

Worksheet

Practice on "Powers of 10"

Name: KEY
Date: _____

Lengths to Memorize:
(units of meters)
 10^0 Human
 10^7 Earth diam
 10^9 Sun diam
 10^{11} Sun dist
 10^{13} Neptune
 10^{16} Light year/
 Dist to stars
 10^{24} Supercluster
 10^{26} Cosm Micro-
 Wave Bkgd

- 1) The mass of the Sun is 2,000,000,000,000,000,000,000,000,000 kg.
 a) Express this mass in scientific notation. 2.0×10^{30} kg
 b) Express the Sun's mass to the nearest power of 10. 10^{30} kg
 c) What is the Sun's mass in units of solar masses (M_{\odot})? $1 M_{\odot}$

- 2) If the mass of the Earth is 10^{24} kg, how much more massive is the Sun than the Earth?
 a) The Sun is 6 orders of magnitude more massive than the Earth.
 b) The Sun is a million times more massive than the Earth.

Multiplication with powers of 10: $10^A \times 10^B = 10^{(A+B)}$
Division with powers of 10: $10^A \div 10^B = 10^{(A-B)}$

- 3) The distance from the Earth to the supermassive black hole at the center of our Milky Way Galaxy is about 28,000 LY. How many meters is this, to the nearest power of 10?

$$2.8 \times 10^4 \times 10^{16} = 10^{4+16} = 10^{20} \text{ m}$$

- 4) How many Sun diameters fit between the Earth and the nearest star about 4 light years away? (Again, to the nearest power of 10.)

$$4 \times 10^{16} / 10^9 = 10^{17-9} = 10^8 \text{ Sun diameters}$$

- 5) If 1 Astronomical Unit is the average distance between the Earth and the Sun, how many AU are in a Light Year (LY)? (Nearest power of 10.)

$$10^{16} / 10^{11} = 10^{16-11} = 10^5 \text{ AU/LY}$$