There are many simple mathematical formulae that astronomers use to describe different aspects of the universe and the physical world. (The above photo of Saturn was taken by NASA's Cassini spacecraft from behind Saturn looking back towards the Sun.)

Problem 1: Find, P, the length of Earth's day 500 million years in the future if **P = 24 hours + 0.004 Y**, where Y is the number of millions of years that have elapsed.

Problem 2: Find the distance to the Andromeda galaxy in light years, L, if its distance in parsecs, P = 770,000 and **L = 3.26** P.

Problem 3:   Find the temperature, T, of a gas cloud emitting X-rays if the energy of the X-rays is E = 12,000 electron Volts and **T = 11,500 E**.

Problem 4: Find the temperature in degrees Centigrade of the air at an altitude of 20 kilometers if H = 20 and T = 25.0 - 6.5 H.

Problem 5: Find the diameter in kilometers, D, of a black hole with a mass of 10 times the sun if **D = 5.6 M** and M = 10.0.

Problem 6: Calculate the speed of sound, S, in meters/second for a temperature of T = 200 Centigrade (that's 392 F), if **S = 331 + 0.6 T**.

Problem 7: Calculate the sunspot number, N, if there are X = 15 individual sunspots and Y = 10 groups of sunspots is **N = X + 11 Y**.

Answer Key

Problem 1: Find, P, the length of Earth's day 500 million years in the future if **P = 24 hours + 0.004 Y**, where Y is the number of millions of years that have elapsed.

Answer; **P = 24 hours + 0.004 (500) = 26 hours.**

Problem 2: Find the distance to the Andromeda galaxy in light years, L, if its distance in parsecs, P = 770,000 and **L = 3.26** P.

Answer: **L = 3.26** (770,000) = **2,200,000 light years.**

Problem 3: Find the temperature, T, of a gas cloud emitting X-rays if the energy of the X-rays is E = 12,000 electron Volts and **T = 11,500 E**.

Answer: **T = 11,500 (12,000) = 138 million K**

Problem 4: Find the temperature in degrees Centigrade of the air at an altitude of 20 kilometers if H = 20 and T = 25.0 - 6.5 H.

Answer: T = 25.0 - 6.5 (20) = **- 105 Centigrade.**

Problem 5: Find the diameter in kilometers, D, of a black hole with a mass of 10 times the sun if **D = 5.6 M** and M = 10.0.

Answer: **D = 5.6 (10) = 56 kilometers.**

Problem 6: Calculate the speed of sound, S, in meters/second for a temperature of T = 200 Centigrade (that's 392 F), if **S = 331 + 0.6 T**.

Answer: **S = 331 + 0.6 (200)** = 331 + 120 = **451 meters/sec.**

Problem 7: Calculate the sunspot number, N, if there are X = 15 individual sunspots and Y = 10 groups of sunspots is **N = X + 15 Y**.

Answer: **N = 15 + 11 (10) = 15 + 110 = 125 sunspots.**