

Lesson 13: Comparison of Numbers Written in Scientific Notation and Interpreting Scientific Notation Using Technology

Classwork

There is a general principle that underlies the comparison of two numbers in scientific notation: *Reduce everything to whole numbers if possible.* To this end, we recall two basic facts.

- Inequality (A)** in Lesson 7: Let x and y be numbers and let $z > 0$. Then $x < y$ if and only if $xz < yz$.
- Comparison of whole numbers:
 - If two whole numbers have different numbers of digits, then the one with more digits is greater.
 - Suppose two whole numbers p and q have the same number of digits and, moreover, they agree digit-by-digit (starting from the left) until the n^{th} place. If the digit of p in the $(n + 1)^{\text{th}}$ place is greater than the corresponding digit in q , then $p > q$.

Exercise 1

The Fornax Dwarf galaxy is 4.6×10^5 light-years away from Earth, while Andromeda I is 2.430×10^6 light-years away from Earth. Which is closer to Earth?

$$FD \rightarrow 4.6 \times 10^5 = 46 \times 10^4$$

$$A \rightarrow 2.430 \times 10^6 = 24.30 \times 10^5$$

$$24.30 \times 10^5 > 4.6 \times 10^5$$

The Fornax Dwarf galaxy is closer to Earth

Exercise 2

The average lifetime of the tau lepton is 2.906×10^{-13} seconds, and the average lifetime of the neutral pion is 8.4×10^{-17} seconds. Explain which subatomic particle has a longer average lifetime.

$$TL \rightarrow 2.906 \times 10^{-13}$$

$$NP \rightarrow 8.4 \times 10^{-17} = 0.00084 \times 10^{-13}$$

$$2.906 > 0.00084$$

The tau lepton has a longer avg lifetime.