

EXPONENTS AND ROOTS

A. EXPONENTS

In math, many symbols have been developed to simplify certain types of number expressions. One of these symbols is the “**exponent**”.

Rule: An exponent indicates how many times a base number is used as a factor.

Example: $10^4 = 10 \times 10 \times 10 \times 10$ or $(10)(10)(10)(10)$
 $3^5 = 3 \times 3 \times 3 \times 3 \times 3$
 $x^2 = (x)(x)$

The exponent is written smaller and is placed above the base number (the number to be multiplied). The first example can be read “ten exponent four” or “ten to the power of four”.

Second and third power have special names: second power is usually called “squared”, and third power is usually called “cubed”.

Example: 5^2 is “five squared”
 5^3 is “five cubed”

A simple way to work out exponents is to write the base digit the same number of times as the value of the exponent, and put a multiplication sign between each digit.

Example: $4^5 = 4 \times 4 \times 4 \times 4 \times 4$ (the exponent is 5, so write 4 five times)
 $= 1024$

PRACTICE A:

Write as an exponent or power (also called “*exponential notation*”):

1.) $5 \bullet 5 \bullet 5 \bullet 5 =$

2.) $2 \bullet 2 \bullet 2 \bullet 2 \bullet 2 =$

3.) $10 \bullet 10 =$

4.) $6 \bullet 6 \bullet 6 =$

Evaluate the following:

5.) $2^4 =$

6.) $5^3 =$

7.) $3^4 =$

8.) $2^5 =$

9.) $10^2 =$

10.) $1^7 =$

B. SQUARE ROOTS

Rule: Taking the square root of a number is the reverse of squaring the number.

The symbol for square root is $\sqrt{\quad}$

Example: $\sqrt{9}$ (the square root of 9) = 3 because $(3)^2 = 9$

$\sqrt{144}$ (the square root of 144) = 12 because $(12)^2 = 144$

PRACTICE B:

Evaluate the following:

1.) $\sqrt{4} =$

2.) $\sqrt{1} =$

3.) $\sqrt{121} =$

4.) $\sqrt{81} =$

5.) $\sqrt{100} =$

6.) $\sqrt{10000} =$

ANSWERS

Practice A (exponents):

1.) 5^4

2.) 2^5

3.) 10^2

4.) 6^3

5.) $2 \times 2 \times 2 \times 2 = 16$

6.) $5 \times 5 \times 5 = 125$

7.) $3 \times 3 \times 3 \times 3 = 81$

8.) $2 \times 2 \times 2 \times 2 \times 2 = 32$

9.) $10 \times 10 = 100$

10.) $1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 = 1$

Practice B (square roots)

1.) 2

2.) 1

3.) 11

4.) 9

5.) 10

6.) 100