

Exponents and Radicals - Notes

Write each expression in radical form.

1) $n^{\frac{1}{3}}$ $\sqrt[3]{n}$

2) $(2x)^{\frac{1}{4}}$ $\sqrt[4]{2x}$

3) $x^{\frac{4}{3}}$ $\sqrt[3]{x^4}$

4) $(7n)^{\frac{1}{2}}$ $\sqrt{7n}$

5) $(4x)^{\frac{4}{3}}$ $\sqrt[3]{(4x)^4}$

6) $(6n)^{\frac{5}{2}}$ $\sqrt{(6n)^5}$

7) $7^{-\frac{1}{2}}$ $\frac{1}{\sqrt{7}}$

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

9) $10^{-\frac{3}{2}}$ $\frac{1}{\sqrt{10^3}}$

10) $2^{-\frac{5}{4}}$ $\frac{1}{\sqrt[4]{2^5}}$

11) $4^{-\frac{2}{3}}$ $\frac{1}{\sqrt[3]{4^2}}$

12) $6^{-\frac{4}{3}}$ $\frac{1}{\sqrt[3]{6^4}}$

Write each expression in exponential form.

13) $(\sqrt{2x})^3$

$(2x)^{3/2}$

14) $\sqrt[3]{7k}$

$(7k)^{1/2}$

15) $(\sqrt[3]{n})^3$

$n^{3/2}$

16) $\sqrt[3]{6n}$

$(6n)^{1/2}$

17) $\sqrt[6]{m}$

$m^{1/6}$

18) $(\sqrt[5]{p})^6$

$p^{6/5}$

19) $\frac{1}{\sqrt[3]{6}}$

$6^{-1/2}$

20) $\frac{1}{\sqrt[3]{7}}$

$7^{-1/3}$

21) $\frac{1}{\sqrt[3]{5}}$

$5^{-1/3}$

22) $\frac{1}{(\sqrt[5]{2})^6}$

$2^{-6/5}$

23) $\frac{1}{(\sqrt[2]{2})^5}$

$2^{-5/2}$

24) $\frac{1}{(\sqrt[2]{5})^5}$

$5^{-5/2}$

Simplify.

$$\begin{aligned} 25) \sqrt{27} \\ &= \sqrt{9 \cdot 3} \\ &= \boxed{3\sqrt{3}} \end{aligned}$$

$$\begin{aligned} 26) \sqrt{48} \\ &= \sqrt{16 \cdot 3} \\ &= \boxed{4\sqrt{3}} \end{aligned}$$

$$\begin{aligned} 27) \sqrt{64x^{10}y^{14}z^6} \\ &= \boxed{8x^5y^7z^3} \end{aligned}$$

$$\begin{aligned} 28) \sqrt{48p^{14}q^9r^7} \\ &= \sqrt{16 \cdot 3 \cdot p^{14} \cdot q^8 \cdot q \cdot r^6 \cdot r} \\ &= \boxed{4p^7q^4r^3\sqrt{3qr}} \end{aligned}$$

$$\begin{aligned} 29) \sqrt{32x^{11}y^6z^{13}} \\ &= \sqrt{16 \cdot 2 \cdot x^{10} \cdot x \cdot y^6 \cdot z^{12} \cdot z} \\ &= \boxed{4x^5y^3z^6\sqrt{2xz}} \end{aligned}$$

$$\begin{aligned} 30) \sqrt{45m^{21}p^{18}q^{15}} \\ &= \sqrt{9 \cdot 5 \cdot m^{20} \cdot m \cdot p^{18} \cdot q^{14} \cdot q} \\ &= \boxed{3m^{10}p^9q^7\sqrt{5mq}} \end{aligned}$$

$$\begin{aligned} 31) \sqrt{8x^3y^7z} \\ &= \sqrt{4 \cdot 2 \cdot x^2 \cdot x \cdot y^6 \cdot y \cdot z} \\ &= \boxed{2xy^3\sqrt{2xyz}} \end{aligned}$$

$$\begin{aligned} 32) \sqrt{64mp^4q^{13}} \\ &= \sqrt{64mp^4q^{12} \cdot q} \\ &= \boxed{8p^2q^6\sqrt{mq}} \end{aligned}$$

$$\begin{aligned} 33) -\sqrt{3} - \sqrt{2} + 3\sqrt{6} + 3\sqrt{2} \\ &= \boxed{-\sqrt{3} + 2\sqrt{2} + 3\sqrt{6}} \end{aligned}$$

$$\begin{aligned} 34) -3\sqrt{2} - 3\sqrt{3} - 2\sqrt{2} - \sqrt{3} \\ &= \boxed{-5\sqrt{2} - 4\sqrt{3}} \end{aligned}$$

$$35) \underline{-3\sqrt{5}} - \underline{\sqrt{6}} - \underline{\sqrt{5}} - \underline{2\sqrt{2}}$$

$$= \boxed{-4\sqrt{5} - \sqrt{6} - 2\sqrt{2}}$$

$$36) \underline{-\sqrt{3}} + \underline{2\sqrt{2}} + \underline{3\sqrt{3}} - \underline{3\sqrt{2}}$$

$$= \boxed{2\sqrt{3} - \sqrt{2}}$$

$$37) \underline{3\sqrt{3}} + \underline{3\sqrt{3}} - \underline{3\sqrt{5}} - \underline{3\sqrt{5}}$$

$$= \boxed{6\sqrt{3} - 6\sqrt{5}}$$

$$38) \underline{-3\sqrt{6}} + \underline{2\sqrt{3}} - \underline{3\sqrt{6}} - \underline{\sqrt{6}}$$

$$= \boxed{-7\sqrt{6} + 2\sqrt{3}}$$

$$39) \underline{3\sqrt{2}} - \underline{\sqrt{3}} - \underline{2\sqrt{12}} + \underline{3\sqrt{2}}$$

$$= 3\sqrt{2} - \sqrt{3} - 2\sqrt{4 \cdot 3} + 3\sqrt{2}$$

$$= 3\sqrt{2} - \sqrt{3} - 2 \cdot 2\sqrt{3} + 3\sqrt{2}$$

$$= \underline{3\sqrt{2}} - \underline{\sqrt{3}} - \underline{4\sqrt{3}} + \underline{3\sqrt{2}}$$

$$= \boxed{6\sqrt{2} - 5\sqrt{3}}$$

$$40) \underline{2\sqrt{2}} - \underline{2\sqrt{3}} + \underline{3\sqrt{5}} - \underline{2\sqrt{18}}$$

$$= 2\sqrt{2} - 2\sqrt{3} + 3\sqrt{5} - 2\sqrt{9 \cdot 2}$$

$$= 2\sqrt{2} - 2\sqrt{3} + 3\sqrt{5} - 2 \cdot 3\sqrt{2}$$

$$= \underline{2\sqrt{2}} - \underline{2\sqrt{3}} + \underline{3\sqrt{5}} - \underline{6\sqrt{2}}$$

$$= \boxed{-4\sqrt{2} - 2\sqrt{3} + 3\sqrt{5}}$$

$$41) \underline{3\sqrt{45}} - \underline{\sqrt{12}} - \underline{\sqrt{24}} - \underline{3\sqrt{20}}$$

$$= 3\sqrt{9 \cdot 5} - \sqrt{4 \cdot 3} - \sqrt{4 \cdot 6} - 3\sqrt{4 \cdot 5}$$

$$= 3 \cdot 3\sqrt{5} - 2\sqrt{3} - 2\sqrt{6} - 3 \cdot 2\sqrt{5}$$

$$= \underline{9\sqrt{5}} - \underline{2\sqrt{3}} - \underline{2\sqrt{6}} - \underline{6\sqrt{5}}$$

$$= \boxed{3\sqrt{5} - 2\sqrt{3} - 2\sqrt{6}}$$

$$42) \underline{-\sqrt{3}} + \underline{3\sqrt{8}} - \underline{3\sqrt{3}} - \underline{\sqrt{20}}$$

$$= -\sqrt{3} + 3\sqrt{4 \cdot 2} - 3\sqrt{3} - \sqrt{4 \cdot 5}$$

$$= -\sqrt{3} + 3 \cdot 2\sqrt{2} - 3\sqrt{3} - 2\sqrt{5}$$

$$= \underline{-\sqrt{3}} + \underline{6\sqrt{2}} - \underline{3\sqrt{3}} - \underline{2\sqrt{5}}$$

$$= \boxed{4\sqrt{3} + 6\sqrt{2} - 2\sqrt{5}}$$