

Solving Equations with Rational Exponents

1. Isolate the term raised to the exponent.
 2. Raise both sides of equation to the reciprocal exponent
 3. Rewrite as a radical
 4. Simplify
- * Flip it

Ex. 1 Solve for x

$$(x^2)^{\frac{2}{3}} = 8^{\frac{2}{3}}$$

$$x = 8^{\frac{2}{3}}$$

$$x = \sqrt[3]{8^2}$$

$$x = 2^2$$

$x = 4$

Ex. 2 Solve for b.

$$((8b)^{\frac{2}{3}})^{\frac{3}{2}} = (64)^{\frac{4}{3}}$$

$$8b = 64^{\frac{4}{3}}$$

$$8b = \sqrt[3]{64^4}$$

$$8b = 4^4$$

$$\frac{8b}{8} = \frac{256}{8}$$

$$b = 32$$

Ex. 3 Solve for b.

8 is not raised to $\frac{3}{4}$

$$8b^{\frac{3}{4}} = 64$$

$$\left(\frac{3}{4} \right)^{\frac{4}{3}} = (8)^{\frac{4}{3}}$$

$$b = 8^{\frac{4}{3}}$$

$$b = \sqrt[3]{8^4}$$

$$b$$

Ex. 4 Solve for x.

$$(x - 24)^{\frac{3}{2}} - 5 = 211$$

$$\left((x-24)^{\frac{3}{2}} \right)^{\frac{2}{3}} = (216)^{\frac{2}{3}}$$

$$x - 24 = 216^{\frac{2}{3}}$$

$$x - 24 = \sqrt[3]{216^2}$$

$$x - 24 = \frac{36}{+24}$$

$x = 60$

Solving Rational Exponent Equations

Date _____ Period _____

Solve each equation.

1) $216 = x^{\frac{3}{2}}$

$$36$$

2) $x^{\frac{3}{2}} = 343$

3) $b^{\frac{1}{2}} = 8$

$$64$$

4) $2 = b^{\frac{1}{3}}$

5) $m^{\frac{1}{2}} = 7$

$$m = 49$$

6) $m^{\frac{3}{4}} = 27$

7) $32 = r^{\frac{5}{6}}$

$$r = 64$$

8) $m^{\frac{4}{3}} = 81$

9) $v^{\frac{5}{4}} = 243$

$$v = 81$$

10) $x^{\frac{3}{2}} = 1000$

11) $n^{\frac{1}{4}} = 3$

$$n = 81$$

12) $4 = k^{\frac{1}{2}}$

$$13) 729 = (81n)^{\frac{3}{2}}$$

$$n = 1$$

$$15) (v + 30)^{\frac{2}{3}} = 16$$

$$v = 34$$

$$17) 5^{\frac{3}{2}} = (4 - 11x)^{\frac{3}{2}}$$

$$125 = 4 - 11x$$

$$\frac{121}{-11} = \frac{-11x}{-11}$$

$$x = -11$$

$$19) (r + 19)^{\frac{1}{2}} = 6$$

$$r = 17$$

$$21) \frac{-4 - 3p^{\frac{3}{2}}}{+4} = -196$$

$$\frac{-3p^{\frac{3}{2}}}{-3} = \frac{-192}{-3}$$

$$(p^{\frac{3}{2}})^{\frac{2}{3}} = 64^{\frac{2}{3}}$$

$$p = \sqrt[3]{64^2} = 16$$

$$23) (-16 - 5x)^{\frac{3}{2}} = 512$$

$$x = -16$$

$$14) -10 = 10 - 5p^{\frac{1}{2}}$$

$$16) (3m + 19)^{\frac{3}{2}} = 512$$

$$18) 8 = (3m - 11)^{\frac{1}{2}}$$

$$20) 4 = (-20 - 3n)^{\frac{1}{3}}$$

$$22) (x + 11)^{\frac{3}{5}} = 8$$

$$24) x^{\frac{1}{4}} + 4 = 7$$