III. Review of Simplifying Expressions Containing Radicals and Rational Exponents

Simplify each expression. Leave your answers as rational exponents if necessary.

6. $(16n^4)^{-0.25}$

$16^{-0.25}n^{4\cdot(-0.25)}$

$16^{-0.25}n^{-1}$

$\frac{1}{16^{0.25}n} \Rightarrow \frac{1}{2n}$

7. $\left(\frac{49a^4b^{\frac{2}{3}}}{\sqrt[3]{b^2}}\right)^{-\frac{1}{2}} \rightarrow b^{2/3}$

$\frac{49^{-1/2}a^{4\cdot-1/2}b^{2/3\cdot-1/2}}{b^{2/3\cdot-1/2}} \Rightarrow \frac{49^{-1/2}a^{-2}b^{-1/3}}{b^{-1/3}}$

$\frac{b^{1/3}}{49^{1/2}a^2b^{1/3}} \Rightarrow \frac{1}{7a^2}$

8. $\sqrt[5]{w^{\frac{3}{4}}x^3y^0}$

$(w^{3/4}x^3y^0)^{1/5}$

$w^{3/4\cdot1/5}x^{3\cdot1/5}y^{0\cdot1/5}$

$w^{3/20}x^{3/5}y^0 \Rightarrow w^{3/20}x^{3/5}$

9. $(\sqrt[4]{16x^7y})^3(-2xy^3)^4$

$(16x^7y)^{3/4}(-2xy^3)^4$

$(16^{3/4}x^{7\cdot3/4}y^{3/4})(-2^4x^4y^{3\cdot4})$

$(16^{3/4}x^{21/4}y^{3/4})(-2^4x^4y^{12})$

$(8x^{21/4}y^{3/4})(16x^4y^{12})$

$128x^{21/4+4}y^{3/4+12}$

$128x^{37/4}y^{51/4}$

10. $\frac{\sqrt{100a^3b^{-2}c}}{\left(5a^{\frac{1}{3}}b\right)^2(abc)^3}$

$\frac{(100a^3b^{-2}c)^{1/2}}{(5a^{1/3}b)^2(abc)^3}$

$\frac{100^{1/2}a^{3\cdot1/2}b^{-2\cdot1/2}c^{1/2}}{(5^2a^{1/3\cdot2}b^2)(a^3b^3c^3)} \Rightarrow \frac{10a^{3/2}b^{-1}c^{1/2}}{(25a^{2/3}b^2)(a^3b^3c^3)}$

$\frac{10a^{3/2}b^{-1}c^{1/2}}{25a^{2/3+3}b^{2+3}c^3} \Rightarrow \frac{10a^{3/2}b^{-1}c^{1/2}}{25a^{11/3}b^5c^3} \Rightarrow \frac{4a^{3/2-11/3}b^{-1-5}c^{1/2-3}}{1a^{-13/6}b^{-6}c^{-5/2}} \Rightarrow \frac{2}{5a^{13/6}b^6c^{5/2}}$

11. $(x^2y^{-3}w^4)^{-2}\cdot(4xy^{\frac{1}{2}})^2$

$(x^{2\cdot(-2)}y^{(-3)(-2)}w^{4\cdot(-2)})(4^2x^2y^{1/2\cdot2})$

$(x^{-4}y^6w^{-8})(16x^2y)$

$16x^{-4+2}y^{6+1}w^{-8}$

$16x^{-2}y^7w^{-8}$

$\frac{16y^7}{x^2w^8}$

IV. Rewrite as a radical. Do no simplify.

12. $3(x^2y)^{\frac{2}{5}}$ $3\left(\sqrt[5]{x^2y}\right)^2$

13. $-4(2ab^3)^{-\frac{2}{7}}$ $\frac{-4}{\left(\sqrt[7]{2ab^3}\right)^2}$

14. $(-p^3q)^{\frac{1}{2}}$ $\sqrt{-p^3q}$

V. Rewrite as a rational exponent. Do not simplify.

15. $2\sqrt[3]{ab^2}$ $2(ab^2)^{1/3}$

16. $\frac{1}{\sqrt{3x}}$ $(3x)^{-1/2}$ or $\frac{1}{(3x)^{1/2}}$

17. $(\sqrt[n]{25c^d})^g$ $(25c^d)^{g/n}$

VI. Solve.

18. $(6x)^{\frac{1}{2}} = 6$

$\sqrt{6x} = 6$

$(\sqrt{6x})^2 = 6^2$

$6x = 36$

$x = 6$

19. $x = (-1-2x)^{\frac{1}{2}}$

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

$x^2 = -1-2x$

$x^2+2x+1=0$

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

$x+1=0 \quad x+1=0$

$x=-1 \quad x=-1$

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20. $(b+3)^{\frac{1}{2}} = (-3-2b)^{0.5}$

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

$b+3 = -3-2b$

$3b = -6$

$b = -2$

$\{-2\}$

VII. Solve. (DESMOS Active)

21. $16^{2-x} = 64$

$\{1/2\}$

22. $6^{-2x} = 6^{x+3}$

$\{-1\}$