Algebra 1
4-10-14

Target 7-4 Rational Exponents

I can evaluate, rewrite and solve expressions involving rational exponents.

"fractions"

Radicals / Square roots

Square roots have an invisible 2.

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

(2 = index)

$\sqrt[3]{y} = y^{\frac{1}{3}}$ $\qquad \sqrt{4} = \sqrt{2^2} = \sqrt[2]{2^2} = 2$

$\sqrt[3]{27} = \sqrt[3]{3^3} = 3$

(27 → 3, 9 → 3, 3)

$\sqrt{x}$	SAME	$x^{\frac{1}{2}}$
radical form		exponential form

$4^{\frac{3}{2}}$ ← denominator is index, numerator is exponent

$\sqrt[2]{4^3} = \left(\sqrt[2]{2^2}\right)^3 = 2^3 = 8$

Write in exponential:

1. $\sqrt{x} = \sqrt[2]{x^1} = x^{\frac{1}{2}}$
2. $\sqrt[3]{y} = \sqrt[3]{y^1} = y^{\frac{1}{3}}$
3. $\sqrt[5]{2x} = (2x)^{\frac{1}{5}}$
4. $\sqrt[3]{x^2} = x^{\frac{2}{3}}$

Rewrite in radical form:

① $81^{\frac{4}{3}} = \sqrt[3]{81^4}$ ② $12m^{\frac{1}{3}} = 12\sqrt[3]{m^1} = 12\sqrt[3]{m}$

③ $16^{\frac{1}{2}} = \sqrt[2]{16^1} = \sqrt{16} = 4$

④ $5(xy)^{\frac{1}{2}} = 5\sqrt{xy}$ ⑤ $10n^{\frac{2}{3}} = 10\sqrt[3]{n^2}$

Simplifying Radicals: create prime factor tree

Prime #: only divisible by itself and 1

Ex: 2, 3, 5, 7, 11, 13, 17

$\sqrt[2]{36}$ *always start with 2

* circle prime #'s

(2) 18
(2) 9
(3)(3)

$2 \cdot 3 = \boxed{6}$

⑤ $\sqrt[4]{256} = \sqrt[4]{2^8} = \sqrt[4]{2^4 \cdot 2^4} = 2^{\frac{4}{4}} \cdot 2^{\frac{4}{4}} = 2^1 \cdot 2^1 = 4$

(2) 128
(2) 64
(2) 32
(2) 16
(2) 8
(2) 4
(2)(2)

Simplify:

⑥ $1331^{\frac{1}{3}} = \sqrt[3]{1331} = 11$ ⑦ $\sqrt[3]{133} = \sqrt[3]{11^3} = 11^{\frac{3}{3}} = 11$

(11) 121
(11)(11)

⑧ $\sqrt[4]{2401} = \boxed{7}$

(7) 343
(7) 49
(7)(7)

⑨ $4096^{\frac{1}{4}} = \sqrt[4]{4096} = 2 \cdot 2 \cdot 2 = \boxed{8}$

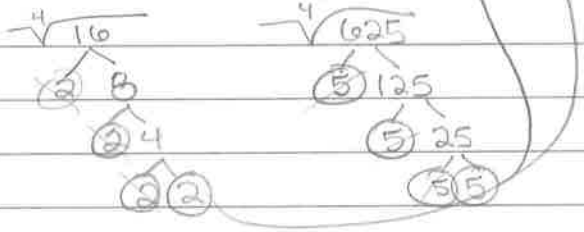
(2) 2048
(2) 1024
(2) 512
(2) 256
(2) 128
(2) 64
(2) 32
(2) 16
(2) 8
(2) 4
(2)(2)

Algebra 1
4-10-14
continued

Simplify. Check answers on a calculator.

(10) $\left(\frac{1}{32}\right)^{\frac{1}{5}} = \frac{1^{\frac{1}{5}}}{32^{\frac{1}{5}}} = \frac{1}{\sqrt[5]{32}} = \boxed{\frac{1}{2}}$

(11) $\left(\frac{16}{625}\right)^{\frac{1}{4}} = \frac{16^{\frac{1}{4}}}{625^{\frac{1}{4}}} = \frac{\sqrt[4]{16}}{\sqrt[4]{625}} = \frac{2}{5} = \boxed{\frac{2}{5}}$



HW: Packet T7-4 # 1-18