

Rational Exponents Review Guide Key

$$\textcircled{1} 27^{1/3} = \sqrt[3]{27} = 3$$

$$\textcircled{2} (32^{1/5})^5 = 32^{5/5} = 32^1 = 32$$

$$\textcircled{3} 7^0 = 1$$

$$\textcircled{4} (-1)^{1/5} = \sqrt[5]{-1} = -1$$

$$\textcircled{5} 16^{1/4} = \sqrt[4]{16} = 2$$

$$\textcircled{6} 2y^{1/2} \cdot y = 2y^{\frac{1}{2} + \frac{2}{2}} = 2y^{3/2} = 2\sqrt{y^3}$$

$$\textcircled{7} \left(\frac{27}{8}\right)^{2/3} = \frac{27^{2/3}}{8^{2/3}} = \frac{\sqrt[3]{27^2}}{\sqrt[3]{8^2}} = \frac{3^2}{2^2} = \frac{9}{4}$$

$$\textcircled{8} (3x^{1/2})(4x^{2/3}) = 12x^{\frac{1}{2} + \frac{2}{3}} = 12x^{\frac{3}{6} + \frac{4}{6}} = 12x^{7/6} = 12\sqrt[6]{x^7}$$

$$\textcircled{9} (3a^{1/2}b^{1/3})^2 = 3^2 a^{\frac{2}{2}} b^{\frac{2}{3}} = 9a\sqrt[3]{b^2}$$

$$\textcircled{10} \frac{x^{4/7}}{x^{2/3}} = x^{\frac{4}{7} - \frac{2}{3}} = x^{\frac{12}{21} - \frac{14}{21}} = x^{-2/21} = \frac{1}{x^{2/21}} = \frac{1}{\sqrt[21]{x^2}}$$

$$\textcircled{11} (9x^4y^{-2})^{1/2} = 9^{1/2} x^{\frac{4}{2}} y^{-\frac{2}{2}} = \sqrt{9} x^2 y^{-1} = 3x^2 y^{-1} = \frac{3x^2}{y}$$

$$\textcircled{12} x^{1/2} \cdot x^{1/3} = x^{\frac{1}{2} + \frac{1}{3}} = x^{\frac{3}{6} + \frac{2}{6}} = x^{5/6} = \sqrt[6]{x^5}$$

$$(13) \frac{2x^4 y^{-4} z^{-3}}{3x^2 y^{-3} z^4} = \frac{2x^4 y^3}{3x^3 z^4 y^4 z^3} = \frac{2x^4 y^3}{3x^3 y^4 z^7} = \frac{2x^1 y^{-1}}{3z^7} = \frac{2x}{3yz^7}$$

$$(14) \frac{2hj^{-3}k^4}{3jk} = \frac{2hk^4}{3jkj^3} = \frac{2hk^4}{3j^4k} = \frac{2hk^3}{3j^4}$$

$$(15) \frac{3x^3 y^{-1} z^{-1}}{x^{-4} y^0 z^0} = \frac{3x^3 x^4}{y^0 z^0 y^1 z^1} = \frac{3x^7}{yz}$$

$$(16) (27y^9)^{1/3} = 27^{1/3} y^{9/3} = \sqrt[3]{27} y^3 = 3y^3$$

$$(17) (32y^{15})^{1/5} = 32^{1/5} y^{15/5} = \sqrt[5]{32} y^3 = 2y^3$$

$$(18) (25b^6)^{3/2} = 25^{3/2} b^{18/2} = \sqrt{25^3} b^9 = 5^3 b^9 = 125b^9$$

$$(19) (64m^6)^{2/3} = 64^{2/3} m^{12/3} = \sqrt[3]{64^2} m^4 = 4^2 m^4 = 16m^4$$

Calculator Section

$$\textcircled{1} \sqrt{3x} = (6)^2$$

$$\frac{3x}{3} = \frac{36}{3}$$

$$\boxed{x=12}$$

$$\text{check: } \sqrt{3(12)} = 6$$

$$\sqrt{36} = 6$$

$$6 = 6 \checkmark$$

$$\textcircled{2} \sqrt{4x} - 8 = -2$$
$$\quad \quad \quad +8 \quad +8$$

$$(\sqrt{4x})^2 = (6)^2$$

$$\frac{4x}{4} = \frac{36}{4}$$

$$\boxed{x=9}$$

$$\text{check: } \sqrt{4(9)} - 8 = -2$$

$$\sqrt{36} - 8 = -2$$

$$6 - 8 = -2$$

$$-2 = -2 \checkmark$$

$$\textcircled{3} \sqrt{7x-6} = \sqrt{5x+2}$$

$$\begin{array}{r} 7x-6 = 5x+2 \\ -5x \quad -5x \\ \hline 2x-6 = 2 \end{array}$$

$$\begin{array}{r} 2x-6 = 2 \\ +6 \quad +6 \\ \hline 2x = 8 \end{array}$$

$$\frac{2x}{2} = \frac{8}{2}$$

$$\boxed{x=4}$$

$$\text{check: } \sqrt{7(4)-6} = \sqrt{5(4)+2}$$

$$\sqrt{28-6} = \sqrt{20+2}$$

$$\sqrt{22} = \sqrt{22} \checkmark$$

$$(4) (X)^2 = \sqrt{30-X}^2$$

$$X^2 = \sqrt{30-X}$$

$$\begin{array}{r} -30+X \\ -30+X \end{array}$$

$$X^2 + X - 30 = 0$$

$$\begin{array}{r} -30 \\ 6 \times -5 \\ 1 \end{array}$$

$$(X+6)(X-5) = 0$$

$$\boxed{X = -6} \quad \boxed{X = 5}$$

↑

Check: $-6 = \sqrt{30+6}$

$$-6 = \sqrt{36}$$

$$\cancel{-6 = 6} \text{ False}$$

$$5 = \sqrt{30-5}$$

$$5 = \sqrt{25}$$

$$5 = 5 \checkmark$$

Extraneous

$$(5) \sqrt{2v-7} = (v-3)^2$$

$$2v-7 = (v-3)(v-3)$$

$$2v-7 = v^2 - 6v + 9$$

$$\begin{array}{r} -2v+7 \\ -2v+7 \end{array}$$

$$0 = v^2 - 8v + 16$$

$$0 = (v-4)(v-4)$$

$$\boxed{v = 4}$$

Check: $\sqrt{2(4)-7} = 4-3$

$$\sqrt{8-7} = 1$$

$$1 = 1 \checkmark$$

$$(6) (n-5)^2 = \sqrt{21-6n}^2$$

$$(n-5)(n-5) = 21-6n$$

$$n^2 - 10n + 25 = 21 - 6n$$

$$\begin{array}{r} +6n-21 \\ -21+6n \end{array}$$

$$n^2 - 4n + 4 = 0$$

$$\begin{array}{r} 4 \\ -2 \times -2 \\ -4 \end{array}$$

$$(n-2)(n-2) = 0$$

$$\boxed{n = 2}$$

← Extraneous
no solutions

Check: $2-5 = \sqrt{21-6(2)}$

$$-3 = \sqrt{21-12}$$

$$-3 = \sqrt{9}$$

$$\cancel{-3 = 3} \text{ False}$$