MES44QCS-Lesson 4 Mr. Pineda

Aim: How can we simplify radicals and radical expressions with numerical radicands?

Do Now:

1) Identify the perfect square numbers : 16, 15, 146, 300, 324, 729
2) If any number (from previous question) is not a perfect square then write that number as the product of prime numbers.

Example: 196 = 2 x 2 x 7 x 7

1) Answers

$\sqrt{16} = \pm 4$ $\sqrt{15} =$ NO $\sqrt{146} =$ NO $\sqrt{300} =$ NO $\sqrt{324} = \pm 18$ $\sqrt{729} = \pm 27$

a) $15 = 3 \cdot 5$

$146 = 2 \cdot 73$

$300 = 2 \cdot 2 \cdot 3 \cdot 5 \cdot 5$

I – What is a radical?

Index
even - PAR
ODD - impARES

1- index → $\sqrt[n]{x}$ ← radical

radicand

$\sqrt[2]{-8}$ = ERROR

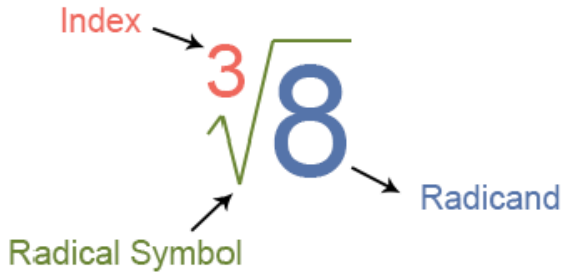
$\sqrt[3]{-8} = -2$

$\sqrt[4]{-8}$ = error

$\sqrt[5]{-8} = -1.51$

Conclusion: IF the index is even the RADICAND CANNOT be negative

2- Example:



$\sqrt[2]{}$ → Square Root

$\sqrt[3]{}$ → Cube Root

$\sqrt[4]{}$ → Quartic Root

3- Use your calculator to find roots: (Round up to the nearest hundreth) = 2 Decimals

$\sqrt{5} \approx 2.24$

Radicand = 5

Index = 2

$\sqrt[3]{6} \approx 1.82$

Radicand = 6

Index = 3

$\sqrt[4]{3} \approx 1.32$

Radicand = 3

Index = 4

II – How do you simpify radical without the calculator? (Positive)

1) $\sqrt{75} = \sqrt{5}\sqrt{5}\cdot\sqrt{3}$
$\sqrt{25}\cdot\sqrt{3} = 5\cdot\sqrt{3}$

2) $\sqrt{16} = 4$

3) $\sqrt{36} = 6$

4) $\sqrt{64} = 8$

5) $\sqrt{80} = \sqrt{5}\cdot\sqrt{2\cdot\sqrt{2}\cdot\sqrt{2}\cdot\sqrt{2}}$
$\sqrt{5}\ \sqrt{16} = 4\sqrt{5}$
$\sqrt{5}\ 4$

6) $\sqrt{30} =$
$\sqrt{2}\cdot\sqrt{3}\cdot\sqrt{5}$

7) $\sqrt{8} = \sqrt{\sqrt{2}\ \sqrt{2}\ \sqrt{2}}$
$\sqrt{4}\ \sqrt{2} = 2\sqrt{2}$

8) $\sqrt{18} = 3\sqrt{2}$

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II – How do you simplify more complicated radicals?

Examples:

$\sqrt{48a^5} = \sqrt{2}\cdot\sqrt{2}\cdot\sqrt{2}\cdot\sqrt{2}\sqrt{3}\sqrt{a}\sqrt{a}\sqrt{a}\sqrt{a}\sqrt{a}$

$\sqrt{16}\sqrt{3}\sqrt{a^4}\sqrt{a^1}$

$4\sqrt{3}\,a^2\sqrt{a} = 4a^2\sqrt{3a}$

1) $\sqrt{48a^5} = \sqrt{16}\sqrt{3}\sqrt{a^4}\sqrt{a} = 4a^2\sqrt{3a}$

2) $\sqrt{x^4y^3} = \sqrt{x^4}\sqrt{y^2}\sqrt{y} = x^2y\sqrt{y}$

$\sqrt[2]{x^4} = \sqrt[2]{x^2}\cdot\sqrt[2]{x^2} = x^1\cdot x^1 = x^{(+1)} = x^2$

$\sqrt[2]{x^4} = x^2$

$\sqrt[2]{y^3} = \sqrt[2]{y^2}\sqrt{y^1} = y^1\sqrt{y^1}$

Exercises

Simplify.

1) $\sqrt{125n}$

2) $\sqrt{216v}$

3) $\sqrt{512k^2}$ $= \sqrt{256} \cdot \sqrt{2} \cdot \sqrt[2]{k^2}$

$16 \quad \sqrt{2} \quad k = 16k\sqrt{2}$

512 | 2
256 | 2
128 | 2
64 | 2
32 | 2
16 | 2
8 | 2
4 | 2
2 | 2
1

$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$

$256 \times 2 = 512$

4) $\sqrt{512m^3}$

5) $\sqrt{216k^4}$

6) $\sqrt{100v^3}$

7) $\sqrt{80p^3}$

8) $\sqrt{45p^2}$

9) $\sqrt{147m^3n^3}$

10) $\sqrt{200m^4n}$

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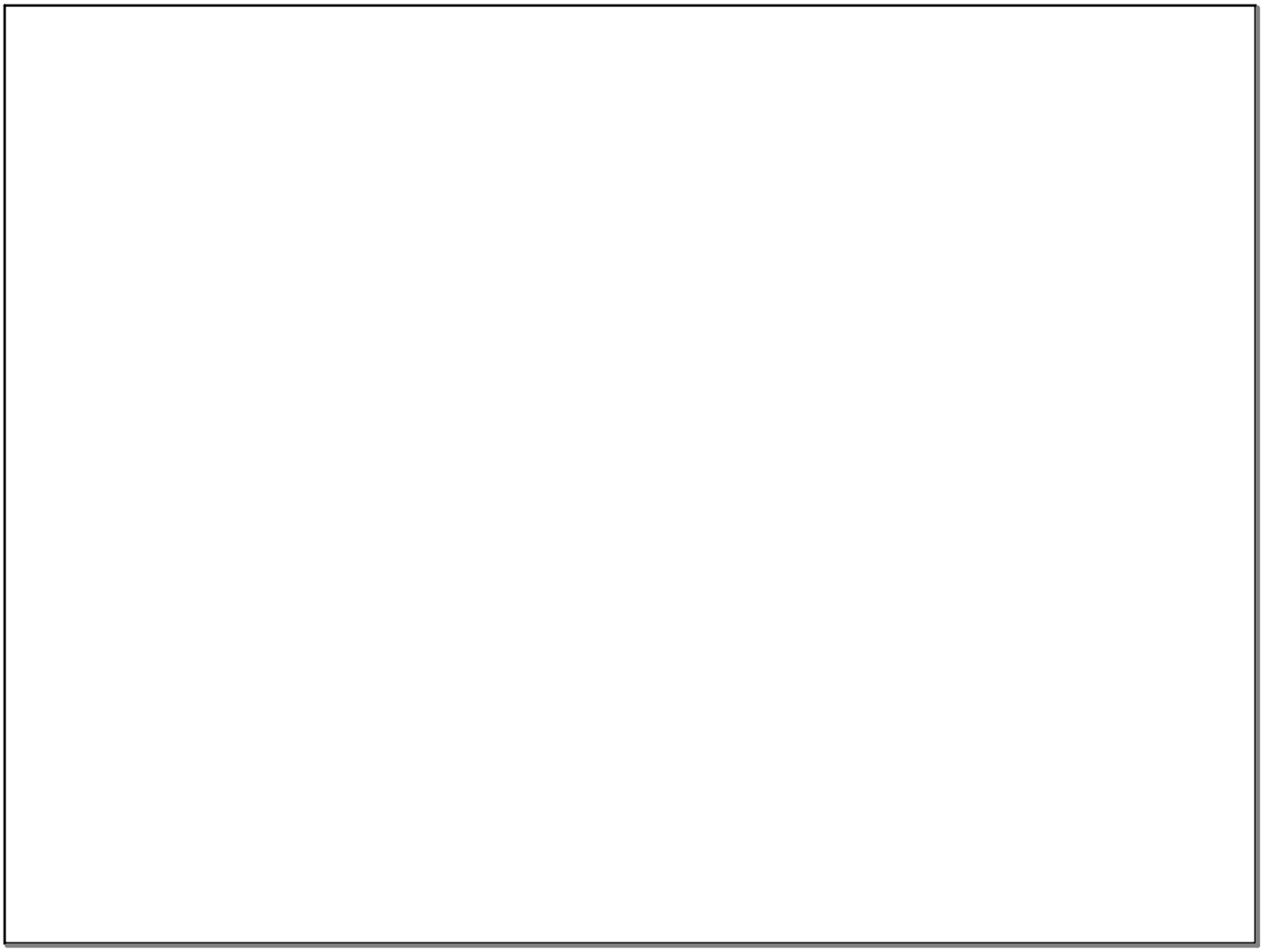

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