Pre-Test: Unit 2.1 Powers and Exponent Laws Name: Answer Key

Instructions: No Calculator. Show steps if asked.

1. Complete the table.

Power	Base	Exponent	Repeated Multiplication	Standard Form
7^3	7	3	$7 \times 7 \times 7$	343
2^5	2	5	$2 \times 2 \times 2 \times 2 \times 2$	32
$(-3)^4$	-3	4	$(-3) \times (-3) \times (-3) \times (-3)$	81
10^4	10	4	$10 \times 10 \times 10 \times 10$	10000
-4^3	4	3	$-4 \times 4 \times 4$	-64

$7^6 = 49 \times 7 = 343$

2. Write the following as a **power of 10**, and **order them** from **largest to smallest**.

a) one billion $= 10^9$ b) $10 \times 10 \times 10 \times 10 \times 10 \times 10 = 10^6$

c) 10,000,000 $= 10^7$ d) $(10^{11})^0 = 10^0$

a) 10^9 > c) 10^7 > b) 10^6 > d) 10^0

3. Evaluate the following, showing at least one step. Use power laws when possible.

a) $(2 \times 3 - 4 \times 5^0)^2$

$= (6 - 4)^2$

$= 4\ 2^2$

$= \boxed{4}$

b) $3^3 - 5^2 + (-2)^3$

$= 27 - 25 + (-8)$

$= \boxed{-6}$

c) $10 \div 2 + (4 - 1)^2$

$= 5 + 3^2$

$= 5 + 9$

$= \boxed{14}$

d) $(-4^0 \times 10)^7 \div (-10)^5$

$= (-1 \times 10)^7 \div (-10)^5$

$= (-10)^7 \div (-10)^5$

$= (-10)^{7-5}$

$= (-10)^2 = \boxed{100}$

Write each expression as a single power. Predict if the answer is positive or negative. Do NOT evaluate these!

	As a single power ...	Positive or Negative?
a) $(-3)^2 \div (-3)^4 \times (-3)^6$	$(-3)^4$	+
b) $-[(-3)^4]^3$	$-(-3)^{12}$	−
c) $\frac{[(-2)^5]^3}{(-2)^6}$	$(-2)^9$	−

5. Evaluate these expression, showing at least one step.

a) $-(-9^3)^0$

$= -(-1)^0(9^3)^0$

$= -1$.

b) $3^2 + 3^2 - 3^2 \times 3^2 \div 3^2$

$= 9 + 9 - 9 \times 9 \div 9$

$= 9$.

c) $(3 \times 7)^3 \div (3+4)^3$

$= 3^3 \times 7^3 \div 7^3$

$= 3^3 = 27$.

d) $\frac{72^2}{36^2}$

$= \frac{(36 \times 2)^2}{36^2} = \frac{36^2 \times 2^2}{36^2} = 2^2 = 4$

Hint: write 72 as a product ?x? and write 36 as a product with one of the same factors!

6. Alice and Bob tried to evaluate this expression on a test:

$$(-3)^2 \times (-3)^6 \div (-3)^4$$

For the answer, Alice wrote down $(-3)^3$. Bob wrote down $(-3)^4$.

a) Who is correct?

Bob. $(-3)^4$

b) What is the likely error that the other student made?

Alice probably used the wrong rule, and multiplied / divided the exponents.

7. On his last mid-unit quiz, Johnny wrote this solution:

1) $(-3)^3 - 3[(-4) \div (-2)]^2$
2) $= -9 - 3(2)^2$
3) $= 27(2)^2$
4) $= 108$

a) Explain all the errors that Johnny has made, and why he might have made the errors.

1) → 2) : $(-3)^3$ is not -9. Johnny probably multiplied -3 by the exponent.

2) → 3) Johnny probably thought line 2 reads -9 multiplied by -3, and that $= 27$.

b) Show the correct solution to the problem.

$(-3)^3 - 3[(-4) \div (-2)]^2$
$= -27 - 3(2)^2$
$= -27 - 12$
$= -39$

8. Old McDonald ~~bought~~ another farm. The land is 10^3 meters in length, and 10^5 meters in width.

a) Write an expression for the area, in m^2 and the perimeter, in meters, of the field. You do not need to evaluate them.

Area : $10^3 \times 10^5 = 10^8 m^2$

Perimeter : $10^3 + 10^5 + 10^3 + 10^5$

$= 2 \times 10^5 + 2 \times 10^3$

b) Suppose that Old McDonald spent one billion to buy the whole area of the land. How much does the land cost for every m^2? (Units are $\$/m^2$)

\$ 1 Billion $= \$10^9$

Cost every m^2 = $\$/m^2$ = $\frac{10^9}{10^8}$

$= 10^1 =$

$1 = 10$ Dollars per m^2