

Radicals and Rational Exponents

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KEY
1.5 is $\frac{3}{2}$ as a fraction

Write each expression in radical form.

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

3) $2^{\frac{5}{3}}$ $\sqrt[3]{2^5}$

5) $6^{\frac{3}{2}}$ $\sqrt{6^3}$

2) $4^{\frac{4}{3}}$ $\sqrt[3]{4^4}$
or $(\sqrt[3]{4})^4$

4) $7^{\frac{4}{3}}$ $\sqrt[3]{7^4}$

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

8) $2^{\frac{1}{6}}$ $2^{\frac{1}{6}}$

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

12) $\sqrt[6]{10}$ $10^{\frac{1}{6}}$

17) $(6v)^{1.5}$ $(6v)^{\frac{3}{2}}$
 $(\sqrt{6v})^3$

18) $m^{\frac{-1}{2}}$ $\frac{1}{\sqrt{m}}$

Write each expression in exponential form.

19) $(\sqrt[4]{m})^3$ $m^{\frac{3}{4}}$

21) $\sqrt[4]{v}$ $v^{\frac{1}{4}}$

23) $(\sqrt[3]{3a})^4$ $(3a)^{\frac{4}{3}}$

20) $(\sqrt[3]{6x})^4$ $(6x)^{\frac{4}{3}}$

22) $\sqrt{6p}$ $(6p)^{\frac{1}{2}}$

24) $\frac{1}{(\sqrt{3k})^5}$

$(3k)^{\frac{5}{2}}$
or $(3k)^{-\frac{5}{2}}$

Simplify.

25) $9^{\frac{1}{2}}$ $\sqrt{9} = 3$

26) $343^{\frac{4}{3}}$
 $\sqrt[3]{343^4} = \sqrt[3]{2401}$

27) $1000000^{\frac{1}{6}}$ $\sqrt[6]{1000,000} = 10$

28) $36^{\frac{3}{2}}$ $(\sqrt{36})^3 = (6)^3 = 216$

29) $(x^6)^{\frac{1}{2}}$ $\sqrt{x^6} = x^3$

$3n^2 = \sqrt{9n^4}$

31) $(64n^{12})^{\frac{1}{6}}$
 $\sqrt[6]{64n^{12}} = \sqrt[6]{2n^2}$

$9m^3 = \sqrt[3]{81m^6}$

32) $(81m^6)^{\frac{1}{2}}$

Write each expression in exponential form.

7) $(\sqrt{10})^3$ $10^{\frac{3}{2}}$

9) $(\sqrt[4]{2})^5$ $2^{\frac{5}{4}}$

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

Write each expression in radical form.

13) $(5x)^{-\frac{5}{4}}$ $\frac{1}{(\sqrt[4]{5x})^5}$

15) $(10n)^{\frac{3}{2}}$ $(\sqrt{10n})^3$

14) $(5x)^{\frac{-1}{2}}$ $\frac{1}{\sqrt{5x}}$

16) $a^{\frac{6}{5}}$ $\sqrt[5]{a^6}$
or $(\sqrt[5]{a})^6$

30) $(9n^4)^{\frac{1}{2}}$

32) $(81m^6)^{\frac{1}{2}}$

More Radical equations

NAME KEY

1. $(\sqrt{3x-3})^2 = (6)^2$

$$\begin{array}{r} 3x-3 = 36 \\ +3 \quad +3 \end{array}$$

$$3x = 39$$

$$\boxed{x=13}$$

2. $\sqrt{2x-5} - 7 = 0$

$$(\sqrt{2x-5})^2 = (7)^2$$

$$2x-5 = 49$$

$$2x = 54$$

$$\boxed{x=27}$$

3. $(\sqrt{3x})^2 = (6)^2$

$$3x = 36$$

$$\boxed{x=12}$$

4. $\frac{5\sqrt{x} + 2}{-2} = \frac{12}{-2}$

$$\frac{5\sqrt{x}}{5} = \frac{10}{5}$$

$$(\sqrt{x})^2 = (2)^2$$

$$\boxed{x=4}$$

5. $4(x^{1/2}) - 5 = 27$ - Get this by itself.

$$\frac{4x^{1/2}}{4} = \frac{32}{4}$$

$$x^{1/2} = 8$$

$$(\sqrt{x})^2 = (8)^2$$

$$\boxed{x=64}$$

or $4^2(\sqrt{x})^2 = 32^2$

$$\frac{16x}{16} = \frac{1024}{16}$$

$$\boxed{x=64}$$

6. $(3x+1)^{1/2} - 5 = 0$

$$(3x+1)^{1/2} = 5$$

Same as $\sqrt{3x+1} = (5)^2$

$$3x+1 = 25$$

$$\frac{3x}{3} = \frac{24}{3}$$

$$\boxed{x=8}$$

7. $(2\sqrt{x})^2 = (\sqrt{x+6})^2$

$$\begin{array}{r} 4x = x+6 \\ -x \quad -x \end{array}$$

$$3x = 6$$

$$\boxed{x=2}$$

8. $(2\sqrt{x-1})^2 = \sqrt{26+x}$

$$4(x-1) = 26+x$$

$$\begin{array}{r} 4x-4 = 26+x \\ -x \quad -x \end{array}$$

$$\begin{array}{r} 3x-4 = 26 \\ +4 \quad +4 \end{array}$$

$$3x = 30$$

$$\boxed{x=10}$$

9. $\sqrt{2x+1} = -3$

~~or~~
No Solution

Can't take square root and = a negative

* Challenge: $(\sqrt[3]{x-2})^3 = (4)^3$

$$\begin{array}{r} x-2 = 64 \\ +2 \quad +2 \end{array}$$

$$\boxed{x=66}$$