



π IN THE SKY¹⁰

Deduce an asteroid's makeup from afar, and
see for yourself what's possible with pi!

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METAL MATH

Asteroid (16) Psyche is of particular interest to scientists because ground-based observations indicate that the surface may be metallic. Earth and other terrestrial planets have metal cores, but they are buried deep inside the planets, so they are difficult to study. If Psyche consists of a large amount of metal, it might resemble a planetary core from which we could learn about terrestrial planet core formation. Determining how much metal exists on the asteroid is one of the goals of NASA's Psyche mission.

Psyche has a roughly triaxial ellipsoid shape with axes of about 290 km, 245 km, and 170 km. Its mass, as estimated from its gravitational effects on nearby bodies such as Mars, is about 2.7×10^{19} kg. Use the formula for volume, $V = 4/3 \pi abc$, where a , b , and c are the lengths of the semi-axes, to compute Psyche's approximate density.

Based on the average density of terrestrial materials (shown in the graphic), does Psyche's density support the observations indicating the presence of metal?

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analyzing asteroid makeup ...
comparing density to ...
ice: 917 kg/m^3
water: 997 kg/m^3
rock: 1600 - 3500 kg/m^3
metal: 534 - 22,590 kg/m^3
result ■
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