Homework #1:
Powers of ten; units conversion; distance scales
Due: Wednesday, January 22

Show your work.

Good things to know: 1 mile $\approx$ 1.609 kilometers. rate $\times$ time = distance, so time = distance/rate. circumference of a circle = π D = 2 π r.

1. (6 points) The Earth has an equatorial *radius* of 6378 kilometers.
a) What is the Earth's *diameter* in miles? [Express this as a 4 digit integer, and also in scientific notation.]
b) What is the Earth's *circumference* in miles? [Express this as a 5 digit integer, and also in scientific notation.]
c) What is the equatorial speed of the rotating Earth, in miles per hour? [Express this as a 4 digit integer and also in scientific notation.]

2. (4 points) The mean distance of the Earth to the Sun is 92.9 million miles $\approx$ 149.6 million kilometers. 1 year $\approx$ 3.1557 X 10^7 seconds. How fast does the Earth move along on its near-circular orbit around the Sun? Express this in km/sec and also in miles/sec. And round off to 3 significant figures.

3. (3 points) The Sun and the solar system are moving with respect to the other stars in their neighborhood of the Galaxy at 19.5 km/sec towards the constellation Lyra.
a) How many miles per *hour* does the solar system move with respect to the nearby stars? [Express your answer as a 5 digit integer and also in scientific notation.]
b) How many miles does it move per day towards Lyra? [Express in scientific notation.]

4. (2 points) The speed of light in a vacuum is 299,792.458 km/sec (exactly). How many miles per minute is this? [Express this in scientific notation, and round it off to 5 significant figures.]

5. Extra credit (5 points). The local region of our Galaxy is moving at roughly 220 km/sec toward the constellation Cygnus, owing to the rotation of the Galaxy. Our portion of the Galaxy is revolving on a circular orbit around the center of the Galaxy. The distance to the center of the Galaxy is roughly 8000 parsecs. 1 parsec = 206265 Astronomical Units. 1 AU $\approx$ 149.6 million kilometers. 1 year $\approx$ 3.1557 X 10^7 seconds. How many years are required for our local portion of the Galaxy to make one lap around the center of the Galaxy?