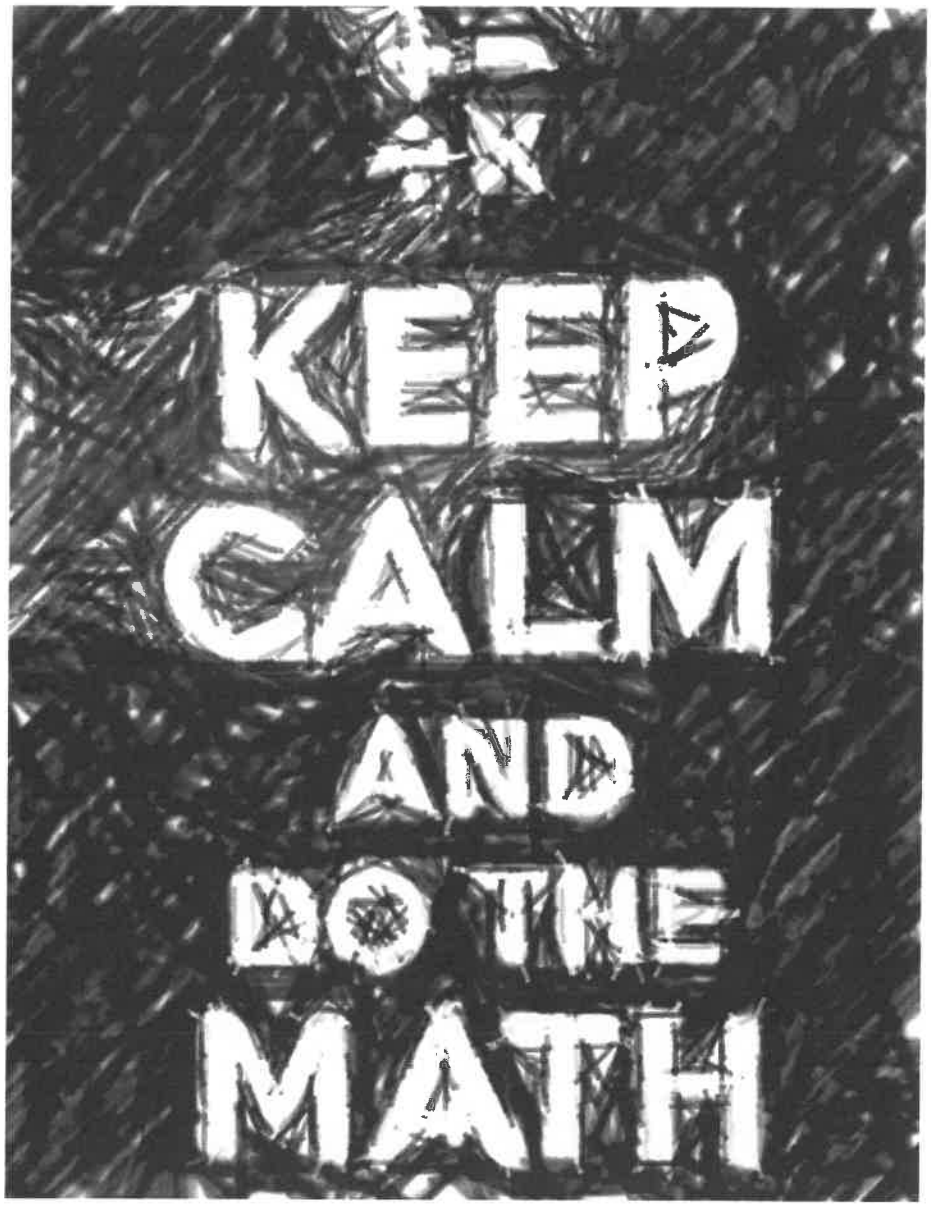
NAME: _____

Math P.A.T. Prep

Powers / Law of Exponents / Exponents - SOLUTIONS



St. Brendan School

Mr. Martínez

Use the following information to answer question 4.

$(3^4)^2$ 3^8 | $\frac{3^{12}}{3^4}$ $3^{12-4} = 3^8$ | $3^5 + 3^3$ | $[(3^{10})^0]^2$ $1^2 = 1$ anything to the power of 0 is 1 | $\frac{(3 \times 2)^6}{2^6}$ $6^6/2^6 = 729$ | $3^8 - 3^4$ 6480

4. How many of the expressions shown above have a value that is larger than 3^7?

A. 2
B. 3
C. 4
D. 5

$3^5 + 3^3 = 270$

• First, determine (using the law of exponents), the values above
• $3^7 = 2187$

Remember: law of exponents can not be used with addition and subtraction of powers

Use the law of exponents

5. If $n = 2$, then which of the following expressions yields the largest result?

A. $\frac{n^5 \times n^2}{n^4}$ $= \frac{2^5 \times 2^2}{2^4} = \frac{2^7}{2^4} = 2^3$

B. $\frac{n^2 \times n^3}{n}$ $\frac{2^2 \times 2^3}{2} = \frac{2^5}{2} = 2^4$

C. $\frac{(n^2)^3}{n}$ $\frac{(2^2)^3}{2} = \frac{2^6}{2} = 2^5$

D. $\frac{(n^5)^2}{n^4}$ $\frac{(2^5)^2}{2^4} = \frac{2^{10}}{2^4} = 2^6$

You must carry it!

5. Which of the following sets of powers is arranged in order of increasing value from left to right?

A. $-2^2, -1^2, (-1)^2, (-2)^2$ (−4, −1, 1, 4)
B. $(-2)^2, (-1)^2, -1^2, -2^2$ (4, 1, −1, −4)
C. $-1^2, (-1)^2, -2^2, (-2)^2$ (−1, 1, −4, 4)
D. $(-1)^2, -1^2, -2^2, (-2)^2$ (1, −1, −4, 4)

increasing → smallest to greatest

Remember:
• negative bases have the neg. sign inside brackets
• If the neg sign is not in brackets

14. The expression $(3^2 \times 2)^3$ can be simplified to

A. $3^2 \times 2^3$
B. $3^6 \times 2$
C. $3^5 \times 2^3$
D. $3^6 \times 2^3$

$(3^2 \times 2)^3 = 3^6 \times 2^3$

Law of exponents

1. Another representation of the expression $\left(\frac{2}{3}\right)^4$ is

A. $\frac{2+4}{3+4}$
B. $\frac{2 \times 4}{3 \times 4}$
C. $\frac{2+2+2+2}{3+3+3+3}$
D. $\frac{2 \times 2 \times 2 \times 2}{3 \times 3 \times 3 \times 3}$

• A power is a repeated multiplication
• $\left(\frac{2}{3}\right)^4 = \left(\frac{2}{3}\right)\left(\frac{2}{3}\right)\left(\frac{2}{3}\right)\left(\frac{2}{3}\right)$

You can't use the law of exponents when adding or sub.

7. Which one of the following statements is correct?

A. $4^5 + 4^7 = 4^{12}$ Can't add exponents here
B. $4^{12} - 4^4 = 4^8$ Can't subtract exponents
C. $4^2 \times 4^5 = 4^7$ → $4^{2+5} = 4^7$
D. $4^6 \div 4^3 = 4^2$ NOT TRUE $\frac{4^6}{4^3} = 4^3$

Numerical Response

$\frac{x^6}{x^4} = 144 \Rightarrow x^{6-4} = 144$
$x^2 = 144$

3. If $(x^3)^2 \div x^4 = 144$, then what is the whole number value of x?

Answer: 12

$x^2 = 144$, then $x = 12$

(Record your answer in the numerical-response section on the answer sheet.)

An incorrect simplification of the expression $(2^3)(2^5)^2 \div (4 \times 2)^2$ is shown below.

	$(2^3)(2^5)^2 \div (4 \times 2)^2$
Step 1	$(2^3)(2^5)^2 \div (8)^2$
Step 2	$(2^3)(2^7) \div (8)^2$
Step 3	$(2^3)(2^7) \div (2^3)^2$
Step 4	$(2^3)(2^7) \div (2^5)$
Step 5	$2^{10} \div 2^5$
Step 6	2^2

Incorrect! $(2^{5 \times 2}) = 2^{10}$, not 2^7

Numerical Response

8. In which step is the **first** recorded error?

Answer: Step 2

(Record your answer in the numerical-response section on the answer sheet.)

Lowest
Expression 1 $(2^2)^3 + 2^2 = 2^6 + 2^2 = 64 + 4 = 68$

Highest
Expression 2 $4^2 + 4^3 - (4^3)^0 = 16 + 64 - 1 = 79$

Expression 3 $3^4 - 3^2 = 81 - 9 = 72$

30. Which of the following rows correctly identifies the expression with the lowest value and the expression with the highest value?

Row	Lowest Value	Highest Value
A.	Expression 1	Expression 3
B.	Expression 1	Expression 2
C.	Expression 3	Expression 2
D.	Expression 3	Expression 1

Use the following information to answer question 20.

The expression $\left(\frac{(n^3)^4}{n^2}\right)(n^{10} \div n^5 \times n^2)$ can be simplified to the form n^p.

• Apply the law of exponents!
• BEDMAS

$\left(\frac{n^{12}}{n^2}\right)(n^{10} \div n^5 \times n^2) \Rightarrow (n^{12-2})(n^5 \times n^2) = (n^{10})(n^7)$

$\frac{n^{10}}{n^5} = n^5$

$n^{10+7} = n^{17}$ $P = 17$

20. The value of p is

A. 20
B. 17
C. 14
D. 13

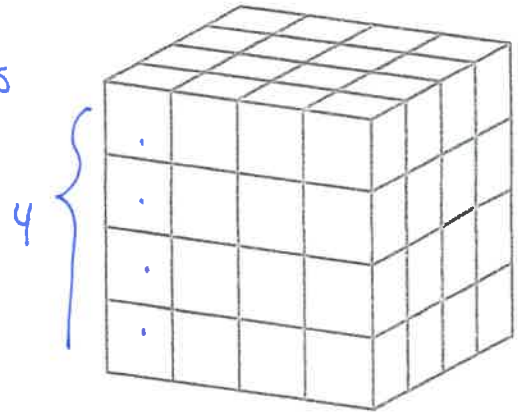
14. Which of the following expressions represents the addition of 7^2 and 7^3

7^2 is (7×7)
7^3 is $(7 \times 7 \times 7)$

A. $(7 + 7)^{2+3}$
B. $(7 + 7)^{2 \times 3}$
C. $(7 \times 7) + (7 \times 7 \times 7)$
D. $(7 + 7) \times (7 + 7 + 7)$

The cubes in the 3-D object shown below represent a repeated multiplication and a power.

• a cube Represents the exponent of 3



4^3 (four cubed)

32. Which of the following rows identifies the repeated multiplication and the power that the 3-D object represents?

Row	Repeated Multiplication	Power
A.	$3 \times 3 \times 3 \times 3$	3^4
B.	$3 \times 3 \times 3 \times 3$	4^3
C.	$4 \times 4 \times 4$	3^4
D.	$4 \times 4 \times 4$	4^3

When simplified, the expression $\left[(a^2b)(a^3b^2)\right]^3$ can be written in the form $a^m b^n$.

37. Which of the following rows correctly identifies the values of m and n?

Row	m	n
A.	8	6
B.	9	5
C.	15	9
D.	18	6

• $(a^2b)(a^3b^2) = a^{2+3}b^{1+2} = a^5b^3$

• $[a^5b^3]^3 = a^{5\times3}b^{3\times3} = a^{15}b^9$

m n

9. *The values of 4^5 and 5^4 are* ___i___ *because* ___ii___.

The statement above is completed by the information in row

	i	*ii*
A.	equal	4×5 has the same value as 5×4 NOT TRUE
B.	equal	both powers represent the same model ?
C.	not equal	two powers cannot have the same value not necessarily true
D.	not equal	they cannot be written using the same repeated multiplication