Math 10C

LO2 – 4.2 Integral Exponents

Part 1 – Review of Exponent Laws

	Exponent Law	
	Note that a and b are rational or variable bases and m and n are integral exponents.	
1	Product of Powers	$(a^m)(a^n) = a^{m+n}$
2	Quotient of Powers	$\frac{a^m}{a^n} = a^{m-n}, a \neq 0$
3	Power of a Power	$(a^m)^n = a^{mn}$
4	Power of a Product	$(ab)^m = (a^m)(b^m)$
5	Power of a Quotient	$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}, b \neq 0$
6	Zero Exponent	$a^0 = 1, a \neq 0$

Q1: Write each expression as a single power:

$y^2 * y^7$

$$y^9$$

$5^3 * 5^8$

$$5^{11}$$

$(-2)^5 * (-2)^4$

$$(-2)^9$$

$(x^2)^4$

$$x^8$$

$(7^2)^3$

$$7^6$$

$\{(-5)^2\}^4$

$$(-5)^8$$

Part 2 – Simplifying Exponents with a Common Base

Q2: Write each expression as a single power:

$(x^2)^5 * (x)^4$

$$x^{10} \cdot x^4$$
$$x^{14}$$

$(4)^5 * (2)^4$

$$(2^2)^5 \cdot (2)^4$$
$$2^{10} \cdot 2^4$$
$$2^{14}$$

$(27)^2 * (9)^4$

$$(3^3)^2 \cdot (3^2)^4$$
$$3^6 \cdot 3^8$$
$$3^{14}$$

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Part 3 – Integral Exponent Rule

$$x^{-n} = \frac{1}{x^n}$$

$$\frac{1}{x^{-n}} = x^n$$

Q3: Write each expression with positive exponents.

c^{-4}

$$\frac{1}{c^4}$$

$-5x^{-3}y^{-2}$

$$\frac{-5}{x^3y^2}$$

$$\frac{-5x^2y^{-7}}{15x^3y^{-4}} = \frac{-1x^2y^4}{3x^3y^7}$$

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

Part 4 – Simplifying Integral Exponents

Q4: Simplify each expression. State the answer using positive exponents.

$(2^{-2})(2^3)$

$$= 2^{(-2+3)}$$
$$= 2^1$$
$$= 2$$

$$\frac{(3^{-7})(4)}{(3^9)(4^3)}$$

$$\frac{4^1}{3^7 \cdot 3^9 \cdot 4^3}$$

$$= \frac{1}{3^{16} \cdot 4^2}$$

$\left[(4)(2^{-3})\right]^{-2}$

$$\left[(2^2)(2^{-3})\right]^{-2}$$

$$\left[2^{-1}\right]^{-2}$$

$$2^2$$

$\left(\dfrac{6^2}{5^{-3}}\right)^{-3}$

$$\frac{(6^2)^{-3}}{(5^{-3})^{-3}} = \frac{6^{-6}}{5^9}$$

$$= \frac{1}{5^9 \cdot 6^6}$$

$\left(-3m^2n\right)\left(-4m^4n^{-2}\right)$

$$= 12m^6n^{-1}$$

$$= \frac{12m^6}{n}$$

$$\frac{m^3n^{-2}}{(mn^4)(m^5n^2)}$$

$$= \frac{m^3n^{-2}}{m^6n^6}$$

$$= \frac{m^3}{m^6n^6 \cdot n^2}$$

$$= \frac{1}{m^3n^8}$$

◼ Key ◼

Part 5 – Integral Exponents and Scientific Notation

Q5: Write each of the following in Scientific Notation

236	1450	0.0068	12
2.36×10^2	1.45×10^3	6.8×10^{-3}	1.2×10^1

17,256,000	0.54	56	0.74
1.7256×10^7	5.4×10^{-1}	5.6×10^1	7.4×10^{-1}

Q6: Write each of the following in Standard Notation

2.45×10^2	5.4×10^3	1.46×10^{-1}	1.2×10^{-4}
245	5400	0.146	0.00012

1.5×10^3	4.56×10^2	5.56×10^{-3}	4.40×10^0
1500	456	0.00556	4.40

Q7: Simplify. Write each answer in Scientific Notation

$(2.6 \times 10^3)(4.5 \times 10^4)$

1.17×10^8

$(1.76 \times 10^{-2})(3.44 \times 10^{-1})$

6.0544×10^{-3}

$(4.69 \times 10^4)(1.33 \times 10^{-4})$

6.2377 ← Better!

or

6.2377×10^0