

Algebra 2  
Simplifying Roots and Radicals

Root Master: KEY  
Date: \_\_\_\_\_ Period: \_\_\_\_\_

Rewind: Simplify.

1.)  $\sqrt[3]{250a^5b^6c^8}$   
 $\sqrt[3]{125A^3B^6C^6} \cdot \sqrt[3]{2A^2C^2}$   
 $5AB^2C^2 \sqrt[3]{2A^2C^2}$

2.)  $4\sqrt{20} - 5\sqrt{80}$   
 $4\sqrt{4} \sqrt{5} - 5\sqrt{16} \sqrt{5}$   
 $4 \cdot 2 \cdot \sqrt{5} - 5 \cdot 4 \cdot \sqrt{5}$   
 $8\sqrt{5} - 20\sqrt{5}$   
 $-12\sqrt{5}$

3.)  $\sqrt[4]{32m^{12}n^9p^6}$   
 $\sqrt[4]{16M^{12}N^8P^4} \cdot \sqrt[4]{2MP^2}$   
 $2M^3N^2P \sqrt[4]{2MP^2}$

4.)  $\sqrt[3]{32x^2y^5} \cdot \sqrt[3]{2x^4y^4}$   
 $\sqrt[3]{64x^6y^9}$   
 $4x^2y^3$

5.)  $\sqrt[3]{50} - \sqrt[3]{32} + 4\sqrt[3]{200}$   
 $\sqrt[3]{25} \sqrt[3]{2} - \sqrt[3]{16} \sqrt[3]{2} + 4\sqrt[3]{100} \sqrt[3]{2}$   
 $5\sqrt[3]{2} - 4\sqrt[3]{2} + 40\sqrt[3]{2}$   
 $41\sqrt[3]{2}$

6.)  $\sqrt[4]{162x^{10}y^7z^3}$   
 $\sqrt[4]{81x^8y^4} \cdot \sqrt[4]{2x^2y^3z^3}$   
 $3x^2y \sqrt[4]{2x^2y^3z^3}$

7.)  $\sqrt[3]{32x^2y^5} \cdot \sqrt[3]{2x^4y^4}$   
 SEE #4

8.)  $\sqrt[4]{162x^{10}y^7z^3}$   
 SEE #6

9.)  $\sqrt{500x^7y^3z^{13}}$   
 $\sqrt{100x^6y^2z^{12}} \cdot \sqrt{5xyz}$   
 $10x^3y^2z^6 \sqrt{5xyz}$

10.)  $(3 - 2\sqrt{3})(2\sqrt{3} - 4)$   
 $6\sqrt{3} - 12 - 4\sqrt{9} + 8\sqrt{3}$   
 $6\sqrt{3} - 12 - 4(3) + 8\sqrt{3}$   
 $6\sqrt{3} - 12 - 12 + 8\sqrt{3}$   
 $14\sqrt{3} - 24$

11.)  $\frac{(4+\sqrt{6})(\sqrt{3}-2)}{(\sqrt{3}+2)(\sqrt{3}-2)}$   
 $\frac{4\sqrt{3} - 8 + \sqrt{18} - 2\sqrt{6}}{\sqrt{9} - 2\sqrt{3} + 2\sqrt{3} - 4}$   
 $\frac{4\sqrt{3} - 8 + 3\sqrt{2} - 2\sqrt{6}}{3 - 4}$   
 $\frac{4\sqrt{3} - 8 + 3\sqrt{2} - 2\sqrt{6}}{-1}$   
 $-4\sqrt{3} + 8 - 3\sqrt{2} + 2\sqrt{6}$

12.)  $(4\sqrt{2} - 3)^2$   
 $(4\sqrt{2} - 3)(4\sqrt{2} - 3)$   
 $16\sqrt{4} - 12\sqrt{2} - 12\sqrt{2} + 9$   
 $16(2) - 24\sqrt{2} + 9$   
 $32 - 24\sqrt{2} + 9$   
 $41 - 24\sqrt{2}$

Simplify.

13.)  $36^{\frac{3}{2}}$   
 $(\sqrt{36})^3$   
 $(6)^3$   
 $\boxed{216}$

14.)  $16^{-\frac{3}{4}}$   
 $\frac{1}{16^{\frac{3}{4}}}$   
 $(\frac{1}{\sqrt[4]{16}})^3$   
 $\frac{1}{(2)^3}$   
 $\frac{1}{8}$

15.)  $81^{\frac{2}{3}}$   
 $(\sqrt[3]{81})^2$   
 $(\sqrt[3]{27} \cdot \sqrt[3]{3})^2$   
 $(3 \sqrt[3]{3})^2$   
 $3 \sqrt[3]{3} \cdot 3 \sqrt[3]{3}$   
 $\boxed{9 \sqrt[3]{9}}$

16.)  $2x^{\frac{1}{2}} \cdot x^{\frac{3}{4}} \cdot 6x^{\frac{1}{6}}$   
 $12x^{\frac{6}{12} + \frac{9}{12} + \frac{2}{12}}$   
 $12x^{\frac{17}{12}}$  or  $12\sqrt[12]{x^{17}}$   
 $12x^{\frac{12}{12} \cdot \frac{5}{12}}$  or  $12\sqrt[12]{x^{12} \cdot x^5}$   
 $12x \cdot x^{\frac{5}{12}}$  or  $12x\sqrt[12]{x^5}$

17.)  $(27x^2)^{\frac{3}{2}}$   
 $27^{\frac{3}{2}} x^3$   
 $(\sqrt{27})^3 x^3$   
 $(\sqrt{9} \sqrt{3})^3 x^3$   
 $(3\sqrt{3})^3 x^3$   
 $27(\sqrt{3})^3 x^3$   
 $27(\sqrt{3} \sqrt{3} \sqrt{3}) x^3$   
 $27 \cdot 3 \cdot \sqrt{3} \cdot x^3$   
 $81\sqrt{3} \cdot x^3$   
 $\boxed{81x^3 \sqrt{3}}$

18.)  $(x^{-2} \cdot x^{\frac{3}{4}} \cdot x^3)^{\frac{1}{2}}$   
 $x^{-1} \cdot x^{\frac{3}{4}} \cdot x^{\frac{3}{2}}$   
 $x^{-4/4} \cdot x^{3/4} \cdot x^{6/4}$   
 $x^{5/4}$  or  $\sqrt[4]{x^5}$   
 $x^{4/4} \cdot x^{1/4}$   
 $x \cdot x^{\frac{1}{4}}$  or  $x\sqrt[4]{x}$

19.)  $\left(\frac{x^2 y^{-2}}{y x^{-\frac{7}{4}}}\right)^4$   
 $\frac{x^2 y^{-8}}{x^{-7} y^4}$   
 $\frac{x^9}{y^{12}}$

20.)  $\frac{(x^3 y^2)^{\frac{3}{2}}}{(x^{-1} y^{-\frac{2}{3}})^{\frac{1}{4}}}$   
 $x^{\frac{9}{2}} y^3$   
 $x^{-\frac{1}{4}} y^{-\frac{2}{12}}$   
 $x^{\frac{19}{4}} y^{\frac{19}{6}}$   
 $x^4 \cdot x^{\frac{3}{4}} \cdot y^3 \cdot y^{\frac{11}{6}}$   
 $x^4 y^3 \sqrt[12]{x^9 y^2}$

21.)  $2^{\frac{2}{3}} \cdot x^{\frac{1}{2}} \cdot y^{\frac{4}{3}}$   
 $2^{\frac{4}{6}} x^{\frac{3}{6}} y^{\frac{8}{6}}$   
 $\sqrt[6]{2^4 x^3 y^8}$   
 $\sqrt[6]{16 x^3 y^8}$   
 $\sqrt[6]{y^6} \cdot \sqrt[6]{16 x^3 y^2}$   
 $y \sqrt[6]{16 x^3 y^2}$

22.)  $\left(\frac{125x^2 y^{-3}}{27x^{-6} y^9}\right)^{\frac{2}{3}}$   
 $125^{\frac{2}{3}} x^{\frac{4}{3}} y^{-2}$   
 $27^{\frac{2}{3}} x^{-4} y^6$   
 $\frac{25 x^{\frac{10}{3}}}{9 y^8}$   
 $\frac{25 x^5 \cdot x^{\frac{1}{3}}}{9 y^8}$

23.)  $(48x^5 y^2)^{\frac{1}{2}}$   
 $\sqrt{48 x^5 y^2}$   
 $\sqrt{16 x^4 y^2} \cdot \sqrt{3 x}$   
 $4x^2 y \sqrt{3x}$

24.)  $\left(\frac{m^{-2} n^{-6}}{121}\right)^{-\frac{1}{2}}$   
 $M^{-2 \cdot -\frac{1}{2}} N^{-6 \cdot -\frac{1}{2}}$   
 $M^1 N^3$   
 $\frac{M N^3 \cdot 121^{\frac{1}{2}}}{121^{\frac{1}{2}}}$   
 $11 M N^3$