

A real number raised to an even power is ALWAYS POSITIVE.

A real number raised to an odd power can either be negative or positive.

The answer will have the same sign as the base.

The answer from an even radical must be POSITIVE.
"Principal Root"

Unless there is a - or \pm in front of the radical

The answer from an odd radical can be anything.

Answer will have the same sign as the radicand.

Simplify. $\sqrt{m^4} = m^2$

What do you do to find a root of a variable with an exponent?

For example: $\sqrt[3]{w^{12}} = w^4$

To find the answer you divide the exponent by the index.

This works because a radical is really a rational exponent:

$$\sqrt[3]{w^{12}} = (w^{12})^{\frac{1}{3}} = w^{(12 \cdot \frac{1}{3})}$$

Multiplying 12 by $\frac{1}{3}$ is the same as dividing 12 by 3.

Simplify.

1. $\sqrt{a^2} \rightarrow$ An even root without any sign in front means the Principal Root (Pos Root).

$$\sqrt{a^2} = \cancel{a} = |a|$$

absolute value symbols guarantee the result is pos.

2. $\sqrt[3]{x^3} = x$ Answer will have the same sign as the radicand which means answer can be either positive OR negative.
DON'T use Absolute Value symbols!

Simplify each. Use absolute value symbols when needed.

1. a. $\sqrt{r^{10}} = |r^5|$

b. $\sqrt[4]{m^{12}} = |m^3|$

c. $\sqrt[5]{w^{40}} = w^8$

Simplify each. Use absolute value symbols when needed.

2. a. $\sqrt{x^4} = x^2$ b. $\sqrt[3]{m^{12}} = x^4$

No abs. Value symbols because x^2 is already pos!

3. a. $\sqrt{x^6} = |x^3|$ b. $\sqrt[3]{m^{21}} = m^7$

4. a. $\sqrt{9x^8} = 3x^4$ b. $\sqrt[3]{-125q^{36}} = -5q^{12}$

Simplify each. Use absolute value symbols when needed.

5. $\sqrt{36x^{22}} = 6|x^{11}|$

6. $\sqrt{x^9} = x^4 \cdot \sqrt{x}$

2 goes into 9 four times

7. $\sqrt{x^{15}} = |x^7| \sqrt{x}$

2 goes into 15 7 times with a remainder of 1

WITH A Remainder of 1 (you don't have to put the exponent 1 on the radicand)

Simplify each. Use absolute value symbols when needed.

$$8. \sqrt{16x^{27}} = 4|x^{13}|\sqrt{x}$$

$$9. \sqrt{25a^{18}b^7c^{13}} = 5|a^9b^3|c^6\sqrt{bc}$$

OR
 $5|a^9||b^3|c^6\sqrt{bc}$

$$10. \sqrt[3]{x^6} = x^2$$

Simplify each. Use absolute value symbols when needed.

$$11. \sqrt[3]{x^{15}} = x^5$$

$$12. \sqrt[3]{8x^{33}} = 2x^{11}$$

$$13. \sqrt[3]{x^{14}} = x^4\sqrt[3]{x^2}$$

3 goes into 14 4 times
with a remainder of 2

Simplify each. Use absolute value symbols when needed.

$$14. \sqrt[3]{x^{22}} = x^7\sqrt[3]{x}$$

$$15. \sqrt[3]{-27e^{12}f^{17}g^{19}} = -3e^4f^5g^6\sqrt[3]{f^2g}$$

Simplify each. Use absolute value symbols when needed.

$$16. \sqrt[4]{16m^{12}n^{25}} = 2|m^3|n^6\sqrt[4]{n}$$

$$17. \sqrt[5]{32R^{21}S^{34}} = 2R^4S^6\sqrt[5]{RS^4}$$

You can now finish Hwk #3:

Sec 7-1

[Due Tomorrow](#)

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probs 3-5, 9, 23-25, 27, 44, 45, 50, 51