NOTES!

7.1 Roots and Radical Expressions

Find all Square roots of:

1. 225 find all $(15)(15) = 225$ $(-15)(-15)^2$ $(x)(x)$
2. 0.0049 $(.07)(0.07)$ $(0.07)(2)$
3. $-\frac{1}{121}$ None $(x)(x) = -\frac{1}{121}$ (6)
4. $\frac{64}{169}$ $\pm\frac{8}{13}$ (2)

Positive root is called the principal root

Most of $\sqrt{\ }$ given?

Find all CUBE roots of:

1. -64 (-4) one
2. 0.125 (0.5) one
3. $-\frac{27}{216}$ $-\frac{3}{6}$ $-\frac{1}{2}$ one
4. 0.000343 (0.07) one

Find all FOURTH roots of:

1. 16 2 -2 2
2. -16 none
3. 0.0081 $\pm(0.3)$ (-0.3) 2

What is the pattern for odd/even roots?

even 2, or [∅ neg]

odd 1 neg or positive.

Radical Symbol

$\sqrt[\text{index}]{\text{Radicand}}$

If the index **is not written it is automatically 2.**

Find Each Real Root

1. $\sqrt{36}$ → Wants Positive (principal root)
   6
2. $-\sqrt{36}$ -6
3. $\sqrt{-36}$ none
4. $\sqrt{0.36}$ 0.6
5. $-\sqrt[3]{64}$ -4
6. $\sqrt[3]{-64}$
   -4
7. $-\sqrt[4]{81}$ -3
8. $\sqrt[4]{-81}$ none

Simplifying Radicals

1. $\sqrt{16x^2}$ $\sqrt{16}$ $\sqrt{x^2}$ method 1

$\sqrt{16} \to 4$

$\sqrt{x^2} \to |x|$ ← x could be neg

even → odd

need absolute when using even degrees

Higher Order Thinking Skills

Volume of Sphere: V= 4/3 πr³ . What is radius if v=10cm or v = 0.002mm

$10 = \frac{4}{3}\pi r^3$ $r^3 = \frac{V}{4/3\pi}$ $r = \sqrt[3]{\frac{V}{4/3\pi}}$

$\frac{30}{4} = \pi r^3$ $r = \sqrt[3]{\frac{10}{4/3\pi}}$

1.33 in. 0.08 mm

over

Practice Simplifying Radical Expressions

What about Roots outside the radical sign

$-\sqrt[3]{18x}$

What about neg inside the radical sign –

$\sqrt[3]{-18x}$

2. $\sqrt{25x^2}$

$\sqrt{25}\sqrt{x^2}$

$5x^3$

3. $\sqrt{216}$ Not even out.

pairs

2	108
2	54
2	27
3	9
3	3
3	1

$6\sqrt{6}$

4. $\sqrt{125n}$ n need pair

5	25
5	5
5	1

$5\sqrt{5n}$

5. $\sqrt{0.25x^6}$ ← even

0.5	0.5
0.5	

$0.5|x^3|$

6. $\sqrt{x^8y^{18}}$ divide by 2

xx xx xx xx

yy yy yy yy yy yy yy yy yy

x^4 $|y^9|$

7. $\sqrt[3]{-64a^3}$ need triples

−4	aaa
−4	
−4	

$-4a$

8. $\sqrt[3]{27y^6}$

$3y^2$

9. $\sqrt[4]{x^8y^{12}}$

$x^2|y^3|$

10. $\sqrt[5]{32y^{10}}$

$2y^2$

11. $\sqrt{512K^2}$

2·2·2

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

$16K\sqrt{2}$ ✓

12. $\sqrt{100v^3}$

$10v\sqrt{v}$

13. $\sqrt{80p^3}$

2·2·2

2	40
2	20
2	10
2	5
5	1

pp p

$4p\sqrt{5p}$

14. $\sqrt{45p^2}$

$\sqrt{9}\sqrt{5}$ pp

$3p\sqrt{5}$

On Boards

1. $\sqrt{147m^3n^3}$

$7mn\sqrt{3mn}$

2. $\sqrt{200m^4n}$

$10m^2\sqrt{2n}$

3. $\sqrt{75x^2y}$

$5x\sqrt{3y}$

4. $\sqrt{64m^3n^3}$

$8mn\sqrt{mn}$

5. $\sqrt{160u^4v^3}$

$4u^2v\sqrt{v}$

6. $\sqrt{28x^3y^3}$

$2xy\sqrt{7xy}$