Groups, Clusters and Individuals

Astronomers study many different kinds of objects in space. Sometimes these objects contain many individuals that need to be tallied separately.

The cluster of galaxies called Abell-2218 is a rich collection of galaxies, as shown in the Hubble Space Telescope photo to the left.

1 – Astronomers observed the surface of the Sun on March 27, 2001 and counted 230 sunspots. If there were 10 sunspots in each group, about how many sunspot groups were on the Sun that day?

2 – Since 1950, astronomers have cataloged 35 individual galaxies within the group of galaxies containing the Milky Way. If this group is typical, and there are 200 galaxy groups within 100 million light years of the Milky Way, how many individual galaxies are present?

3 – The Milky Way galaxy has 158 satellite star clusters that orbit its in space. If each of these star clusters contains 100,000 stars, how many stars exist in these clusters?

4 – Astronomers have detected 430 planets orbiting 300 nearby stars. About how many planets orbit an average star in this sample?

5 – A cubic centimeter of gas in the Orion Nebula contains about 10 atoms of hydrogen and 4 atoms of helium. Hydrogen atoms contain one proton and one electron. Helium atoms contain 2 protons, 2 neutrons and 2 electrons. How many protons would you find in a single cubic centimeter of this gas? How many neutrons? How many electrons? What is the total number of protons, neutrons and electrons?

1 – Astronomers observed the surface of the sun on March 27, 2001 and counted 230 sunspots. If there were 10 sunspots in each group, about how many sunspot groups were on the sun that day?

Answer: 230 spots / 10 spots per group = **23 groups.**

2 – Since 1950, astronomers have cataloged 35 individual galaxies within the group of galaxies containing the Milky Way. If this group is typical, and there are 200 galaxy groups within 100 million light years of the Milky Way, how many individual galaxies are present?

Answer: 200 galaxy groups x 35 galaxies per group = **7000 galaxies**

3 – The Milky Way galaxy has 158 satellite star clusters that orbit its in space. If each of these star clusters contains 100,000 stars, how many stars exist in these clusters?

Answer: 158 clusters x 100,000 stars per cluster = **15,800,000 stars.**

4 – Astronomers have detected 430 planets orbiting 300 nearby stars. About how many planets orbit an average star in this sample?

Answer: 430 planets / 300 stars = 1.4 planets, or about **1 planet per star.**

5 – A cubic centimeter of gas in the Orion Nebula contains about 10 atoms of hydrogen and 4 atoms of helium. Hydrogen atoms contain one proton and one electron. Helium atoms contain 2 protons, 2 neutrons and 2 electrons. How many protons would you find in a single cubic centimeter of this gas? How many neutrons? How many electrons? What is the total number of protons, neutrons and electrons?

Answer: 10 atoms hydrogen + 4 atoms helium
           10(1 proton) + 4(2 protons)   = **18 protons**
           10(0 neutrons) + 4(2 neutrons) =   **8 neutrons**
           10(1 electron) + 4(2 electrons) = **18 electrons.**
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                                         44 particles