ILLAWARRA TUTORING

In this worksheet you will explore fractional indices and learn to convert between radical and exponential forms. Each question instructs you on the task; work step by step and show all intermediate workings where appropriate.

Easy Questions

1. Write $x^{\frac{1}{2}}$ in radical form.
2. Write $x^{\frac{1}{3}}$ in radical form.
3. Express $\sqrt{x}$ in fractional index form.
4. Express $\left(x^3\right)^{\frac{1}{2}}$ in radical form.
5. Evaluate $16^{\frac{1}{4}}$ by first writing it in radical form.

Intermediate Questions

6. Simplify $a^{\frac{3}{2}} \times a^{\frac{1}{2}}$.
7. Simplify $\left(16x^8\right)^{\frac{1}{4}}$.
8. Express $\sqrt{a^3}$ in fractional index notation.
9. Simplify $\left(y^{\frac{1}{3}}\right)^6$.
10. Simplify $\left(x^{\frac{1}{2}}\right)^2$.
11. Write the cube root of x^5 in fractional index form.
12. Express $81^{\frac{1}{4}}$ in simplest form.
13. Rewrite $\sqrt{ab^2}$ in fractional index form.
14. Write $\sqrt[3]{a^2b^5}$ in fractional exponent form.
15. Simplify $a^{\frac{3}{4}} \times a^{\frac{1}{4}}$.
16. Simplify $\left(2^{\frac{1}{3}}\right)^3$.
17. Simplify $x^{\frac{2}{3}} \times x^{\frac{1}{3}}$.

18. Write $\left(16m^8\right)^{\frac{1}{4}}$ in simplest radical form.

19. Simplify $\left(b^{\frac{5}{2}}\right)^{\frac{2}{5}}$, where $b > 0$.

20. Simplify $\left(x^{\frac{2}{3}}\right)^3$.

Hard Questions

21. Simplify $a^{\frac{1}{2}} \times a^{\frac{1}{3}}$ and express your answer as a single fractional exponent.

22. Simplify $\left(16x^8\right)^{\frac{3}{4}}$ and write your answer in both simplified radical and exponential forms.

23. Simplify $\left(x^{\frac{1}{4}}\right)^2 \times \left(x^{\frac{1}{2}}\right)^3$.

24. If $c^{\frac{1}{3}} = 2$, find $c^{\frac{2}{3}}$.

25. Simplify $\dfrac{a^{\frac{1}{2}}}{a^{\frac{1}{3}}}$ for $a > 0$.

26. Simplify $\dfrac{\left(9x^6\right)^{\frac{1}{2}}}{3x}$.

27. Prove that $\left(x^{\frac{2}{3}}\right)^{\frac{3}{2}} = x$, and state any necessary conditions on x.

28. Write the expression for $\sqrt[4]{81x^8}$ in simplest radical form and also as an expression with fractional indices.

29. Simplify $\left(x^{\frac{3}{4}}\right)^2 \times \left(x^{\frac{1}{2}}\right)^3$.

30. Given that $27^{\frac{1}{3}} = 3$, solve for x if $x^{\frac{1}{3}} = 3$, and express your answer in exponential form.