Name: KEY

Learning Target 1 – 1: Numeracy Basics, Radicals, and Exponent Laws – V1

Learning Target $(L-T)$	Procedural Context

$1-1$
 	
Numeracy Basics, GCF and LCM, and Exponent Laws
	• Numeracy Fundamentals
	  • Prime Factors and Factors
	• Lowest Common Multiple and Greatest Common Factor
	  • Basic understanding of Multiple versus Factor
	  • Using Prime Factors to Determine LCM and GCF
	• Exponent Laws
	  • All laws and rules from grade nine
	  • Include rational and negative exponents

Self-Reflection for this Section of the Course. What challenges did you face in this Section? What could improve moving forward?

Proficiency Outcome and Feedback

Your Level of Understanding of this Learning Target is:

Feedback:

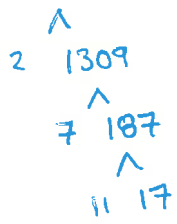
Show your steps, use a calculator if necessary, unless otherwise prohibited.

Answer only is not sufficient for demonstrating the thought process.

EMERGING

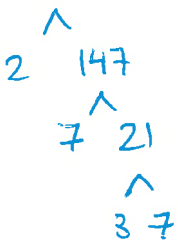
Simplify the following composite numbers into **a product of primes**.

1. 2618



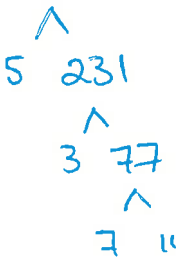
$2 \cdot 7 \cdot 11 \cdot 17$

2. 294



$2 \cdot 3 \cdot 7 \cdot 7$

3. 1155



$3 \cdot 5 \cdot 7 \cdot 11$

Simplify. Leaves solutions with positive exponents only

4. $(2x^3y^{-2}z^5)^2$

$2^2 x^6 y^{-4} z^{10}$

$\frac{4x^6z^{10}}{y^4}$

5. $8^{-\frac{2}{3}}$

$\frac{1}{8^{2/3}}$

$\frac{1}{\sqrt[3]{8}^2}$

$\frac{1}{2^2} = \frac{1}{4}$

6. $\frac{(3x)^{-3}}{(3^2x^2)^{-1}}$

$\frac{3^{-3}x^{-3}}{3^{-2}x^{-2}}$

$3^{-1}x^{-1}$

$\frac{1}{3x}$

PROFICIENT

Find the GCF and the LCM **(Answers as a product of primes)** of the following numbers

7. $34, 72, 100$

34 = 2 · 17

72 = 8 · 9 = (2 · 4) · (3 · 3) = 2 · 2 · 2 · 3 · 3

100 = 10 · 10 = (2 · 5) · (2 · 5)

$34: 2 \cdot 17$

$72: 2^3 \cdot 3^2$

$100: 2^2 \cdot 5^2$

GCF: 2

LCM: $2^3 \cdot 3^2 \cdot 5^2 \cdot 17$

$= 8 \cdot 9 \cdot 25 \cdot 17$

$= 72 \cdot 425$

$= 30600$

8. $28, 56, 196$

28 = 2 · 14 = 2 · 2 · 7

56 = 7 · 8 = 7 · (2 · 4) = 7 · 2 · 2 · 2

196 = 2 · 98 = 2 · 2 · 49 = 2 · 2 · 7 · 7

$28: 2^2 \cdot 7$

$56: 2^3 \cdot 7$

$196: 2^2 \cdot 7^2$

GCF: $2^2 \cdot 7$

LCM: $2^3 \cdot 7^2$

$= 8 \cdot 49$

$= 392$

$= 4 \cdot 7$

$= 28$

Simplify the following, leave your **answer with only positive exponents** and a fully reduced base

9. $\dfrac{(3x^2)^{-2}}{(2y^3)^3}$

$\dfrac{3^{-2} \times^{-4}}{2^3 y^9}$

$\dfrac{1}{8 \cdot 9 x^4 y^9}$

$\dfrac{1}{72 x^4 y^9}$

10. $\dfrac{\sqrt[3]{3}}{\sqrt[4]{3}}$

$\dfrac{3^{\frac{1}{3}}}{3^{\frac{1}{4}}}$

$\dfrac{3^{4/12}}{3^{3/12}}$

$3^{\frac{1}{12}}$

or

$\sqrt[12]{3}$

11. $\left(\dfrac{81}{16}\right)^{-\frac{3}{4}}$

$\left(\dfrac{16}{81}\right)^{3/4}$

$\dfrac{\sqrt[4]{16}^3}{\sqrt[4]{81}^3} = \dfrac{2^3}{3^3}$

$\dfrac{8}{27}$

Extending

Simplify the following. Answer should be fully reduced bases and only positive exponents.

12. $\left(\frac{4ab^3}{3a^{-4}b^2}\right)^{-2}\left(\frac{3a^{-3}b^4}{a^2b^3}\right)^2$

$\left(\frac{4a^5b}{3}\right)^{-2}\left(3a^{-5}b\right)^2$

$\frac{4^{-2}a^{-10}b^{-2}}{3^{-2}} \cdot 3^2a^{-10}b^2$

$\frac{3^4a^{-20}}{4^2} \rightarrow \boxed{\frac{81}{16a^{20}}}$

13. $\frac{\sqrt{3}\cdot\sqrt[3]{9}}{\sqrt[4]{27}}$

$\frac{3^{\frac{1}{2}}\cdot(3^2)^{\frac{1}{3}}}{(3^3)^{\frac{1}{4}}} \rightarrow \frac{3^{\frac{1}{2}}\cdot 3^{\frac{2}{3}}}{3^{\frac{3}{4}}}$

$\frac{3^{6/12}\cdot 3^{8/12}}{3^{9/12}} \rightarrow \frac{3^{14/12}}{3^{9/12}} = \boxed{3^{5/12}}$

or

$\boxed{\sqrt[12]{3^5}}$

14. $\left[\frac{(3x^2yz^{-3})^3(2^2x^{-1}y^4z^2)^2}{6x^4y^{-3}z^2}\right]^{-2}$

$\left[\frac{3^3x^6y^3z^{-9}\cdot 2^4x^{-2}y^8z^4}{6x^4y^{-3}z^2}\right] \rightarrow \left[\frac{3^3\cdot 2^4x^4y^{11}z^{-5}}{2\cdot 3x^4y^{-3}z^2}\right]^{-2}$

$\left[3^2\cdot 2^3x^{14}y^{-7}z^{-7}\right]^{-2}$

$3^{-4}\cdot 2^{-6}x^{-28}y^{14}z^{14} \rightarrow \boxed{\frac{z^{14}}{3^4\cdot 2^6y^{28}}}$ or $\boxed{\frac{z^{14}}{5184y^{28}}}$