

Square Roots & Cube Roots

Simplify.

1) $\sqrt[2]{49}$ (7) $\begin{array}{r} 7 \\ \times 7 \\ \hline 49 \end{array}$

Index of 2 is not required to indicate square root, it is understood by default.

2) $\sqrt{49}$ (7)

3) $\sqrt{100}$ (10) $\begin{array}{r} 10 \\ \times 10 \\ \hline 100 \end{array}$

4) $\sqrt{17+8}$
 $\sqrt{25}$
(5)

5) $\sqrt{64}$ (8) $\begin{array}{r} 8 \\ \times 8 \\ \hline 64 \end{array}$

6) $\sqrt{144}$ (12)

$\sqrt{100}$ is 10,
so try 11
or 12.

$\begin{array}{r} 11 \\ \times 11 \\ \hline 11 \\ 110 \\ \hline 121 \end{array}$	$\begin{array}{r} 12 \\ \times 12 \\ \hline 24 \\ 120 \\ \hline 144 \end{array}$
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7) $\sqrt{95-14}$
 $\sqrt{81}$ (9) $\begin{array}{r} 95 \\ 14 \\ \hline 81 \end{array}$
 $\begin{array}{r} 9 \\ \times 9 \\ \hline 81 \end{array}$

8) $\sqrt{100+21}$
 $\sqrt{121}$ (11)

Remember
earlier
calculation,
 $11 \cdot 11 = 121$ ✓

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notice $\sqrt[3]{}$ cube root

9) $\sqrt[3]{8}$ (2) $\begin{array}{r} 2 \cdot 2 \cdot 2 \\ \downarrow \downarrow \downarrow \\ 4 \cdot 2 \\ \downarrow \\ 8 \end{array}$

10) $\sqrt[3]{64}$ (4) $\begin{array}{r} 4 \cdot 4 \cdot 4 \\ \downarrow \downarrow \downarrow \\ 16 \cdot 4 \\ \downarrow \\ 64 \end{array}$ (sad face)

11) $\sqrt[3]{125}$ (5) $\begin{array}{r} 5 \cdot 5 \cdot 5 \\ \downarrow \downarrow \downarrow \\ 25 \cdot 5 \\ \downarrow \\ 125 \end{array}$ (happy face)

12) $\sqrt[3]{20+7}$
 $\sqrt[3]{27}$ (3)

Remember
earlier
calculation,
 $3 \cdot 3 \cdot 3 = 27$.

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These may look strange.

13) $\sqrt{1}$
①

14) $-\sqrt{9}$
↓
③

15) $\sqrt{-9}$
no solution
(in the Real Numbers)

16) $-\sqrt{1}$
↓
①

17) $\sqrt{-1}$
no solution
(in the Real Numbers)

Unlike square roots, cube roots can be negative.

18) $-\sqrt[3]{8}$
↓
②

19) $\sqrt[3]{-8}$
②

~~-2~~ · ~~-2~~ · ~~-2~~
↓
4 · -2
↓
-8 ✓

20) $-\sqrt[3]{1}$
↓
①

21) $\sqrt[3]{-1}$
①

~~-1~~ · ~~-1~~ · ~~-1~~
↓
1 · -1
↓
-1 ✓