

Name

Date

Scales in the Universe

Studying the Universe requires the use of a huge range of scales. This often means using new units – especially for distances and masses. For the answers below, you need only be accurate to 1 or 2 significant figures.

The Earth is 150 million km from the Sun. This distance is called an “astronomical unit”.

$$1 \text{ au} = 150 \text{ million km}$$

The Earth is 13,000 km in diameter, and the Sun is 1.6 million km in diameter.

1) If the Earth were the size of a golf ball (40mm diameter), how far away would the Sun be? #

2) How large would the Sun be on this scale?

3) Neptune is 30 au from the Sun. How far is that on this scale?

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- 4) Light travels at 3×10^8 m/s (300,000,000 metres per second). In one year how far does it travel? We call this distance a “light year”

- 5) The nearest star is 4 light years away. On the scale we used before, how far away is it?

- 6) Is there another scale on which the Solar System and the nearest star can be conveniently represented?

- 7) Our Galaxy, the Milky Way, contains about one hundred billion stars, and has a disk around 100,000 lightyears in diameter. The nearest large Galaxy, the Andromeda Galaxy, is around 2.5 million lightyears away.

What does this tell you about the relative separation of galaxies compared with that of stars?