

## Worksheet #21 — Harder Arithmetic and Algebraic Radical Problems

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Simplify each of the following.

- |   |   |  |
|---|---|--|
| (1) $\sqrt{144}$                        | (2) $\sqrt[3]{64}$                            | (3) $\sqrt{25x^{10}}$                  |
| (4) $\sqrt{9x^4y^z}$                    | (5) $\sqrt{(x+1)^2}$                          | (6) $\frac{1}{\sqrt{7}}$               |
| (7) $\sqrt[4]{16x^8y^{12}}$             | (8) $\sqrt[3]{27x^6y^{27}}$                   | (9) $\frac{\sqrt{2}}{\sqrt{3}}$        |
| (10) $\frac{x}{\sqrt{2x^3}}$            | (11) $\frac{1}{\sqrt[3]{2}}$                  | (12) $\frac{\sqrt{12}}{\sqrt{3}}$      |
| (13) $\sqrt{16x^{16}}$                  | (14) $\sqrt{32x^5y^3}$                        | (15) $\sqrt[3]{4x^4}$                  |
| (16) $\frac{1}{\sqrt[3]{4x}}$           | (17) $\frac{1}{\sqrt{6}}$                     | (18) $\frac{4}{\sqrt{2x^3}}$           |
| (19) $2\sqrt{3} + 5\sqrt{3}$            | (20) $\sqrt[3]{16}$                           | (21) $\sqrt{50}$                       |
| (22) $\sqrt{18}$                        | (23) $\frac{\sqrt[3]{2x^2}}{\sqrt[3]{5xy^2}}$ | (24) $\frac{\sqrt[3]{3}}{\sqrt[3]{2}}$ |
| (25) $\sqrt[3]{81}$                     | (26) $\frac{\sqrt[3]{5}}{\sqrt[3]{7^2}}$      | (27) $\frac{1}{\sqrt{2}}$              |
| (28) $\sqrt{125}$                       | (29) $\sqrt[3]{54}$                           | (30) $\sqrt{40}$                       |
| (31) $\sqrt[3]{125}$                    | (32) $2\sqrt[4]{16}$                          | (33) $\sqrt[5]{x^{40}}$                |
| (34) $\frac{\sqrt{3xy^3}}{\sqrt{12xy}}$ | (35) $\frac{\sqrt{x}}{\sqrt{y}}$              | (36) $\sqrt{9x^6y^4}$                  |
| (37) $\sqrt[4]{9}$                      | (38) $\sqrt{4x^{12}}$                         | (39) $\sqrt{18} + \sqrt{50}$           |
| (40) $3\sqrt{48}$                       | (41) $\frac{2}{\sqrt{8}}$                     | (42) $\sqrt{x^3}$                      |
| (43) $3\sqrt{\frac{2}{3}}$              | (44) $\sqrt[3]{8x^{27}}$                      | (45) $\sqrt{4x^3}$                     |
| (46) $\sqrt{8x^5}$                      | (47) $\sqrt{12} - 2\sqrt{3}$                  | (48) $\sqrt{20} + 2\sqrt{125}$         |
| (49) $\sqrt{-9} + \sqrt{-1}$            | (50) $\sqrt{x^3} + 2x\sqrt{x}$                | (51) $\sqrt{12x^9}$                    |
| (52) $3\sqrt{8}$                        | (53) $(\sqrt{8} - \sqrt{2})^2$                | (54) $\frac{2x}{\sqrt[3]{2x}}$         |
| (55) $\sqrt{\frac{5x}{6y}}$             | (56) $2x\sqrt{x} - 16\sqrt{x^3}$              | (57) $\sqrt[3]{0}$                     |
| (58) $\sqrt[8]{x^{16}}$                 | (59) $\frac{7}{\sqrt[3]{49}}$                 | (60) $5\sqrt[3]{16} - 2\sqrt[3]{2}$    |
| (61) $\frac{\sqrt{12}}{\sqrt{8}}$       | (62) $\sqrt{8}\sqrt{2x}$                      | (63) $\sqrt{8}\sqrt{12}$               |

- (64)  $3\sqrt{12} - \sqrt{27}$
- (65)  $\sqrt[3]{4x^7}$
- (66)  $(1 + \sqrt{2})^2$
- (67)  $\frac{2}{\sqrt{3}}$
- (68)  $\frac{\sqrt{5}}{\sqrt{2}}$
- (69)  $3\sqrt{8} - \sqrt{2} + \sqrt{18}$
- (70)  $(\sqrt{1+x})^2$
- (71)  $\sqrt[3]{8x^6}$
- (72)  $\frac{1}{\sqrt[3]{25}}$
- (73)  $\frac{\sqrt{8}}{4}$
- (74)  $-\sqrt[5]{-32} - \sqrt{-4}$
- (75)  $\frac{\sqrt[3]{16x^5}}{2}$
- (76)  $\frac{\sqrt{12a^3}}{2a}$
- (77)  $6\sqrt[3]{81}$
- (78)  $\frac{\sqrt[3]{81}}{12}$
- (79)  $\sqrt{1000}$
- (80)  $\sqrt{x^3} - 5x\sqrt{x}$
- (81)  $\sqrt[3]{8x^6}\sqrt{4x^6}$
- (82)  $\sqrt[3]{8x^3} - \sqrt{x^4}$
- (83)  $\frac{\sqrt{3x^2y}}{\sqrt{6xy^3}}$
- (84)  $\frac{\sqrt[3]{2}}{\sqrt[3]{9}}$
- (85)  $\frac{x}{\sqrt[3]{4x}}$
- (86)  $(\sqrt{2} - 1)^2$
- (87)  $\frac{4}{\sqrt[3]{16}}$
- (88)  $\sqrt{3x}$
- (89)  $\sqrt{5y}$
- (90)  $\frac{a}{\sqrt[3]{a}}$
- (91)  $\sqrt[3]{4x} + \sqrt{8x^2}$
- (92)  $2\sqrt{8} - \sqrt{12}$
- (93)  $(2\sqrt{3x})^2$
- (94)  $\sqrt{x^2 + y^2}$
- (95)  $(3\sqrt[3]{2x^2})^2$
- (96)  $\sqrt[5]{x^{18}}$
- (97)  $\sqrt[3]{8x^9}$
- (98)  $\sqrt[3]{16x^{10}}$
- (99)  $\sqrt[3]{10000}$
- (100)  $x\sqrt[3]{x^{11}}$
- (101)  $\sqrt[3]{24x^5}$
- (102)  $\frac{1}{\sqrt[4]{x}}$
- (103)  $\sqrt{x^2} + \sqrt{y^2}$
- (104)  $\sqrt[4]{4x^5y^{12}}$
- (105)  $\sqrt[3]{(2a+1)^6}$
- (106)  $\frac{2}{\sqrt{x}}$
- (107)  $\sqrt[5]{-1}$
- (108)  $\frac{1}{\sqrt{12x}}$
- (109)  $\frac{\sqrt{12}}{\sqrt{2}}$
- (110)  $\sqrt[3]{8x^5y^6}$
- (111)  $\frac{1}{\sqrt[3]{2}}$
- (112)  $\frac{2}{\sqrt[3]{4}}$
- (113)  $\frac{\sqrt[3]{2x^2y}}{\sqrt[3]{9xy^5}}$
- (114)  $2\frac{x}{\sqrt[3]{12x^2}}$
- (115)  $\sqrt[4]{x^6}$
- (116)  $\sqrt{-4} - \sqrt{-1}$
- (117)  $\sqrt{2x} - 3\sqrt{8x}$
- (118)  $\sqrt{8x^3}\sqrt{2xy}$
- (119)  $\sqrt[3]{x}\sqrt[4]{x}$
- (120)  $\frac{1}{\sqrt[4]{8x^2}}$

- Answers: (1) 12 (2) 4 (3)  $5x^5$  (4)  $3x^2y^{\frac{5}{2}}$  (5)  $x+1$  (6)  $\frac{\sqrt{7}}{7}$  (7)  $2x^2y^3$
- (8)  $3x^2y^9$  (9)  $\frac{\sqrt{6}}{3}$  (10)  $\frac{\sqrt{2x}}{2x}$  (11)  $\frac{\sqrt[3]{4}}{2}$  (12) 2 (13)  $4x^8$  (14)  $4x^2y\sqrt{2xy}$
- (15)  $x\sqrt[3]{4x}$  (16)  $\frac{\sqrt[3]{2x^2}}{2x}$  (17)  $\frac{\sqrt{6}}{6}$  (18)  $\frac{2\sqrt{2x}}{x^2}$  (19)  $7\sqrt{3}$  (20)  $2\sqrt[3]{2}$  (21)  $5\sqrt{2}$
- (22)  $3\sqrt{2}$  (23)  $\frac{\sqrt[3]{50xy}}{5y}$  (24)  $\frac{\sqrt[3]{12}}{2}$  (25)  $3\sqrt[3]{3}$  (26)  $\frac{\sqrt[3]{35}}{7}$  (27)  $\frac{\sqrt{2}}{2}$  (28)  $5\sqrt{5}$
- (29)  $3\sqrt[3]{2}$  (30)  $2\sqrt{10}$  (31) 5 (32) 4 (33)  $x^8$  (34)  $\frac{y}{2}$  (35)  $\frac{\sqrt{xy}}{y}$  (36)  $3x^3y^2$
- (37)  $\sqrt{3}$  (38)  $2x^6$  (39)  $8\sqrt{2}$  (40)  $12\sqrt{3}$  (41)  $\frac{\sqrt{2}}{2}$  (42)  $x\sqrt{x}$  (43)  $\sqrt{6}$  (44)  $2x^9$
- (45)  $2x\sqrt{x}$  (46)  $2x^2\sqrt{2x}$  (47) 0 (48)  $12\sqrt{5}$  (49)  $4i$  (50)  $3x\sqrt{x}$  (51)  $2x^4\sqrt{3x}$
- (52)  $6\sqrt{2}$  (53) 2 (54)  $\sqrt[3]{4x^2}$  (55)  $\frac{\sqrt[3]{30xy}}{6y}$  (56)  $-14x\sqrt{x}$  (57) 0 (58)  $x^2$  (59)  $\sqrt[3]{7}$
- (60)  $8\sqrt[3]{2}$  (61)  $\frac{\sqrt{6}}{2}$  (62)  $4\sqrt{x}$  (63)  $4\sqrt{6}$  (64)  $3\sqrt{3}$  (65)  $x^2\sqrt[3]{4x}$  (66)  $2\sqrt{2}+3$
- (67)  $\frac{2\sqrt{3}}{3}$  (68)  $\frac{\sqrt{10}}{2}$  (69)  $8\sqrt{2}$  (70)  $x+1$  (71)  $2x^2$  (72)  $\frac{\sqrt[3]{5}}{5}$  (73)  $\frac{\sqrt{2}}{2}$
- (74)  $-2i+2$  (75)  $x\sqrt[3]{2x^2}$  (76)  $\sqrt{3a}$  (77)  $18\sqrt[3]{3}$  (78)  $\frac{\sqrt[3]{3}}{4}$  (79)  $10\sqrt{10}$  (80)  $-4x\sqrt{x}$
- (81)  $4x^5$  (82)  $-x^2+2x$  (83)  $\frac{\sqrt{2x}}{2y}$  (84)  $\frac{\sqrt[3]{6}}{3}$  (85)  $\frac{\sqrt[3]{2x^2}}{2}$  (86)  $-2\sqrt{2}+3$  (87)  $\sqrt[3]{4}$
- (88)  $\sqrt{3x}$  (89)  $\sqrt{5y}$  (90)  $\sqrt[3]{a^2}$  (91)  $\sqrt[3]{4x}+2x\sqrt{2}$  (92)  $-2\sqrt{3}+4\sqrt{2}$  (93)  $12x$
- (94)  $\sqrt{y^2+x^2}$  (95)  $9x\sqrt[3]{4x}$  (96)  $x^3\sqrt[5]{x^3}$  (97)  $2x^3$  (98)  $2x^3\sqrt[3]{2x}$  (99)  $10\sqrt[3]{10}$
- (100)  $x^4\sqrt[3]{x^2}$  (101)  $2x\sqrt[3]{3x^2}$  (102)  $\frac{\sqrt[4]{x^3}}{x}$  (103)  $y+x$  (104)  $xy^3\sqrt[4]{4x}$  (105)  $(2a+1)^2$
- (106)  $\frac{2\sqrt{x}}{x}$  (107) -1 (108)  $\frac{\sqrt{3x}}{6x}$  (109)  $\sqrt{6}$  (110)  $2xy^2\sqrt[3]{x^2}$  (111)  $\frac{\sqrt[3]{4}}{2}$  (112)  $\sqrt[3]{2}$
- (113)  $\frac{\sqrt[3]{6xy^2}}{3y^2}$  (114)  $\frac{\sqrt[3]{18x}}{3}$  (115)  $x\sqrt{x}$  (116)  $i$  (117)  $-5\sqrt{2x}$  (118)  $4x^2\sqrt{y}$
- (119)  $\sqrt[12]{x^7}$  (120)  $\frac{\sqrt[4]{2x^2}}{2x}$