

Review Multiplying and Simplifying Roots

Find the exact form of the following roots. Show all steps for full credit.

1) $\sqrt{81}$

81
 \wedge
 9 9
 \wedge \wedge
 3 3 3 3
 $3 \cdot 3 = 3^2 = 9$

2) $\sqrt[3]{81}$

$\sqrt[3]{3 \cdot 3 \cdot 3 \cdot 3}$
 $3 \sqrt[3]{3}$

3) $\sqrt[4]{81}$

$\sqrt[4]{3 \cdot 3 \cdot 3 \cdot 3}$
 3

4) $\sqrt[4]{3000}$

3000
 \wedge
 6 500
 \wedge \wedge
 3 2 100 5
 \wedge \wedge
 10 10
 5 2 5 3

$\sqrt[4]{2 \cdot 2 \cdot 2 \cdot 3 \cdot 5 \cdot 5 \cdot 5}$

5) $\sqrt[3]{250}$

250 $\sqrt[3]{2 \cdot 5 \cdot 5 \cdot 5}$
 \wedge \wedge
 10 25 $5 \sqrt[3]{2}$
 \wedge \wedge
 2 5 5 5

6) $\sqrt{36}$

36
 \wedge
 6 6
 \wedge \wedge
 3 2 3 2
 $\sqrt{2 \cdot 2 \cdot 3 \cdot 3}$
 6

7) $\sqrt[3]{-81}$

$-3 \sqrt[3]{3}$

8) $\sqrt{x^5}$

$\sqrt{x \cdot x \cdot x \cdot x \cdot x}$
 $x^2 \sqrt{x}$

9) $\sqrt[3]{x^6}$

$\sqrt[3]{x \cdot x \cdot x \cdot x \cdot x \cdot x}$
~~.....~~
 x^2

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

$\sqrt[4]{x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x}$
 $x \sqrt[4]{x^3}$

11) $\sqrt{36x^7}$

36
 \wedge
 6 6
 \wedge \wedge
 3 2 3 2
 $\sqrt{3 \cdot 3 \cdot 2 \cdot 2 \cdot x \cdot x \cdot x \cdot x \cdot x}$
 $6x \sqrt{x}$

12) $\sqrt[3]{128x^{10}}$

128
 \wedge
 14 32
 \wedge \wedge
 2 2 8 4
 \wedge \wedge \wedge
 4 2 2 2
 \wedge \wedge
 2 2
 $\sqrt[3]{4 \cdot 3 \cdot 2 \cdot x}$

$\sqrt[3]{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x}$

Roots Quiz

Simplify.

1) $\sqrt{2n^3} \cdot \sqrt{8n}$

Handwritten solution for problem 1:

$\sqrt{16n^4}$

Factorization: $\sqrt{2 \cdot 2 \cdot 2 \cdot 2 \cdot n \cdot n \cdot n \cdot n}$

Prime factorization of 16: $2 \cdot 2 \cdot 2 \cdot 2$ (with arrows pointing to 4 and 2)

Final answer: $4n^2$

2) $\sqrt{3n^2} \cdot \sqrt{8n^2}$

Handwritten solution for problem 2:

$\sqrt{24n^4}$

Factorization: $\sqrt{3 \cdot 2 \cdot 2 \cdot 2 \cdot n \cdot n \cdot n \cdot n}$

Prime factorization of 24: $2 \cdot 2 \cdot 2 \cdot 3$ (with note: "should not be circled")

Final answer: $2n^2\sqrt{6}$

3) $\sqrt{15x^3} \cdot \sqrt{15x}$

Handwritten solution for problem 3:

$\sqrt{225x^4}$

Factorization: $\sqrt{5 \cdot 5 \cdot 3 \cdot 3 \cdot x \cdot x \cdot x \cdot x}$

Prime factorization of 225: $3 \cdot 3 \cdot 5 \cdot 5$

Final answer: $15x^2$

4) $\sqrt[3]{3p} \cdot \sqrt[3]{5p^2}$

Handwritten solution for problem 4:

$\sqrt[3]{15p^3}$

Factorization: $\sqrt[3]{3 \cdot 5 \cdot p \cdot p \cdot p}$

Prime factorization of 15: $3 \cdot 5$

Final answer: $p\sqrt[3]{15}$

5) $\sqrt{5a^3} \cdot \sqrt{4a^2}$

Handwritten solution for problem 5:

$\sqrt{20a^5}$

Factorization: $\sqrt{2 \cdot 2 \cdot 5 \cdot a \cdot a \cdot a \cdot a \cdot a}$

Prime factorization of 20: $2 \cdot 2 \cdot 5$

Final answer: $2a^2\sqrt{5a}$

6) $\sqrt[4]{10x^3} \cdot \sqrt[4]{10x}$

Handwritten solution for problem 6:

$\sqrt[4]{100x^4}$

Factorization: $\sqrt[4]{5 \cdot 5 \cdot 2 \cdot 2 \cdot x \cdot x \cdot x \cdot x}$

Prime factorization of 100: $2 \cdot 2 \cdot 5 \cdot 5$

Final answer: $x\sqrt[4]{10}$