

Lesson 1: Exponential Notation

Classwork

5^6 means $5 \times 5 \times 5 \times 5 \times 5 \times 5$ and $\left(\frac{9}{7}\right)^4$ means $\frac{9}{7} \times \frac{9}{7} \times \frac{9}{7} \times \frac{9}{7}$.
Exponent
base

You have seen this kind of notation before: it is called **exponential notation**. In general, for any number x and any positive integer n ,

$$x^n = \underbrace{(x \cdot x \cdots x)}_{n \text{ times}}$$

The number x^n is called x raised to the n^{th} power, where n is the **exponent** of x in x^n and x is the **base** of x^n .

Exercise 1

$$\underbrace{4 \times \cdots \times 4}_{7 \text{ times}} = 4^7$$

Exercise 6

$$\underbrace{\frac{7}{2} \times \cdots \times \frac{7}{2}}_{21 \text{ times}} =$$

Exercise 2

$$\underbrace{3.6 \times \cdots \times 3.6}_{47 \text{ times}} = 3.6^{47}$$

Exercise 7

$$\underbrace{(-13) \times \cdots \times (-13)}_{6 \text{ times}} =$$

Exercise 3

$$\underbrace{(-11.63) \times \cdots \times (-11.63)}_{34 \text{ times}} = (-11.63)^{34}$$

Exercise 8

$$\underbrace{\left(-\frac{1}{14}\right) \times \cdots \times \left(-\frac{1}{14}\right)}_{10 \text{ times}} =$$

Exercise 4

$$\underbrace{12 \times \cdots \times 12}_{\text{times}} = 12^{15}$$

Exercise 9

$$\underbrace{x \cdot x \cdots x}_{185 \text{ times}} = x^{185}$$

Exercise 5

$$\underbrace{(-5) \times \cdots \times (-5)}_{10 \text{ times}} = (-5)^{10}$$

Exercise 10

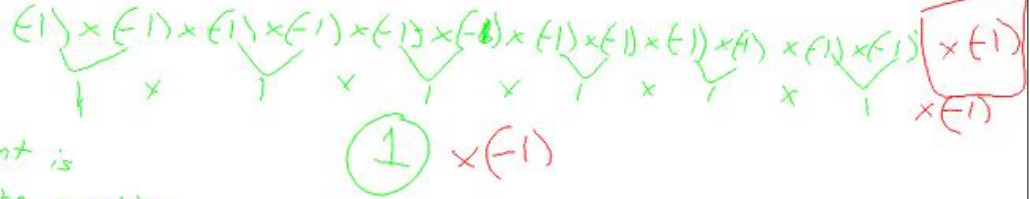
$$\underbrace{x \cdot x \cdots x}_{\text{times}} = x^{11}$$

Exercise 11

Will these products be positive or negative? How do you know?

$(-1) \times (-1) \times \dots \times (-1) = (-1)^{12}$
12 times

even = positive



positive, b/c the exponent is an even number. All the negatives "pair off" and become positive

$(-1) \times (-1) \times \dots \times (-1) = (-1)^{13}$
13 times

odd = negative

negative, b/c the exponent is an odd number

b/c

Exercise 12

Is it necessary to do all of the calculations to determine the sign of the product? Why or why not?

$(-5) \times (-5) \times \dots \times (-5) = (-5)^{95}$
95 times

No, the product will be negative b/c the exponent "95" is an odd number.

$(-1.8) \times (-1.8) \times \dots \times (-1.8) = (-1.8)^{122}$
122 times

Exercise 13

Fill in the blanks about whether the number is positive or negative.

If n is a positive even number, then $(-55)^n$ is _____ ⁺ _____.

If n is a positive odd number, then $(-72.4)^n$ is _____ ⁻ _____.

Exercise 14

Josie says that $\underbrace{(-15) \times \dots \times (-15)}_{6 \text{ times}} = -15^6$. Is she correct? How do you know?

$$\underbrace{(-15) \times \dots \times (-15)}_{6 \text{ times}} = (-15)^6$$

positive answer

$$\underbrace{- (15 \times \dots \times 15)}_{6 \text{ times}} = -15^6$$

(positive)
↓
negative