

$\left(\frac{1}{x^2}\right)^2 = 4$, then what is the value of x^2 ?

1/2

2

4

16

256

$$x = 16$$

$$x^2 = 256$$

If $x = -3$ and $y = 9$, what is the value of $|\sqrt[3]{xy} - y|$?

-12

0

6

12

36

$$|\sqrt[3]{-3 \cdot 9} - 9|$$

$$|\sqrt[3]{-27} - 9|$$

$$|-3 - 9|$$

$$|-12|$$

$$12$$

Notes: Rational Exponents

Review:

$$1. \quad x^3 \cdot x^5 = \boxed{x^8}$$

$$2. \quad \frac{x^5}{x^6} = x^{5-6} = x^{-1} = \boxed{\frac{1}{x}}$$

$$3. \quad \frac{x^9}{x^4} = x^{9-4} = \boxed{x^5}$$

$$4. \quad (x^2 y^3)^5 = \boxed{x^{10} y^{15}}$$

$$b^{\frac{x}{y}}$$

power
root



$$\sqrt[y]{b^x}$$

$$\left(\sqrt[y]{b}\right)^x$$

same
thing!!

Write each expression in radical form.

5. $16^{\frac{1}{4}}$ ← power
← index

$$\sqrt[4]{16^1}$$

6. $64^{\frac{1}{3}}$ ← power
← index

$$\sqrt[3]{64^1}$$

7. $8^{\frac{2}{3}}$ ← power
← index

$$\sqrt[3]{8^2}$$

8. $4^{\frac{5}{2}}$

$$\sqrt{4^5}$$

Write each expression using rational exponents.

9. $\sqrt[4]{7^3}$

$$7^{3/4}$$

10. $(\sqrt[3]{10})^9$

$$10^{9/3} = \boxed{10^3}$$

11. $\sqrt[3]{11^6}$

$$11^{6/3} = \boxed{11^2}$$

12. $(\sqrt[5]{4})^3$

$$\boxed{4^{3/5}}$$

Simplify completely. $\frac{3}{5} + \frac{2}{5} = 1$

$$13. \quad \underline{25}^{\frac{3}{5}} \cdot \underline{25}^{\frac{2}{5}} = \boxed{25}$$

$$14. \quad 36^{\frac{3}{8}} \cdot 36^{\frac{1}{8}} = 36^{\frac{3}{8} + \frac{1}{8}}$$

$$= 36^{\frac{1}{2}} = \sqrt{36}$$

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

$$15. \quad \frac{8^{\frac{1}{2}}}{8^{\frac{2}{3}}} = 8^{\frac{1}{3} - \frac{2}{3}} = 8^{-\frac{1}{3}}$$

$$= \frac{1}{8^{1/3}} = \frac{1}{\sqrt[3]{8}} = \boxed{\frac{1}{2}}$$

$$16. \quad \frac{5^{\frac{9}{4}}}{5^{\frac{1}{4}}} = 5^{\frac{9}{4} - \frac{1}{4}} = 5^{\frac{8}{4}} = 5^2$$

$$= \boxed{25}$$

17. $(27)^{\frac{1}{3}}$

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

18. $(4^2)^{\frac{1}{2}}$

$$4^{2 \cdot \frac{1}{2}} = \boxed{4}$$

19. $\left(8^{\frac{2}{3}}\right)^{\frac{1}{2}}$

$$8^{\frac{2}{3} \cdot \frac{1}{2}} = 8^{\frac{1}{3}}$$

$$= \sqrt[3]{8} = \boxed{2}$$

20. $\left(125^{\frac{2}{3}}\right)^{\frac{1}{2}}$

$$125^{\frac{2}{3} \cdot \frac{1}{2}} = 125^{\frac{1}{3}}$$

$$= \sqrt[3]{125} = \boxed{5}$$

Solve.

21. $(x + 6)^{\frac{1}{2}} = 3$

* If the index is 2,
we have a square root.

$$\left(\sqrt{x+6}\right)^2 = (3)^2$$

$$x + 6 = 9$$

$$\begin{array}{r} x + 6 = 9 \\ -6 \quad -6 \\ \hline \end{array}$$

$$\boxed{x = 3}$$

$$22. (x + 5)^{\frac{1}{3}} = 3$$

$$\left(\sqrt[3]{x+5}\right)^3 = (3)^3$$

$$\begin{array}{r} x + 5 = 27 \\ -5 \quad -5 \\ \hline \end{array}$$

$$x = 22$$

$$23. (3x - 1)^{\frac{1}{5}} = 2$$

$$\left(\sqrt[5]{3x - 1}\right)^5 = (2)^2$$

$$3x - 1 = 32$$

$$\begin{array}{r} +1 \quad +1 \\ \hline \end{array}$$

$$\begin{array}{r} 3x = 33 \\ \hline \end{array}$$

$$\begin{array}{r} \frac{3}{3} \quad \frac{3}{3} \\ \hline \end{array}$$

$$x = 11$$