

26.1 Astronomical Units

READ

Talking and writing about distances in our solar system can be cumbersome. The Sun and Neptune are on average 4,500,000,000 (or four billion, five hundred million) kilometers apart. Earth's average distance from the Sun is 150,000,000 (one hundred fifty million) kilometers. It can be difficult to keep track of all the zeroes in such large numbers. And it's not easy to compare numbers that large.

Astronomers often switch to astronomical units (abbreviated AU) when describing distances in our solar system. One astronomical unit is 150,000,000 km—the same as the distance from Earth to the Sun.

Neptune is 30 AU from the Sun. Not only is 30 an easier number to work with than 4,500,000,000; but using astronomical units allows us to see immediately that Neptune is 30 times as far from the Sun as Earth.

In this skill sheet, you will practice working with astronomical units.

EXAMPLE

- Jupiter is 778 million kilometers from the Sun, on average. Find this distance in astronomical units.

Solution: Divide 778 million km by 150 million km: $778,000,000 \div 150,000,000 = 5.19$ AU

- The average distance from Mars to the Sun is 1.52 AU. Find this distance in kilometers.

Solution: Multiply 1.52 AU by 150 million km: $1.52 \times 150,000,000 = 228,000,000$ km

PRACTICE

1. The average distance from Saturn to the Sun is 1.43 billion kilometers. Find this distance in astronomical units.
2. The average distance from Venus to the Sun is 108 million kilometers. Find this distance in astronomical units.
3. Mercury's average distance from the Sun is 0.387 astronomical units. How far is this in kilometers?
4. The average distance from Uranus to the Sun is 19.13 astronomical units. How far is this in kilometers?
5. Is the distance from Earth to the moon more or less than one astronomical unit? How do you know?
6. Which planet is almost 20 times as far away from the Sun as Earth?
7. Which planet is less than half as far away from the Sun as Earth?
8. Which planet is almost twice as far from the Sun as Jupiter?
9. An unmanned spacecraft launched from Earth has traveled 10 astronomical units in the direction away from the Sun. It most recently passed through the orbit of which planet?
10. An unmanned spacecraft launched from Earth has traveled 0.5 astronomical units toward the Sun. Has it passed through the orbit of Venus yet?