RADICALS

DEFINITION: any expression that has a square root, cuberoot, etc.

TYPES OF RADICALS: Square Roots $\sqrt{\ }$, Cube Roots $\sqrt[3]{\ }$, 4^{th} Roots $\sqrt[4]{\ }$, 5^{th} Roots $\sqrt[5]{\ }$, etc...

This year, we will focus on simplifying square roots and cube roots only.

SQUARE ROOTS

Simplify the following square roots.

1. $\sqrt{4}$ = 2	**2.** $\sqrt{81}$ = 9	**3.** $\sqrt{256}$ = 16
4. $\sqrt{121}$ = 11	**5.** $\sqrt{36}$ = 6	**6.** $\sqrt{484}$ = 22
7. $\sqrt{324}$ = 18	**8.** $\sqrt{1}$ = 1	**9.** $\sqrt{64}$ = 8
10. $\sqrt{\frac{1}{16}} = \frac{1}{4}$	**11.** $\sqrt{\frac{9}{100}} = \frac{3}{10}$	**12.** $\sqrt{\frac{25}{49}} = \frac{5}{7}$

CUBE ROOTS

Simplify the following cube roots.

13. $\sqrt[3]{8}$ = 2	**14.** $\sqrt[3]{-125}$ = −5	**15.** $\sqrt[3]{729}$ = 9
16. $\sqrt[3]{-1}$ = −1	**17.** $\sqrt[3]{4096}$ = 16	**18.** $\sqrt[3]{-343}$ = −7
19. $\sqrt[3]{-64}$ = −4	**20.** $\sqrt[3]{512}$ = 8	**21.** $\sqrt[3]{1728}$ = 12
22. $\sqrt[3]{-216}$ = −6	**23.** $\sqrt[3]{1331}$ = 11	**24.** $\sqrt[3]{-27}$ = −3

$$2\overline{)162}$$ 81, 18, 02

Simplifying Non-Perfect Roots

NON-PERFECT SQUARE ROOTS: *Use the perfect square numbers below to break the problem apart:*

PERFECT SQUARES:

1, 4, 9, 16, 25, 36, 49, 64, 81, 100, etc...

Put the following in simplest radical form:

1. $\sqrt{24} = \sqrt{4} \cdot \sqrt{6}$ $= 2\sqrt{6}$	**2.** $\sqrt{48} = \sqrt{16} \cdot \sqrt{3}$ $= 4\sqrt{3}$	**3.** $\sqrt{72} = \sqrt{9}\sqrt{8}$ $= 3\sqrt{8}$
4. $\sqrt{63} = \sqrt{9}\sqrt{7}$ $= 3\sqrt{7}$	**5.** $\sqrt{90} = \sqrt{9}\sqrt{10}$ $= 3\sqrt{10}$	**6.** $\sqrt{175} = \sqrt{25}\sqrt{7}$ $= 5\sqrt{7}$
7. $\sqrt{162} = \sqrt{81}\sqrt{2}$ $= 9\sqrt{2}$	**8.** $\sqrt{245} = \sqrt{49}\sqrt{5}$ $= 7\sqrt{5}$	**9.** $\sqrt{343} = \sqrt{49}\sqrt{7}$ $= 7\sqrt{7}$
10. $\sqrt{117} = \sqrt{9}\sqrt{13}$ $= 3\sqrt{13}$	**11.** $\sqrt{28} = \sqrt{4}\sqrt{7}$ $= 2\sqrt{7}$	**12.** $\sqrt{450} = \sqrt{25}\sqrt{18}$ $= 5\sqrt{9}\sqrt{2}$ $= 5 \cdot 3\sqrt{2} = 15\sqrt{2}$

NON-PERFECT CUBE ROOTS: *Use the perfect cube numbers below to break the problem apart:*

PERFECT CUBES:

1, 8, 27, 64, 125, 216, etc...

Put the following in simplest radical form:

13. $\sqrt[3]{40} = \sqrt[3]{8}\sqrt[3]{5}$ $= 2\sqrt[3]{5}$	**14.** $\sqrt[3]{500} = \sqrt[3]{125}\sqrt[3]{4}$ $= 5\sqrt[3]{4}$	**15.** $\sqrt[3]{162} = \sqrt[3]{27} \cdot \sqrt[3]{6}$ $= 3\sqrt[3]{6}$
16. $\sqrt[3]{-16} = \sqrt[3]{-8}\sqrt[3]{2}$ $= -2\sqrt[3]{2}$	**17.** $\sqrt[3]{432} = \sqrt[3]{216}\sqrt[3]{2}$ $= 6\sqrt[3]{2}$	**18.** $\sqrt[3]{-320} = \sqrt[3]{-64}\sqrt[3]{5}$ $= -4\sqrt[3]{5}$
19. $\sqrt[3]{54} = \sqrt[3]{27} \cdot \sqrt[3]{2}$ $= 3\sqrt[3]{2}$	**20.** $\sqrt[3]{96} = \sqrt[3]{8}\sqrt[3]{12}$ $= 2\sqrt[3]{12}$	**21.** $\sqrt[3]{-875} = \sqrt[3]{-125}\sqrt[3]{7}$ $= -5\sqrt[3]{7}$
22. $\sqrt[3]{648} = \sqrt[3]{216}\sqrt[3]{3}$ $= 6\sqrt[3]{3}$	**23.** $\sqrt[3]{-297} = \sqrt[3]{-27}\sqrt[3]{11}$ $= -3\sqrt[3]{11}$	**24.** $\sqrt[3]{686} = \sqrt[3]{343}\sqrt[3]{2}$ $= 7\sqrt[3]{2}$