

C6L4 Notes

Rational Exponents

Simplify:

1. $49^{\frac{1}{2}}$

7

2. $216^{\frac{1}{3}}$

6

3. $32^{\frac{4}{5}}$

16

4. $8^{\frac{5}{3}}$

32

5. $3^{\frac{1}{3}} \cdot 81^{\frac{1}{3}}$

$$\begin{aligned} & 3^{\frac{1}{3}} \cdot (3^4)^{\frac{1}{3}} \\ & 3^{\frac{1}{3}} \cdot 3^{\frac{4}{3}} \\ & 3^{\frac{1}{3} + \frac{4}{3}} \\ & 3^{\frac{5}{3}} \end{aligned}$$

6. $4^{\frac{1}{3}} \cdot 16^{\frac{1}{3}}$

$$\begin{aligned} & 4^{\frac{1}{3}} \cdot (4^2)^{\frac{1}{3}} \\ & 4^{\frac{1}{3}} \cdot 4^{\frac{2}{3}} \\ & 4^{\frac{1}{3} + \frac{2}{3}} \\ & 4^{\frac{3}{3}} \\ & 4^1 \\ & 4 \end{aligned}$$

7. $5^{\frac{1}{4}} \cdot 125^{\frac{1}{4}}$

$$\begin{aligned} & 5^{\frac{1}{4}} \cdot (5^3)^{\frac{1}{4}} \\ & 5^{\frac{1}{4}} \cdot 5^{\frac{3}{4}} \\ & 5^{\frac{1}{4} + \frac{3}{4}} \\ & 5^{\frac{4}{4}} \\ & 5^1 \\ & 5 \end{aligned}$$

8. $7^{\frac{1}{2}} \cdot 7^{\frac{1}{2}}$

$$\begin{aligned} & 7^{\frac{1}{2} + \frac{1}{2}} \\ & 7^{\frac{2}{2}} \\ & 7^1 \\ & 7 \end{aligned}$$

Write in radical form.

9. $x^{\frac{1}{5}}$

$$\sqrt[5]{x}$$

10. $x^{\frac{5}{6}}$

$$\sqrt[6]{x^5}$$

11. $x^{1.4}$

$$x^{\frac{14}{10}}$$

$$x^{\frac{7}{5}}$$

$$\sqrt[5]{x^7}$$

12. $7x^{\frac{4}{5}}$

$$7\sqrt[5]{x^4}$$

13. $(7x)^{\frac{4}{5}}$

$$\sqrt[5]{(7x)^4}$$

14. $4xy^{\frac{2}{3}}$

$$4x\sqrt[3]{y^2}$$

Write in exponential form.

15. $\sqrt{3x^5}$

$$3^{\frac{1}{2}} x^{\frac{5}{2}}$$

16. $\sqrt{(3x)^5}$

$$(3x)^{\frac{5}{2}}$$

17. $(\sqrt{3x})^5$

$$\left((3x)^{\frac{1}{2}}\right)^5$$

$$(3x)^{\frac{5}{2}}$$

18. $\sqrt[5]{2x^3}$

$$2^{\frac{1}{5}} x^{\frac{3}{5}}$$

19. $\sqrt[5]{(2x)^3}$

$$(2x)^{\frac{3}{5}}$$

20. $(\sqrt[5]{2x})^3$

$$\left((2x)^{\frac{1}{5}}\right)^3$$

$$(2x)^{\frac{3}{5}}$$

Find the product or quotient.

21. $(\sqrt[3]{5})(\sqrt[7]{5})$

$$5^{\frac{1}{3}} \cdot 5^{\frac{1}{7}}$$

$$5^{\frac{1}{3} + \frac{1}{7}}$$

$$5^{\frac{7}{21} + \frac{3}{21}}$$

$$5^{\frac{10}{21}}$$

22. $\sqrt{7} \cdot \sqrt[3]{7}$

$$7^{\frac{1}{2}} \cdot 7^{\frac{1}{3}}$$

$$7^{\frac{1}{2} + \frac{1}{3}}$$

$$7^{\frac{3}{6} + \frac{2}{6}}$$

$$7^{\frac{5}{6}}$$

23. $\sqrt{5} \cdot \sqrt[4]{5}$

$$5^{\frac{1}{2}} \cdot 5^{\frac{1}{4}}$$

$$5^{\frac{1}{2} + \frac{1}{4}}$$

$$5^{\frac{2}{4} + \frac{1}{4}}$$

$$5^{\frac{3}{4}}$$

24. $\frac{\sqrt[5]{y^{10}}}{10\sqrt{y^5}}$

$$\frac{y^{\frac{10}{5}}}{10y^{\frac{5}{2}}}$$

$$\frac{y^2}{10y^{\frac{5}{2}}}$$

$$\frac{y^{\frac{1}{2}}}{10y^{\frac{5}{2}}}$$

$$\frac{y^{\frac{1}{2}}}{10y^{2-\frac{1}{2}}}$$

$$\frac{y^{\frac{1}{2}}}{10y^{\frac{4}{2}-\frac{1}{2}}}$$

$$\frac{y^{\frac{1}{2}}}{10y^{\frac{3}{2}}}$$

$$\frac{y^{\frac{1}{2}}}{10y^{\frac{3}{2}}}$$

25. $\frac{\sqrt[4]{3}}{\sqrt[8]{3}}$

$$\frac{3^{\frac{1}{4}}}{3^{\frac{1}{8}}}$$

$$3^{\frac{1}{4} - \frac{1}{8}}$$

$$3^{\frac{2}{8} - \frac{1}{8}}$$

$$3^{\frac{1}{8}}$$

26. $\frac{\sqrt{10}}{\sqrt[3]{100}}$

$$\frac{10^{\frac{1}{2}}}{100^{\frac{1}{3}}}$$

$$\frac{10^{\frac{1}{2}}}{(10^2)^{\frac{1}{3}}}$$

$$\frac{10^{\frac{1}{2}}}{10^{\frac{2}{3}}}$$

$$10^{\frac{1}{2} - \frac{2}{3}}$$

$$10^{\frac{3}{6} - \frac{4}{6}}$$

$$10^{-\frac{1}{6}}$$

$$\frac{1}{10^{\frac{1}{6}}}$$

Simplify.

27. $(8a^6)^{\frac{2}{3}}$

$$8^{\frac{2}{3}} (a^6)^{\frac{2}{3}}$$

$$8^{\frac{2}{3}} a^{\frac{12}{3}}$$

$$4a^4$$

28. $(16x^{12})^{\frac{3}{4}}$

$$16^{\frac{3}{4}} (x^{12})^{\frac{3}{4}}$$

$$16^{\frac{3}{4}} x^{\frac{36}{4}}$$

$$8x^9$$

29. $(243x^{10})^{\frac{6}{5}}$

$$243^{\frac{6}{5}} (x^{10})^{\frac{6}{5}}$$

$$243^{\frac{6}{5}} x^{\frac{60}{5}}$$

$$729 x^{12}$$

30. $(64y^{10})^{\frac{7}{6}}$

$$64^{\frac{7}{6}} (y^{10})^{\frac{7}{6}}$$

$$64^{\frac{7}{6}} y^{\frac{70}{6}}$$

$$128 y^{\frac{35}{3}}$$