

NAME \_\_\_\_\_ DATE \_\_\_\_\_ SCORE \_\_\_\_\_

## Roots of Real Numbers; Properties of Radicals

Evaluate each radical. If the radical does not represent a real number, so state.

- |                               |                                 |   |
|-------------------------------|---------------------------------|---|
| 1. $\sqrt{100}$ _____         | 2. $\sqrt{49a^2}$ _____         | 3. $\sqrt{-36m^2}$ _____                |
| 4. $\sqrt[3]{27}$ _____       | 5. $\sqrt[3]{-216}$ _____       | 6. $-\sqrt[3]{-8}$ _____                |
| 7. $\sqrt[4]{16r^8s^4}$ _____ | 8. $\sqrt[3]{-125u^9v^6}$ _____ | 9. $\sqrt[4]{1.6 \times 10^{-7}}$ _____ |

Find the real roots of each equation. If there are none, so state.

- |   |  |
|---|--|
| 10. $2y^2 = 128$ _____                              | 11. $x^2 + 16 = 0$ _____                                   |
| 12. $\frac{x^5}{8} - 4 = 0$ _____                   | 13. $8y^3 + 125 = 0$ _____                                 |
| 14. $\frac{16x^2 + 7x}{7} = \frac{4x + 7}{4}$ _____ | 15. $\frac{a^2(64a^2 - 3)}{3} = \frac{27 - 4a^2}{4}$ _____ |

For what values of the variable are the following statements true?

- |                                       |                                      |
|---------------------------------------|--------------------------------------|
| 16. $\sqrt[3]{(x-5)^3} = x - 5$ _____ | 17. $\sqrt{(3x-1)^2} = 3x - 1$ _____ |
|---------------------------------------|--------------------------------------|

Simplify. Assume that the given radicals denote real numbers.

- |   |   |  |
|---|---|--|
| 18. $\sqrt{175}$ _____                                | 19. $\frac{12}{\sqrt{6}}$ _____                                 | 20. $\sqrt{30} \cdot \sqrt{\frac{5}{6}}$ _____ |
| 21. $\sqrt[3]{135}$ _____                             | 22. $\sqrt[3]{-250r^6}$ _____                                   | 23. $\sqrt{360rs^2t^3}$ _____                  |
| 24. $\sqrt{\frac{9u^4}{5}}$ _____                     | 25. $\sqrt[3]{\frac{16m^4}{3}}$ _____                           | 26. $\sqrt{\frac{50s^3}{108t^3}}$ _____        |
| 27. $\sqrt{5b^3cd} \cdot \sqrt{20bc^5}$ _____         | 28. $\sqrt[3]{10u^2v} \cdot \sqrt[3]{(5uv)^2}$ _____            |  |
| 29. $\sqrt{3ab^2} \cdot \sqrt[4]{49a^4b^2}$ _____     | 30. $\sqrt{10cd} \cdot \sqrt{6de^2} \cdot \sqrt{3c^2e^2}$ _____ |  |
| 31. $\frac{\sqrt{48x^5y}}{\sqrt{3xy}}$ _____          | 32. $\frac{\sqrt{20e^7f}}{\sqrt{45ef^3}}$ _____                 |  |
| 33. $\frac{\sqrt[3]{54h^4j^2}}{\sqrt[3]{10hj}}$ _____ | 34. $\frac{\sqrt[3]{-24rs}}{\sqrt[3]{25r^4s^8}}$ _____          |  |

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## *Sums of Radicals; Binomials and Equations Containing Radicals*

Simplify. Assume that all radicals denote real numbers.

- |   |  |
|---|--|
| 1. $\sqrt{54} - \sqrt{6} + \sqrt{96}$ _____                   | 2. $\sqrt[3]{256} + \sqrt[3]{-108} + 10\sqrt[3]{32}$ _____         |
| 3. $3\sqrt{20} + 5\sqrt{45} + \sqrt{75}$ _____                | 4. $\sqrt{112x^4} - \sqrt{7x^4}$ _____                             |
| 5. $\sqrt[4]{m}(\sqrt[4]{m^3} + \sqrt[4]{m})$ _____           | 6. $(\sqrt{m} - \sqrt{n})^2$ _____                                 |
| 7. $(\sqrt{2} + \sqrt{6})(\sqrt{2} - \sqrt{6})$ _____         | 8. $(\sqrt{3} + 2\sqrt{5})^2$ _____                                |
| 9. $(5\sqrt{2} + \sqrt{3})(2\sqrt{2} - 3\sqrt{3})$ _____      | 10. $(\sqrt[3]{3} + \sqrt[3]{4})(\sqrt[3]{9} - \sqrt[3]{2})$ _____ |
| 11. $\frac{4}{\sqrt{3} + 2}$ _____                            | 12. $\frac{2\sqrt{3} + \sqrt{5}}{\sqrt{3} + \sqrt{5}}$ _____       |
| 13. $\frac{2\sqrt{2} + 3\sqrt{5}}{\sqrt{2} - \sqrt{5}}$ _____ | 14. $\frac{\sqrt{a} - \sqrt{b}}{\sqrt{a} + \sqrt{b}}$ _____        |

Solve. If there are no solutions, so state.

- |   |   |
|---|---|
| 15. $\sqrt{3z - 5} = 5$ _____               | 16. $3 = \sqrt[3]{12 + 5a}$ _____             |
| 17. $\sqrt{7y + 3} = -1$ _____              | 18. $\sqrt{6b + 1} - 2 = 0$ _____             |
| 19. $\sqrt[5]{3 - 7x} = -2$ _____           | 20. $\sqrt{5c^2 - 48} = c\sqrt{2}$ _____      |
| 21. $\sqrt{3w^2 + 4} - 2 = w$ _____         | 22. $\sqrt{d^2 - 19} - 2d + 11 = 0$ _____     |
| 23. $\sqrt[3]{8v^2 - 6v} + 1 = 0$ _____     | 24. $e - 3\sqrt{e} = 10$ _____                |
| 25. $u = \frac{1}{3}\sqrt{6u - 1}$ _____    | 26. $8f = 1 - 2\sqrt{f}$ _____                |
| 27. $5(t - 3\sqrt{t}) + 3 = 3(t + 1)$ _____ | 28. $\sqrt[4]{2g^2 + 9} = \sqrt[3]{27}$ _____ |

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## The Junior Class Trip

Simplify each of the expressions below. Match your answer with the letter in the chart. Place the letter in the answer blank to the right of the problem. Reading down, you will complete the story.

The junior class officers at E. Majin-Airy High worked hard to plan for the class trip. After deciding on the amusement park at Konja Gate, they took on the complex challenge of travel plans. Discarding radical suggestions by the treasurer, Polly, it was finally agreed to travel by expressway, because that was the most \_\_\_\_\_.

1.  $\sqrt[3]{-64}$  \_\_\_\_\_
2.  $-\sqrt{81}$  \_\_\_\_\_
3.  $\sqrt[3]{-\frac{5}{16}}$  \_\_\_\_\_
4.  $\sqrt{25y^2}$  \_\_\_\_\_
5.  $\sqrt[4]{81^2}$  \_\_\_\_\_
6.  $\sqrt{\frac{5}{9}}$  \_\_\_\_\_
7.  $5\sqrt{3} - \sqrt{12}$  \_\_\_\_\_
8.  $(3 + \sqrt{5})(3 - \sqrt{5})$  \_\_\_\_\_
9.  $\frac{\sqrt{5} - \sqrt{2}}{\sqrt{5} + \sqrt{2}}$  \_\_\_\_\_
10.  $0.\overline{18}$  \_\_\_\_\_
11.  $\sqrt{-81}$  \_\_\_\_\_
12.  $i\sqrt{-15} \cdot \sqrt{-135}$  \_\_\_\_\_
13.  $\frac{2 - i}{1 + 2i}$  \_\_\_\_\_

4	L	$i$	B
3	C	-4	R
$-45i$	T	$5y$	J
$2i$	H	$-\frac{1}{4}\sqrt[3]{20}$	T
$\frac{2}{11}$	O	$\frac{1}{2}\sqrt{2}$	M
$\frac{1}{3}\sqrt[4]{45}$	N	9	O
$\sqrt{7}$	K	$45i$	D
-9	A	$3\sqrt{3}$	A
$\frac{1}{2}$	G	0	S
$5 y $	I	$\frac{7 - 2\sqrt{10}}{3}$	R
$\sqrt[3]{5}$	P	$-9i$	F
$9i$	U	$-i$	E