

Simplifying Rational Exponents

Simplify.

1) $(n^4)^{\frac{3}{2}} = \boxed{n^6}$

2) $(27p^6)^{\frac{5}{3}} = 27^{\frac{5}{3}} p^{\frac{30}{3}} = \boxed{243p^{10}}$

3) $(25b^6)^{-1.5} = (25b^6)^{-\frac{3}{2}}$
 $\frac{1}{(25b^6)^{\frac{3}{2}}} = \boxed{\frac{1}{125b^9}}$

4) $(64m^4)^{\frac{3}{2}} = 64^{\frac{3}{2}} m^6 = \boxed{512m^6}$

5) $(a^8)^{\frac{3}{2}} = \boxed{a^{12}}$

6) $(9r^4)^{0.5} = (9r^4)^{\frac{1}{2}} = \boxed{3r^2}$

7) $(81x^{12})^{1.25} = (81x^{12})^{\frac{5}{4}}$
 $(81)^{\frac{5}{4}} (x)^{15}$
 $\boxed{243x^{15}}$

8) $(216r^9)^{\frac{1}{3}} = (216)^{\frac{1}{3}} r^3$
 $= 6r^3$

Simplify. Your answer should contain only positive exponents with no fractional exponents in the denominator.

← don't worry about this for now.

9) $2m^2 \cdot 4m^{\frac{3}{2}} \cdot 4m^{-2}$

$\boxed{32m^{\frac{3}{2}}}$

10) $3b^{\frac{1}{2}} \cdot b^{\frac{4}{3}} = 3b^{\frac{3}{6}} \cdot b^{\frac{8}{6}} = \boxed{3b^{\frac{11}{6}}}$

11) $(p^{\frac{3}{2}})^{-2} = p^{-3} = \boxed{\frac{1}{p^3}}$

12) $(a^{\frac{1}{2}})^{\frac{3}{2}} = \boxed{a^{\frac{3}{4}}}$

$$13) \frac{2x^{-\frac{7}{4}}}{4x^{\frac{4}{3}}} = \frac{2x^{-\frac{21}{12}}}{4x^{\frac{16}{12}}} = \frac{x^{-\frac{37}{12}}}{2} =$$

$$= \boxed{\frac{1}{2x^{\frac{37}{12}}}}$$

$$14) \frac{4x^2}{2x^{\frac{1}{2}}} = \frac{4x^{\frac{4}{2}}}{2x^{\frac{1}{2}}} = \boxed{2x^{\frac{3}{2}}}$$

$$15) \frac{\cancel{3x^{\frac{1}{2}}} \cdot \cancel{3x^{\frac{1}{2}}} y^{-\frac{1}{3}}}{\cancel{3y^{\frac{7}{4}}}} = \frac{3y^{-\frac{4}{12}}}{y^{-\frac{21}{12}}} =$$

$$\boxed{3y^{\frac{17}{12}}}$$

$$16) \frac{8y^{\frac{1}{4}}}{4x^{-\frac{2}{3}} y^{\frac{3}{2}} \cdot 2y^{\frac{1}{2}}} = \frac{y^{\frac{1}{4}}}{4x^{-\frac{2}{3}} y^2} =$$

$$\frac{x^{\frac{2}{3}} y^{\frac{1}{4}}}{4y^{\frac{7}{4}}} = \boxed{\frac{x^{\frac{2}{3}}}{4y^{\frac{7}{4}}}}$$

$$17) (m \cdot m^{-2} n^{\frac{5}{3}})^2 = (m^{-1} n^{\frac{5}{3}})^2$$

$$\frac{1}{m^{-2} n^{\frac{10}{3}}} = \frac{m^2}{n^{\frac{10}{3}}}$$

$$18) (a^{-1} b^{\frac{1}{3}} \cdot a^{-\frac{4}{3}} b^2)^2 = (a^{-\frac{5}{3}} b^{\frac{7}{3}})^2 = \frac{b^{\frac{14}{3}}}{a^{\frac{10}{3}}}$$

$$(a^{-\frac{5}{3}} b^{\frac{7}{3}})^2 = \frac{b^{\frac{14}{3}}}{a^{\frac{10}{3}}}$$

$$19) \left(\frac{x^{\frac{1}{2}} y^{-2}}{yx^{-\frac{7}{4}}} \right)^4 = \frac{x^2 y^{-8}}{y^4 x^{-7}} =$$

$$x^9 y^{-12} = \boxed{\frac{x^9}{y^{12}}}$$

$$20) \frac{(x^3 y^2)^{\frac{3}{2}}}{(x^{-1} y^{-\frac{2}{3}})^{\frac{1}{4}}} = \frac{x^{\frac{9}{2}} y^3}{x^{-\frac{1}{4}} y^{-\frac{1}{6}}} = \frac{x^{\frac{18}{4}} y^{\frac{18}{6}}}{x^{-\frac{1}{4}} y^{-\frac{1}{6}}} = \boxed{x^{\frac{19}{4}} y^{\frac{19}{6}}}$$

$$21) \frac{(x^{-\frac{1}{2}} y^2)^{-\frac{5}{4}}}{x^2 y^{\frac{1}{2}}} = \frac{x^{\frac{5}{8}} y^{-\frac{5}{2}}}{x^2 y^{\frac{1}{2}}} =$$

$$= \frac{x^{\frac{5}{8}} y^{-3}}{x^{\frac{17}{8}}}$$

$$= \boxed{\frac{1}{x^{\frac{11}{8}} y^3}}$$

$$22) \frac{(x^{-\frac{1}{2}} y^4)^{\frac{1}{4}}}{x^{\frac{2}{3}} y^{\frac{3}{2}} \cdot x^{-\frac{3}{2}} y^{\frac{1}{2}}} = \frac{x^{-\frac{1}{8}} y}{x^{\frac{1}{6}} y^{\frac{3}{2}} x^{-\frac{3}{6}} y^{\frac{1}{2}}} =$$

$$= \frac{x^{-\frac{1}{8}} y}{x^{-\frac{2}{6}} y^2} =$$

$$= \frac{x^{-\frac{3}{24}}}{x^{-\frac{20}{24}} y} = \boxed{\frac{x^{\frac{17}{24}}}{y}}$$