Unit 3: Exponents Practice Test

Math 9 Principles

Name: _____ Block: ____

Please initial this box to indicate you carefully read over your test and checked your work for simple mistakes.

	What I can do in this unit	Level
3-1	I can convert powers between exponential form, expanded form, and standard form and evaluate using integer, fractions, and decimal bases.	
3-2	I can use the exponent laws for products and quotients. (add exponents for products of same bases, subtract for quotients).	
3-3	I can use the power of a power exponent law and apply it to coefficients and variables. (multiply exponents when taking the power of a power)	
3-4	I can convert a negative power to a positive power and evaluate a zero power with integer and fraction bases.	

Code	Value	Description
N	Not Yet Meeting Expectations	I just don't get it.
MM	Minimally Meeting Expectations	Barely got it, I need some prompting to help solve the question.
M	Meeting Expectations	Got it, I understand the concept without help or prompting.
E	Exceeding Expectations	Wow, nailed it! I can use this concept to solve problems I may have not seen in practice. I also get little details that may not be directly related to this target correct.

3-1: I can convert powers between exponential form, expanded form, and standard form and evaluate using integer, fractions, and decimal bases.

Complete the table:

#	Exponential Form	Expanded Form	Standard Form
1)	4^2	$4 \cdot 4$	16
2)	-3^4	$-3 \cdot 3 \cdot 3 \cdot 3$	-81
3)	$(-2)^5$	$(-2)(-2)(-2)(-2)(-2)$	-32
4)	x^6	$x \cdot x \cdot x \cdot x \cdot x \cdot x$	Cannot

Write each of the following in exponential form in as many ways as indicated. Do not use a power of 1.

#	Standard Form	Exponential Form
5)	81 (2 ways)	3^4, 9^2
6)	125	5^3
7)	1 000 000 (3 ways)	10^6, 100^3, 1000^2
8)	$x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x$	x^7

Evaluate each expression

9) $3^3 - 2^4 + 1^{19}$ $= 27 - 16 + 1$ $= 12$	10) $-5^2 + (-2)^3$ $= -25 - 8$ $= -33$
11) $(10 - 25)^0 - (-5)^2$ $= 1 - 25$ $= -24$	12) $\left(\frac{1}{2}\right)^3 \div \left(\frac{3}{4}\right)^2$ $\left(\frac{1}{8}\right)\left(\frac{16}{9}\right) = \frac{2}{9}$

Rewrite in standard form as a fraction or integer (no decimals)

13) $-(-2)^4$ $= -16$	14) $\left(\frac{3}{5}\right)^4$ $= \frac{3^4}{5^4} = \frac{81}{625}$	15) $\left(-\frac{1}{4}\right)^3$ $= -\frac{1}{64}$
16) $\left(-1\frac{1}{3}\right)^2$ $= \left(-\frac{4}{3}\right)^2 = \frac{16}{9}$	17) $(0.4)^3$ $= \left(\frac{2}{5}\right)^3 = \frac{8}{125}$	18) $(2.5)^4$ $= \left(\frac{5}{2}\right)^4 = \frac{5^4}{2^4} = \frac{625}{16}$

3-2: I can use the exponent laws for products and quotients.

19) $5^2 \cdot 5^8$ $= 5^{10}$	20) $\frac{x^{10}}{x}$ $= x^9$	21) $(-2)^5 \cdot (-2)^6$ $= -2^{11}$
22) $\frac{3^6 \cdot 3^2 \cdot 3}{3^5 \cdot 3^4}$ $= \frac{3^9}{3^9} = 1$	23) $\frac{(-4)^3(-4)^4}{(-4)^2(-4)^2}$ $= \frac{(-4)^7}{(-4)^4} = (-4)^3$ $= -64$	24) $\frac{x^6 \cdot x \cdot x^3}{x^2 \cdot x^7}$ $= \frac{x^{10}}{x^9} = x$

25) Rewrite each number with a base 2, then simplify. $\frac{256 \cdot 1024}{16 \cdot 64}$

$= \frac{2^8 \cdot 2^{10}}{2^4 \cdot 2^6} = \frac{2^{18}}{2^{10}} = 2^8$ (256)

26) If a spaceship can travel at a rate of about 10^5 km per second, how long, in seconds, would it take to reach a star that is 10^{12} km away?

$t = \frac{d}{r} = \frac{10^{12}}{10^5} = 10^7 s$

27) There are approximately 10^8 grains of sand in one cubic meter of sand. If a beach contains 10^6 cubic meters of sand, how many grains of sand are on the beach?

$= 10^8 \cdot 10^6$

$= 10^{14}$ grains

28) A space probe can travel at 10^{14} km in 10^6 hours. How far can it travel (in km) in 10^{22} hours? (Hint: First convert its speed to km/h.)

$r = \frac{10^{14} km}{10^6 h} = 10^8 km/h$

$d = rt = (10^8 km/h)\, 10^{22} h = 10^{30} km$

3-3: I can use the power of a power exponent law and apply it to coefficients and variables.

29) $(3^5)^3$

$= 3^{15}$

30) $(2^3)^6$

$= 2^{18}$

31) $(a^6)^3(a^2)^3$

$= a^{18}a^6$

$= a^{24}$

32) $\frac{(3^2)^3(3^7)^2}{(3^5)^2}$

$= \frac{3^6 \cdot 3^{14}}{3^{10}}$

$= \frac{3^{20}}{3^{10}}$

$= 3^{10}$

33) $(5x^3)^5$

$= 5^5x^{15}$

34) $\frac{(5x^3)^2(5x^3)^7}{(5x^3)^5}$

$= \frac{5^2x^6 \cdot 5^7x^{21}}{5^5x^{15}}$

$= \frac{5^9x^{27}}{5^5x^{15}}$

$= 5^4x^{12}$

35) $\frac{(6x^{12})^3}{(6x^7)^2}$

$= \frac{6^3x^{36}}{6^2x^{14}}$

$= 6x^{22}$

36) $\frac{(256x^5)^4(128x^2)^5}{(1024x^6)^3}$

$= \frac{(2^8x^5)^4(2^7x^2)^5}{(2^{10}x^6)^3}$

$= \frac{2^{32}x^{20}2^{35}x^{10}}{2^{30}x^{18}}$

$= \frac{2^{67}x^{30}}{2^{30}x^{18}}$

$= 2^{37}x^{12}$

37) $\frac{(243x^4)^3(81x^2)^5}{(2187x^8)^2}$

$= \frac{(3^5x^4)^3(3^4x^2)^5}{(3^7x^8)^2}$

$= \frac{3^{15}x^{12}3^{20}x^{10}}{3^{14}x^{16}}$

$= \frac{3^{35}x^{22}}{3^{14}x^{16}}$

$= 3^{21}x^6$

3-4: ***I can convert a negative power to a positive power and evaluate a zero power with integer and fraction bases.***

38) 5^{-3}

$= \frac{1}{5^3}$

39) $(-x)^{-24}$

$= \frac{1}{(-x)^{24}}$

$= \frac{1}{x^{24}}$

40) -3^{-5}

$= -\frac{1}{3^5}$

41) $(2x^6)^0$

$= 1$

42) $29x^0$

$= 29$

43) $-(-4)^{-2}$

$= -\frac{1}{(-4)^2}$

$= -\frac{1}{16}$

44) $(2^{-3})^3 \cdot (2^4)^{-2}$

$= 2^{-9} \cdot 2^{-8}$

$= 2^{-17}$

$= \frac{1}{2^{17}}$

45) $\frac{1}{3^{-4}} \cdot 3^{-9}$

$= \frac{3^{-9}}{3^{-4}}$

$= 3^{-5}$

$= \frac{1}{3^5}$

46) $\frac{(2^2)^{-4} \cdot (2^{-5})^{-3}}{(2^{-3})^3}$

$= \frac{2^{-8} \times 2^{15}}{2^{-9}}$

$= \frac{2^7}{2^{-9}}$

$= 2^{16}$