$7(2) \cdot \sqrt[3]{4}$$

$$14\sqrt[3]{4}$$

c) $3\sqrt[3]{54x^7}$

$$3\sqrt[3]{27 \cdot 2x^6x}$$

$$3 \cdot 3 \cdot x^2 \sqrt{2x}$$

$$9x^2 \sqrt{2x}$$

#2. Change the Mixed Radicals to Entire Radicals.

a) $2\sqrt{15}$

$$\frac{\sqrt{2^2 \cdot 15}}{\sqrt{60}}$$

b) $2xy^2\sqrt[3]{5x}$

$$\sqrt[3]{(2xy^2)^3 \cdot 5x}$$

$$\sqrt[3]{8x^3y^6 \cdot 5x}$$

$$\sqrt[3]{40x^4y^6}$$

c) $-x^3y\sqrt{5}, x \geq 0$

$$-\sqrt{(x^3y)^2 \cdot 5}$$

$$-\sqrt{5x^6y^2}$$

#3. Multiply and Simplify the following Radicals.

a) $(-2\sqrt{10})(7\sqrt{2})(4\sqrt{30})$

$$-56\sqrt{600}$$

$$-56\sqrt{100 \cdot 6}$$

$$-56(10)\sqrt{6}$$

$$-560\sqrt{6}$$

b) $(-2\sqrt{6xy})(3\sqrt{2x^2y})(5\sqrt{2xy^5}), x \geq 0$

$$-30\sqrt{24x^4y^7}$$

$$-30\sqrt{4 \cdot 6 \cdot x^4 \cdot y^6 \cdot y}$$

$$-30(2)(x^2)(y^3)\sqrt{6y}$$

$$-60x^2y^3\sqrt{6y}$$

#4. Add, Subtract and Simplify the following radicals.

a) $5\sqrt{108} + 3\sqrt{75}$

$$5\sqrt{36 \cdot 3} + 3\sqrt{25 \cdot 3}$$

$$5(6)\sqrt{3} + 3(5)\sqrt{3}$$

$$30\sqrt{3} + 15\sqrt{3}$$

$$45\sqrt{3}$$

b) $5a\sqrt{28} - 3\sqrt{63a^2}, a \geq 0$

$$5a\sqrt{4 \cdot 7} - 3\sqrt{9 \cdot 7a^2}$$

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

$$10a\sqrt{7} - 9a\sqrt{7}$$

$$a\sqrt{7}$$

c) $-\frac{5}{2}\sqrt{20} - \frac{2}{5}\sqrt{125} + \frac{11}{3}\sqrt{45}$

$$-\frac{5}{2}\sqrt{4 \cdot 5} - \frac{2}{5}\sqrt{25 \cdot 5} + \frac{11}{3}\sqrt{9 \cdot 5}$$

$$-\frac{5}{2}(2)\sqrt{5} - \frac{2}{5}(5)\sqrt{5} + \frac{11}{3}(3)\sqrt{5}$$

$$-5\sqrt{5} - 2\sqrt{5} + 11\sqrt{5}$$

$$4\sqrt{5}$$

d) $5\sqrt[3]{80} + 3\sqrt[3]{270} - 6\sqrt[3]{10}$

$$5\sqrt[3]{8 \cdot 10} + 3\sqrt[3]{27 \cdot 10} - 6\sqrt[3]{10}$$

$$5(2)\sqrt[3]{10} + 3(3)\sqrt[3]{10} - 6\sqrt[3]{10}$$

$$10\sqrt[3]{10} + 9\sqrt[3]{10} - 6\sqrt[3]{10}$$

$$13\sqrt[3]{10}$$

#5. Expand and Simplify the following.

a) $5\sqrt{3}(4\sqrt{15} - 7\sqrt{21})$ distribute

$$20\sqrt{45} - 35\sqrt{63}$$

$$20\sqrt{9 \cdot 5} - 35\sqrt{9 \cdot 7}$$

$$20(3)\sqrt{5} - 35(3)\sqrt{7}$$

$$60\sqrt{5} - 105\sqrt{7}$$

b) $(5\sqrt{7} - 2\sqrt{5})(4\sqrt{7} + 5\sqrt{5})$ FOIL

$$20(7) + 25\sqrt{35} - 8\sqrt{35} - 10(5)$$

$$140 + 13\sqrt{35} - 50$$

$$90 + 13\sqrt{35}$$

#6. Divide the following Radicals. (Rationalize the denominator if needed!) *divide, then rationalize*

a) $\frac{2\sqrt{50}}{3\sqrt{10}} = \frac{1\sqrt{5}}{3}$ or $\frac{\sqrt{5}}{3}$

that will give 8 which is a perfect cube

b) $\frac{2\sqrt[3]{2}}{\sqrt[3]{4}} = \frac{2\sqrt[3]{2}}{\sqrt[3]{2^2}} = \frac{2\sqrt[3]{2}}{2} = \sqrt[3]{2}$

c) $\frac{\sqrt{10}}{\sqrt{2}-\sqrt{5}} \cdot \frac{(\sqrt{2}+\sqrt{5})}{(\sqrt{2}+\sqrt{5})} = \frac{\sqrt{20} + \sqrt{50}}{2-5}$

$\frac{\sqrt{4 \cdot 5} + \sqrt{25 \cdot 2}}{-3} = \frac{2\sqrt{5} + 5\sqrt{2}}{-3}$

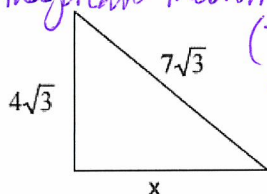
d) $\frac{6x\sqrt{3}}{\sqrt{20x^3}}, x > 0$ $\frac{6x\sqrt{3}}{\sqrt{4 \cdot 5 \cdot x^2 \cdot x}}$

$\frac{6x\sqrt{3}}{2x\sqrt{5x}} = \frac{3\sqrt{3}}{\sqrt{5x}}$

$\frac{3\sqrt{15x}}{5x}$

#7. Solve for x in the right triangle below. Write your answer in EXACT form.

Pythagorean Theorem



$c^2 - a^2 = x^2$
 $(7\sqrt{3})^2 - (4\sqrt{3})^2 = x^2$
 $49(3) - 16(3) = x^2$
 $147 - 48 = x^2$
 $\sqrt{99} = \sqrt{x^2}$
 $\sqrt{9 \cdot 11} = x$
 $3\sqrt{11} = x$

#8. For diamonds of comparable quality, the cost, "C", in dollars is related to the mass, "m", in carats, by the formula,

$m = \sqrt{\frac{C}{700}}, C \geq 0$ $(3)^2 = \left(\sqrt{\frac{C}{700}}\right)^2$

What is the cost of a 3-carat diamond?

$700(9) = \left(\frac{C}{700}\right) 700$

$6300 = C$

A 3 carat diamond would cost \$6300.

#9. Solve the following radical equations. Verify your solutions.

a) $2\sqrt{x+2} - 5 = 1$

$\frac{2\sqrt{x+2}}{2} = \frac{6}{2}$

$(\sqrt{x+2})^2 = (3)^2$

$x+2 = 9$

$x = 7$

Verify $2\sqrt{7+2} - 5 = 1$

$2\sqrt{9} - 5 = 1$

$2(3) - 5 = 1$

$6 - 5 = 1$

$1 = 1$

$x = 7$

b) $\sqrt{x+4} - \sqrt{2x+3} = 0$

$(\sqrt{x+4})^2 = (\sqrt{2x+3})^2$ verify

$x+4 = 2x+3$

$-2x -4 -2x -4$

$-x = -1$

$x = 1$

Verify $\sqrt{1+4} - \sqrt{2(1)+3} = 0$

$\sqrt{5} - \sqrt{5} = 0$

$\sqrt{5} - \sqrt{5} = 0$

$0 = 0$

$x = 1$

c) $(\sqrt{3x+3})^2 = (x+1)^2$

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

$0 = x^2 - x - 2$

$0 = (x-2)(x+1)$

$x = 2$ $x = -1$

Verify

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

$\sqrt{6+3} = 3$ $\sqrt{-3+3} = 0$

$\sqrt{9} = 3$ $\sqrt{0} = 0$

$3 = 3$

$0 = 0$

d) $\sqrt{4x+1} - \sqrt{3x-5} = 2$

$(\sqrt{4x+1})^2 = (2 + \sqrt{3x-5})^2$

$4x+1 = (2 + \sqrt{3x-5})(2 + \sqrt{3x-5})$

$4x+1 = 4 + 2\sqrt{3x-5} + 2\sqrt{3x-5} + 3x-5$

$4x+1 = 3x + 4\sqrt{3x-5} - 1$

$-3x+1 -3x+1$

$(x+2)^2 = (4\sqrt{3x-5})^2$

$x^2 + 4x + 4 = 16(3x-5)$ verify

$x^2 + 4x + 4 = 48x - 80$ $\sqrt{4(42)+1} - \sqrt{3(42)-5} = 2$

$-48x+80 -48x+80$ $\sqrt{168+1} - \sqrt{126-5} = 2$

$x^2 - 44x + 84 = 0$

$(x-42)(x-2) = 0$

$x = 42$ $x = 2$

$13 - 11 = 2$

$2 = 2$

TRUE!

verify $\sqrt{4(2)+1} - \sqrt{3(2)-5} = 2$

$\sqrt{9} - \sqrt{1} = 2$ $2 = 2$ TRUE!