The space between the planets is filled with fragments of asteroids, comets and material left over from the formation of the planets. These rocks and debris rain down upon exposed surfaces at speeds up to 30 km/sec.

The figure on the left summarizes the impact frequency of various sizes of particles in space. Note the graph is plotted in the Log-Log format due to the enormous range of masses and rates being described.

Replacing a data graph with an empirical model:

Problem 1 - What linear function of the form y = mx + b best describes the data in the LogLog graph?

Problem 2 - What function N(m) is obtained from your answer to Problem 1?

Problem 1 - What linear function of the form y = mx + b best describes the data in the LogLog graph?

Answer: Use the two-point formula:

$$(y - y1) = \frac{y2 - y1}{x2 - x1}(x - x1)$$ with p1 = (x1,y1) and p2 = (x2,y2)

Select: p1 = (-4, +2)   p2 = (16, -16)

and get **y = -0.9x - 1.6**

Problem 2 - What function N(m) is obtained from your answer to Problem 2?

Answer: Since y = Log(N(m)) and x = Log(m) we have

Log(N(m)) = -0.9 Log(m) - 1.6   then

$$10^{Log(Nm))} = 10^{Log(m)}$$

And N(m) = $10^{-1.6}$ m$^{-0.9}$ so   **N(m) = 0.025 m$^{-0.9}$**