The radius of the Earth is about _____________________ miles.

The diameter of the Earth is about _____________________ miles.

Distance around the Earth (the circumference) at the equator is about _____________________ miles.

The Earth spins once every __________ hours.

A person standing at the equator moves about _____________________ miles in 24 hours, or about _____________________ miles in 1 hour.

Distance from the Sun to the Earth is about _____________________ miles.

This is the radius of the Earth’s orbit round the Sun.

The distance the Earth travels round the Sun (circumference) is about _____________________ miles.

The Earth takes 1 year, or __________ days, to orbit the Sun.

People on the Earth move about _____________________ miles in 1 year, or about _____________________ miles in 1 day.

Sun light takes about 10 minutes to travel from the Sun to the Earth.

That is about _____________________ miles in 10 minutes, or about _____________________ miles in 1 minute, or about _____________________ miles in 1 second.

* Actual values: radius Earth = 3959 miles; distance Sun = 92,960,000 miles; speed light = 186,282 mps
This lesson uses the dimensions of the Earth and distances to the Sun to do calculations with BIG numbers and answer the question “How fast are we going?”

This is good lesson to be used toward end of 5th grade. Use rounded values to obtain estimations and focus on the size of the numbers rather than the actual precise values.

1. Goal

Calculations with really big numbers
The concept of relative speed
Interesting facts about our solar system

2. Exploring

Opening question: Is it possible to be moving and not moving at the same time???? [yes, while riding in a car (or any vehicle)] [our classroom is moving and not moving at the same time]

How about all of us in this classroom, are we moving now? [yes, we are spinning. how do you know we are spinning we have day and night]

So, how fast are we spinning? That is what we’ll calculate today.

3. Introduce rate and circumference as linear distance

What do we mean by “how fast are we going?” When you drive in a car, how do we measure the speed? [miles per hour]

If we travel 60 miles per hour, how far do we go in one hour? [60 miles]

How far do we go in two hours? [2 x 60 = 120 miles]

How far do we go in 30 minutes (or ½ hour)? [30 miles or ½ x 60 mph]

How far would we go in 1 minute? [since there are 60 minutes in one hour, 1 minute is 1/60 of an hour so we have 60 x 1/60 = 1 mile]

If we want to talk about how fast around a circle, easiest to “cut” the circle and make it into a line segment.
To show the kids that we are going to calculate a linear distance for the circle, draw a circle on the board, mark a hash line through the top and label it A on one side an b on the other, and then “open” the circle so that we now have a line segment AB. Tell them that if we were traveling around the circle, that is how far we would go!

To calculate how fast we are going, we’d take that distance at the equator, which is miles, and divide it by time, hours, to get our miles per hour.

4. Calculating BIG numbers

Hand out Worksheet
Tell students to use rounded values as we want estimates of the really big numbers, not the precise values.

Start with left side and put in info about year, day, hours, and at bottom, seconds. Just work through handout one question at a time.

All answers are on separate page.
The radius of the Earth is about __________4,000_______ miles.

The diameter of the Earth is about ________8,000_________ miles.

Distance around the Earth (the circumference) at the equator is about

\[2 \times \pi \times r \quad \text{or} \quad 2 \times 3 \times 4000 = 24,000\quad (\text{use} \quad \pi = 3)\quad \text{miles.}\]

The Earth spins once every ___24_______ hours.

A person standing at the equator moves about ______24,000___________ miles in 24 hours, or about _______1,000___________ miles in 1 hour.

Distance from the Sun to the Earth is about

________________90,000,000________________ miles. This is the radius of the Earth’s orbit round the Sun.

The distance the Earth travels round the Sun (circumference) is about \[2 \times \pi \times r \quad \text{or} \quad 2 \times 3 \times 90,000,000 = 540,000,000\quad \text{miles.}\]

The Earth takes 1 year, or _____365__ days, to orbit the Sun.

People on the Earth move about ____540,000,000___________ miles in 1 year, or

about ___540,000,000 ÷ 365 = 1,479 or about 1500 ________ miles in 1 day.

Sun light takes about 10 minutes to travel from the Sun to the Earth.

That is, light travels about _90,000,000 ___miles in 10 minutes, or

about ___90,000,000 ÷ 10 =9,000,000_____ miles in 1 minute, or

about ___9,000,000 ÷ 60 =150,000_______ miles in 1 second.

Actual values: radius Earth =3959 miles; distance Sun=92,960,000 miles; speed light =186,000 mps