

## RADICAL OPERATIONS PRACTICE

Simplify the following radicals (assume all variables represent positive real numbers).

- |                           |   |                                      |
|---------------------------|---|--------------------------------------|
| 1. $\sqrt{18}$            | 6. $\sqrt{100y^{10}}$                   | 11. $\sqrt{150}$                     |
| 2. $\sqrt{76}$            | 7. $-\sqrt{144m^{10}z^2}$               | 12. $\sqrt[3]{16}$                   |
| 3. $\sqrt[3]{128}$        | 8. $\sqrt[4]{\frac{1}{16}m^{12}x^{16}}$ | 13. $\sqrt[4]{32}$                   |
| 4. $-\sqrt[4]{1250}$      | 9. $\sqrt{7x^5y^6}$                     | 14. $\sqrt[5]{128}$                  |
| 5. $\sqrt{\frac{72}{25}}$ | 10. $\sqrt[3]{24z^5x^9}$                | 15. $\sqrt[3]{\frac{32}{125}}$       |
|                           |   | 16. $-\sqrt[3]{8k^9}$                |
|                           |   | 17. $-\sqrt[3]{-125m^9b^{18}c^{24}}$ |
|                           |   | 18. $\sqrt{75y^3}$                   |
|                           |   | 19. $\sqrt[3]{8z^9r^{12}}$           |
|                           |   | 20. $\sqrt[4]{16a^8b^{12}}$          |

Add or subtract the following radicals. Write answers in simplified form.

- |  |   |
|--|---|
| 21. $4\sqrt{3} - 2\sqrt{3}$                        | 31. $3 + 4\sqrt{x} - 6\sqrt{x}$         |
| 22. $4\sqrt{10} + 6\sqrt{10} - \sqrt{10} + 2$      | 32. $\sqrt{8} - \sqrt{12}$              |
| 23. $4\sqrt{x} + \sqrt{x}$                         | 33. $\sqrt{75} + \sqrt{108}$            |
| 24. $3\sqrt{y} - 6\sqrt{y}$                        | 34. $4\sqrt{50} - \sqrt{72} + \sqrt{8}$ |
| 25. $\sqrt{x} + \sqrt{y} + x + 3\sqrt{y}$          | 35. $4\sqrt{80} - \sqrt{75}$            |
| 26. $4\sqrt{x} + 6\sqrt{x} - 3\sqrt{x} + 2x$       | 36. $8\sqrt{64} - \sqrt{96}$            |
| 27. $6\sqrt{7} - 8\sqrt{7}$                        | 37. $\sqrt{200} - \sqrt{72}$            |
| 28. $12\sqrt{15} + 5\sqrt{15} - 8\sqrt{15}$        | 38. $\sqrt{60} - \sqrt{135}$            |
| 29. $-\sqrt{x} + 6\sqrt{x} - 2\sqrt{x}$            | 39. $-6\sqrt{75} + 4\sqrt{125}$         |
| 30. $3\sqrt{5} - \sqrt{x} + 4\sqrt{5} + 3\sqrt{x}$ | 40. $7\sqrt{108} - 6\sqrt{180}$         |

Multiply and simplify (assume all variables represent positive real numbers).

- |                                     |   |   |
|-------------------------------------|---|---|
| 41. $\sqrt{15}\sqrt{5}$             | 45. $\sqrt{75x^7}\sqrt{75x^7}$          | 49. $\sqrt[3]{s^2t^4} \cdot \sqrt[3]{s^4t^6}$   |
| 42. $\sqrt{10}\sqrt{14}$            | 46. $\sqrt[3]{5a^2} \cdot \sqrt[3]{2a}$ | 50. $\sqrt[3]{(x+5)^2} \cdot \sqrt[3]{(x+5)^4}$ |
| 43. $\sqrt[3]{2} \cdot \sqrt[3]{4}$ | 47. $\sqrt{3x^5}\sqrt{15x^2}$           | 51. $\sqrt{a} \cdot \sqrt[4]{a^3}$              |
| 44. $\sqrt{18a^3}\sqrt{18a^3}$      | 48. $\sqrt{5a^7}\sqrt{15a^3}$           | 52. $\sqrt{xy^3} \cdot \sqrt[3]{x^2y}$          |

Rationalize the denominators and simplify (assume all variables represent positive real numbers).

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|-------------------------------------|---|---|
| 53. $\frac{15}{\sqrt{5}}$           | 58. $\frac{\sqrt{32a^5b^3}}{\sqrt{2ab^2}}$      | 62. $\frac{9^5\sqrt{160x^8y^{11}}}{3^5\sqrt{5xy^2}}$  |
| 54. $\frac{5}{\sqrt{18}}$           | 59. $\frac{6\sqrt{45x^3}}{3\sqrt{5x}}$          | 63. $\frac{2}{3+\sqrt{5}}$                            |
| 55. $\frac{8\sqrt{3}}{\sqrt{k}}$    | 60. $\frac{\sqrt[3]{625x^6y^4}}{\sqrt[3]{5xy}}$ | 64. $\frac{2+\sqrt{5}}{6-\sqrt{3}}$                   |
| 56. $\frac{2\sqrt{5r}}{\sqrt{m^3}}$ | 61. $\frac{\sqrt[3]{27xy^7}}{\sqrt[3]{xy}}$     | 65. $\frac{1+\sqrt{2}}{3+\sqrt{5}}$                   |
| 57. $\sqrt[3]{\frac{10}{9}}$        |   | 66. $\frac{\sqrt{a}}{\sqrt{a}+\sqrt{b}}$              |
|                                     |   | 67. $\frac{\sqrt{7}-\sqrt{3}}{\sqrt{3}-\sqrt{7}}$     |
|                                     |   | 68. $\frac{\sqrt{7}+\sqrt{5}}{\sqrt{5}+\sqrt{2}}$     |
|                                     |   | 69. $\frac{3\sqrt{2}-\sqrt{7}}{4\sqrt{2}+\sqrt{5}}$   |
|                                     |   | 70. $\frac{5\sqrt{3}-3\sqrt{2}}{3\sqrt{2}-2\sqrt{3}}$ |



## RADICAL OPERATIONS PRACTICE ANSWERS

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|--------------------------------|--------------------------------|---|
| 1. $3\sqrt{2}$                 | 26. $7\sqrt{x} + 2x$           | 52. $xy \cdot \sqrt[3]{y}$                          |
| 2. $2\sqrt{19}$                | 27. $-2\sqrt{7}$               | 53. $3\sqrt{5}$                                     |
| 3. $4\sqrt[3]{2}$              | 28. $9\sqrt{15}$               | 54. $\frac{5\sqrt{2}}{6}$                           |
| 4. $-5^4\sqrt{2}$              | 29. $3\sqrt{x}$                | 55. $\frac{8\sqrt{3k}}{k}$                          |
| 5. $\frac{6\sqrt{2}}{5}$       | 30. $7\sqrt{5} + 2\sqrt{x}$    | 56. $\frac{2\sqrt{5mr}}{m^2}$                       |
| 6. $10y^5$                     | 31. $3 - 2\sqrt{x}$            | 57. $\frac{\sqrt[3]{30}}{3}$                        |
| 7. $-12m^5z$                   | 32. $2\sqrt{2} - 2\sqrt{3}$    | 58. $4a^2\sqrt{b}$                                  |
| 8. $\frac{1}{2}m^3x^4$         | 33. $11\sqrt{3}$               | 59. $6x$  |
| 9. $x^2y^3\sqrt{7x}$           | 34. $16\sqrt{2}$               | 60. $5xy \cdot \sqrt[3]{x^2}$                       |
| 10. $2zx^3\sqrt[3]{3z^2}$      | 35. $16\sqrt{5} - 5\sqrt{3}$   | 61. $3y^2$  |
| 11. $5\sqrt{6}$                | 36. $64 - 4\sqrt{6}$           | 62. $6xy \cdot \sqrt[5]{x^2y^4}$                    |
| 12. $2^3\sqrt{2}$              | 37. $4\sqrt{2}$                | 63. $-3 + \sqrt{5}$                                 |
| 13. $2^4\sqrt{2}$              | 38. $-\sqrt{15}$               | 64. $\frac{12+2\sqrt{3}+6\sqrt{5}+\sqrt{15}}{33}$   |
| 14. $2^5\sqrt{4}$              | 39. $-30\sqrt{3} + 20\sqrt{5}$ | 65. $\frac{3-\sqrt{5}+3\sqrt{2}-\sqrt{10}}{4}$      |
| 15. $\frac{2^3\sqrt{4}}{5}$    | 40. $42\sqrt{3} - 36\sqrt{5}$  | 66. $\frac{a-\sqrt{ab}}{a-b}$                       |
| 16. $-2k^3$                    | 41. $5\sqrt{3}$                | 67. $-1$  |
| 17. $5m^3b^6\sqrt[3]{c^2}$     | 42. $2\sqrt{35}$               | 68. $\frac{\sqrt{35}-\sqrt{14}+5-\sqrt{10}}{3}$     |
| 18. $5y\sqrt{3y}$              | 43. $2$                        | 69. $\frac{24-3\sqrt{10}-4\sqrt{14}+\sqrt{35}}{27}$ |
| 19. $2z^3r^4$                  | 44. $18a^3$                    | 70. $\frac{3\sqrt{6}+4}{2}$                         |
| 20. $2a^2b^3$                  | 45. $75x^7$                    |   |
| 21. $2\sqrt{3}$                | 46. $a \cdot \sqrt[3]{10}$     |   |
| 22. $9\sqrt{10} + 2$           | 47. $3x^3\sqrt{5x}$            |   |
| 23. $5\sqrt{x}$                | 48. $5a^5\sqrt{3}$             |   |
| 24. $-3\sqrt{y}$               | 49. $s^2t^3\sqrt[3]{t}$        |   |
| 25. $\sqrt{x} + 4\sqrt{y} + x$ | 50. $(x + 5)^2$                |   |
|                                | 51. $a$                        |   |

