

1. Rewrite and simplify:

$$27^{1/3}$$

$$\sqrt[3]{27}$$

$$3$$

$$256^{3/4}$$

$$(\sqrt[4]{256})^3$$

$$4^3$$

$$64$$

$$-81^{3/4}$$

$$-(\sqrt[4]{81})^3$$

$$-(3)^3$$

$$-27$$

and $81^{-3/4}$ and $-81^{-3/4}$

$$\frac{1}{81^{3/4}}$$

$$\frac{1}{(\sqrt[4]{81})^3}$$

$$\frac{1}{3^3}$$

$$\frac{1}{27}$$

$$-\frac{1}{(81)^{3/4}}$$

$$-\frac{1}{(\sqrt[4]{81})^3}$$

$$-\frac{1}{(3)^3} = -\frac{1}{27}$$

$$4ba^2 (ab^3)^{5/6}$$

$$4b a^{2/3} a^{5/6} b^{15/6}$$

$$4a^{4/6+5/6} b^{2+1/2}$$

$$4a^{9/6} b^{3/2}$$

$$\frac{4a^{3/2} b^{3/2}}{4ab\sqrt{ab}}$$

2. Simplify:

i. $\sqrt{121x^{14}y^4}$

$$\sqrt{11^2 x^{14} y^4}$$

$$11x^{14/2} y^{4/2}$$

$$11|x^7|y^2$$

ii. $\sqrt[3]{343x^{15}y^8}$

$$\sqrt[3]{7^3 x^{15} y^6 y^2}$$

$$7x^{15/3} y^{6/3} y^{2/3}$$

$$7|x^5|y^2 \sqrt[3]{y^2}$$

iii. $\sqrt[3]{432f^3w^{14}x^{15}}$

$$\sqrt[3]{6^3 \cdot 2 \cdot f^3 \cdot w^{12} \cdot w^2 \cdot x^{15}}$$

$$6f w^{12/3} x^{15/3} \sqrt[3]{2w^2}$$

$$6|f|w^4|x^5|\sqrt[3]{2w^2}$$

iv. $(\frac{98x^{-8}y^{14}x^5}{2x^9y^{-4}})^{1/2}$

$$(\frac{49y^{14}y^4}{x^9x^3})^{1/2}$$

$$(\frac{49y^{18}}{x^{12}})^{1/2}$$

$$\frac{7y^{18/2}}{x^{12/2}} = \frac{7|y^9|}{x^6}$$

v. $\sqrt[3]{375f^5x \cdot \sqrt{f^{14}x^{13}}}$

$$\sqrt[3]{5^3 \cdot 3 \cdot f^5 \cdot x \cdot f^{14} \cdot x^{13}}$$

$$5^{3/3} \cdot 3^{1/3} \cdot f^{5/3} \cdot x^{1/3} \cdot f^{14/2} \cdot x^{13/2}$$

$$5 \cdot 3^{1/3} \cdot f^6 \cdot x^{13/2}$$

3. Solve:

i. $(\sqrt[3]{x})^4 = (4)^4$

$$x = 256$$

ii. $x^3 = 512$

$$\sqrt[3]{x^3} = \sqrt[3]{512}$$

$$x = 8$$

iii. $\sqrt[3]{x} + 3 = 15$

$$\sqrt[3]{x} = 12$$

$$(\sqrt[3]{x})^3 = (12)^3$$

$$x = 1728$$

iv. $6x^4 = 486$

$$\frac{6x^4}{6} = \frac{486}{6}$$

$$x^4 = 81$$

$$x^4 - 81 = 0$$

$$(x^2 - 9)(x^2 + 9) = 0$$

$$(x+3)(x-3)(x+3i)(x-3i) = 0$$

$$x = -3 \quad x = 3 \quad x = -3i \quad x = 3i$$

$(x-8)(x^2+8x+64)$

$$x = \frac{-8 \pm \sqrt{8^2 - 4(1)(64)}}{2(1)} = \frac{-8 \pm \sqrt{-192}}{2}$$

v. $4\sqrt[3]{x-8} = 44$

$$\frac{4\sqrt[3]{x-8}}{4} = \frac{44}{4}$$

$$\sqrt[3]{x-8} = 11$$

$$(\sqrt[3]{x-8})^3 = (11)^3$$

$$x-8 = 1331$$

$$+8 \quad +8$$

$$x = 1339$$

vii. $-2(3x)^2 - 5 = -77$

$$\frac{-2(3x)^2}{-2} = \frac{-77+5}{-2}$$

$$(3x)^2 = 36$$

$$\sqrt{(3x)^2} = \sqrt{36}$$

$$3x = 6 \quad 3x = -6$$

$$x = 2 \quad x = -2$$

viii. $(2x+6)^{1/4} + 4 = 0$

$$\frac{(2x+6)^{1/4}}{-4} = \frac{-4}{-4}$$

$$(2x+6)^{1/4} = -4$$

$$(\sqrt[4]{2x+6})^4 = (-4)^4$$

$$2x+6 = 256$$

$$2x = 250$$

$$x = 125$$

4. What is your interest rate if your bank account earned \$1000 after 15 years when you put in \$200? Use: $1000 = 200(1+r)^{15}$

$\frac{1000}{200} = \frac{200(1+r)^{15}}{200}$
 $5 = (1+r)^{15}$
 $\sqrt[15]{5} = \sqrt[15]{(1+r)^{15}}$
 $5^{1/15} = 1+r$
 $1.113 = 1+r$
 $0.113 = r$
 11.3%

<p>5. $(\sqrt{3x+7})^2 = (x-1)^2$ $x=6$ $x=-1$ extraneous</p> <p>$3x+7 = x^2 - 2x + 1$ $0 = x^2 - 5x - 6$ $0 = (x-6)(x+1)$</p> <p>$\sqrt{3(6)+7} = 6-1$ $\sqrt{3(-1)+7} = -1-1$ $\sqrt{25} = 5$ $\sqrt{4} = 2$ $5 = 5$ $2 \neq -2$</p>	<p>6. $\sqrt{5x+1} = \sqrt{4x+3}$ $x=2$</p> <p>$(\sqrt{5x+1})^2 = (\sqrt{4x+3})^2$ $\sqrt{5(2)+1} = \sqrt{4(2)+3}$ $5x+1 = 4x+3$ $\sqrt{11} = \sqrt{11}$ ✓</p>
<p>7. $\sqrt{2p+3} = 10$ $\frac{2p}{2} = \frac{49}{2}$ $\sqrt{2(\frac{49}{2})+3} = 10$</p> <p>$-3 \quad -3$ $\sqrt{2p} = 7$ $\sqrt{49+3} = 10$ $(\sqrt{2p})^2 = (7)^2$ $7+3 \neq 10$ $10 = 10$ ✓</p> <p>$p = 49/2$</p>	<p>8. $\sqrt[3]{d+2} = 7$ $d = 341$</p> <p>$(\sqrt[3]{d+2})^3 = (7)^3$ $d+2 = 343$ $-2 \quad -2$</p>
<p>9. $(7w+2)^{1/4} + 2 = 7$ $7w+2 = 625$</p> <p>$-2 \quad -2$ $(7w+2)^{1/4} = 5$ $7w = 623$ $((7w+2)^{1/4})^4 = 5^4$ $\frac{7w}{7} = \frac{623}{7}$ $w = 89$</p>	<p>10. $4\sqrt{3h} - 36 = 0$ $\sqrt{3h} = 9$</p> <p>$+36 \quad +36$ $4\sqrt{3h} = 36$ $(\sqrt{3h})^2 = (9)^2$ $\frac{4\sqrt{3h}}{4} = \frac{36}{4}$ $\frac{3h}{3} = \frac{81}{3}$ $h = 27$</p>

11. $(2\sqrt{y}-7)(3\sqrt{y}+4)$

$6\sqrt{y}^2 + 8\sqrt{y} - 21\sqrt{y} - 28$

$6y - 13\sqrt{y} - 28$

12. $(3\sqrt{x}+5)^2$

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

$9\sqrt{x}^2 + 15\sqrt{x} + 15\sqrt{x} + 25$

$9x^2 + 30\sqrt{x} + 25$

13. $\frac{3}{\sqrt[3]{5x^2}} \cdot \frac{\sqrt[3]{5^2x}}{\sqrt[3]{5^2x}}$ $14. \frac{\sqrt[4]{7}}{4d^3} \cdot \frac{\sqrt[4]{2^2d}}{\sqrt[4]{2^2d}}$

$\frac{3\sqrt[3]{25x^1}}{\sqrt[3]{125x^3}}$ $\frac{\sqrt[4]{7 \cdot 4d}}{\sqrt[4]{2^4 d^4}}$

$\frac{3\sqrt[3]{25x}}{5x}$ $\frac{\sqrt[4]{28d}}{2d}$

15. $\frac{7}{\sqrt{x+4}} \cdot \frac{\sqrt{x-4}}{\sqrt{x-4}}$

$\frac{7\sqrt{x-4}}{\sqrt{x^2-4\sqrt{x}+4\sqrt{x}-16}}$ $= \frac{7\sqrt{x-4}}{x-16}$

16. $\frac{5\sqrt[3]{3x} - 2\sqrt[3]{3x}}{3\sqrt[3]{3x}}$

17. $\frac{3\sqrt[4]{x} - 2\sqrt[4]{x+1}}{3\sqrt[4]{x} - 2\sqrt[4]{x+1}}$

18. $\frac{3\sqrt{a}-2}{3\sqrt{a}+2}$

$\frac{3\sqrt{a}^2 + 2\sqrt{a} + 2\sqrt{a} + 4}{9\sqrt{a}^2 + 6\sqrt{a} - 6\sqrt{a} - 4}$

$\frac{3a + 4\sqrt{a} + 4}{9a - 4}$

19. $3(\sqrt[3]{x+1}-2) - 4\sqrt[3]{x+1}$

$3\sqrt[3]{x+1} - 6 - 4\sqrt[3]{x+1}$

$-\sqrt[3]{x+1} - 6$

20. $3\sqrt[4]{x} + 4\sqrt{x} + 2(\sqrt[4]{x} + 7\sqrt{x})$

$3\sqrt[4]{x} + 4\sqrt{x} + 2\sqrt[4]{x} + 14\sqrt{x}$

$5\sqrt[4]{x} + 18\sqrt{x}$