

$$\textcircled{21} (2\sqrt{6} + 8)(2\sqrt{6} - 8)$$

| | | | |
|-------------|---------------|--------------|-----------|
| $2\sqrt{6}$ | $4 \cdot 6$ | $16\sqrt{6}$ | |
| -8 | $-16\sqrt{6}$ | -64 | $24 - 64$ |

$$-40$$

Dec 4-10:32 AM

Factor + Solve

$$x^4 - 13x^2 + 22 = 0$$

$$(x^2 - 11)(x^2 - 2) = 0$$

$$x^2 - 11 = 0 \quad x^2 - 2 = 0$$

$$x = \pm\sqrt{11} \quad x = \pm\sqrt{2}$$

Dec 4-10:46 AM

$$x^3 - 5x - 2 = 0, \text{ zero of } -2$$

| | | | | |
|--------------|------|------|------|------|
| -2 | 1 | 0 | -5 | -2 |
| \downarrow | -2 | 4 | 2 | |
| 1 | -2 | -1 | 0 | |

$$x^2 - 2x - 1 = 0$$

$$x = \frac{2 \pm \sqrt{4 - 4(1)(-1)}}{2(1)} = \frac{2 \pm \sqrt{8}}{2} = \frac{2 \pm 2\sqrt{2}}{2} = 1 \pm \sqrt{2}$$

Dec 4-10:52 AM

$x^4 - 5x^3 + 11x^2 - 25x + 30 = 0$
 Graph ... $x = 2, x = 3$

$$\begin{array}{r|rrrrr} 2 & 1 & -5 & 11 & -25 & 30 \\ & & 2 & -6 & 10 & -30 \\ \hline & 1 & -3 & 5 & -15 & 0 \end{array} *$$

$$\begin{array}{r|rrrr} 3 & 1 & -3 & 5 & -15 & 0 \\ & & 3 & 0 & 15 & \\ \hline & 1 & 0 & 5 & 0 & \end{array} *$$

 $x^2 + 5 = 0$
 $x^2 = -5 \quad x = \pm i\sqrt{5}$

Dec 4-10:57 AM

$x^4 - 5x^3 + 11x^2 - 25x + 30 = 0$
 Graph ... $x = 2$ and 3

$$\begin{array}{r|rrrrr} 3 & 1 & -5 & 11 & -25 & 30 \\ & & 3 & -6 & 15 & -30 \\ \hline & 1 & -2 & 5 & -10 & 0 \end{array} *$$

$$\begin{array}{r|rrrr} 2 & 1 & -2 & 5 & -10 & 0 \\ & & 2 & 0 & 10 & \\ \hline & 1 & 0 & 5 & 0 & \end{array} *$$

 $x^2 + 5 = 0$
 $\sqrt{x^2} = \sqrt{-5} \quad x = \pm i\sqrt{5}$

Dec 4-1:11 PM

Warm up -
 Write the following problems and answers, using your calculator.
 $25^{(\frac{1}{2})}$ $36^{(\frac{1}{2})}$ $324^{(\frac{1}{2})}$
Do you see a pattern?
What are you actually doing when the exponent is one-half?
Now try these....
 $27^{(\frac{1}{3})}$ $512^{(\frac{1}{3})}$ $343^{(\frac{1}{3})}$
What are you actually doing when the exponent is one-third?

Jan 28-10:26 AM

7.4 Rational Exponents

Lesson Objectives | Teacher's Notes | Lesson Notes

1. Convert a square root to a rational exponent.
2. Convert a cube root to a rational exponent.
3. Convert an "nth" root to a rational exponent.
4. Reduce a rational exponent.

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Objectives

Pull for Hint

Square Roots

A square root is equivalent to an exponent of one-half.

$$\sqrt{x} = x^{\frac{1}{2}}$$

Why? _____

Erase the blue oval to check your explanation.

Square Roots

Pull for Directions

Cube roots

What exponent is equivalent to a cube root?


$$\sqrt[3]{x} = x^{\quad}$$


Answer and explain.


Cube Roots

Challenge

Write these in radical form.
Then click each tile to check your answers.







Challenge

Challenge

Let's look at the last problem.

What if the exponent were negative?

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

Challenge

Examples

Simplify.

1) $\frac{1}{27^{\frac{1}{3}}}$

2) $3^{\frac{1}{2}} \cdot 12^{\frac{1}{2}}$

3) $8^{\frac{2}{3}}$

Square Roots

Pull for Hint

Examples

Simplify.

4) $16^{1.5}$ 5) $25^{\frac{-3}{2}}$ 6) $(8x^{15})^{\frac{-1}{3}}$


Square Roots

Challenge

7) Simplify completely.

$$\left(\frac{x^{\frac{1}{4}}}{y^{\frac{-5}{6}}} \right)^{12}$$

Challenge



HW 7.4
p. 388 #1-25 odd,
#31-35 odd and
#39-49 odd

End of Lesson

Simplify each expression.

| | | |
|--|---|---|
| 1. $36^{\frac{1}{2}}$ | 2. $27^{\frac{1}{3}}$ | 3. $49^{\frac{1}{2}}$ |
| 4. $10^{\frac{1}{2}} \cdot 10^{\frac{1}{2}}$ | 5. $(-3)^{\frac{1}{2}} \cdot (-3)^{\frac{1}{2}} \cdot (-3)^{\frac{1}{2}}$ | 6. $3^{\frac{1}{2}} \cdot 12^{\frac{1}{2}}$ |
| 7. $2^{\frac{1}{3}} \cdot 32^{\frac{1}{3}}$ | 8. $3^{\frac{1}{3}} \cdot 9^{\frac{1}{3}}$ | 9. $3^{\frac{1}{2}} \cdot 27^{\frac{1}{2}}$ |

Write each expression in radical form.

| | | | |
|------------------------|------------------------|-----------------------|-----------------------|
| 10. $x^{\frac{1}{6}}$ | 11. $x^{\frac{1}{3}}$ | 12. $x^{\frac{2}{3}}$ | 13. $y^{\frac{2}{3}}$ |
| 14. $y^{-\frac{2}{8}}$ | 15. $t^{-\frac{3}{4}}$ | 16. $x^{1.5}$ | 17. $y^{1.2}$ |

Write each expression in exponential form.

| | | | |
|---------------------|-----------------------|---------------------|-------------------------|
| 18. $\sqrt{-10}$ | 19. $\sqrt{7x^3}$ | 20. $\sqrt{(7x)^3}$ | 21. $(\sqrt{7x})^3$ |
| 22. $\sqrt[3]{a^2}$ | 23. $(\sqrt[3]{a})^2$ | 24. $\sqrt[3]{a^2}$ | 25. $\sqrt[3]{(5xy)^6}$ |

Dec 3-3:08 PM

Simplify each number.

| | | | |
|---------------------------|------------------------|--------------------------|---------------------------|
| 30. $8^{\frac{2}{3}}$ | 31. $64^{\frac{2}{3}}$ | 32. $(-8)^{\frac{2}{3}}$ | 33. $(-32)^{\frac{2}{5}}$ |
| 34. $(32)^{-\frac{4}{5}}$ | 35. $4^{1.5}$ | 36. $16^{1.5}$ | 37. $10,000^{0.75}$ |


Write each expression in simplest form. Assume that all variables are positive.

| | | | |
|--|---|--|---|
| 38. $(x^{\frac{2}{3}})^{-3}$ | 39. $(x^{-\frac{1}{2}})^7$ | 40. $(3x^{\frac{2}{3}})^{-1}$ | 41. $5(x^{\frac{2}{3}})^{-1}$ |
| 42. $(-27x^{-9})^{\frac{1}{3}}$ | 43. $(-32y^{15})^{\frac{1}{5}}$ | 44. $\left(\frac{x^3}{x^{-1}}\right)^{-\frac{1}{4}}$ | 45. $\left(\frac{x^2}{x^{-11}}\right)^{\frac{1}{2}}$ |
| 46. $(x^{\frac{1}{2}}y^{-\frac{3}{4}})^{-6}$ | 47. $(x^{\frac{1}{3}}y^{-\frac{1}{6}})^{-12}$ | 48. $\left(\frac{x^{\frac{1}{2}}}{y^{-\frac{1}{4}}}\right)^{12}$ | 49. $\left(\frac{x^{-\frac{2}{3}}}{y^{-\frac{1}{3}}}\right)^{15}$ |

Dec 3-3:09 PM

Pull for Teacher's Notes

Match Equivalents





Match Equivalents

Pull for Teacher's Notes

Number Cube Practice

Use number cubes to generate values of m and n .
Write as a rational exponent. Reduce if necessary.

m : 
 n : 

$$\sqrt[n]{x^m} = x^{-} = x$$

Number Cube Practice

Algebra: Radicals and Exponents

Lesson Objectives | **Teacher's Notes** | Lesson Notes

Grades: 9 through 12

These activities may be used to review, reinforce, or enrich your study of how to convert radicals to rational exponents.

Prior Knowledge:
Students should be familiar with the terms index, exponent, radical, radicand, and rational. They also should be able to identify exponents and reduce fractions.

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Teacher Notes

Algebra: Radicals and Exponents

Lesson Objectives | Teacher's Notes | **Lesson Notes**

Students will practice converting square roots, cube roots, and n th roots to rational exponents. They will also reduce the rational exponents they find.

As a challenge, they will be asked to convert rational exponents to radical expressions.

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Lesson Notes



Jan 24-10:50 AM
