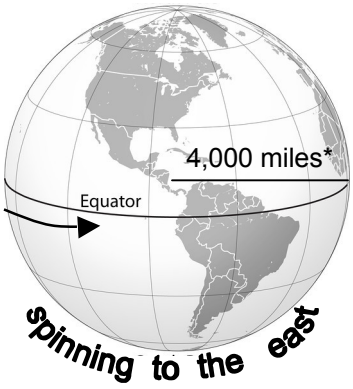
How Fast Are We Going???

Is it possible to be moving and standing still at the same time?



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.

$C = 2 \times \pi \times r$

$\text{rate} = \frac{\text{distance}}{\text{time}}$

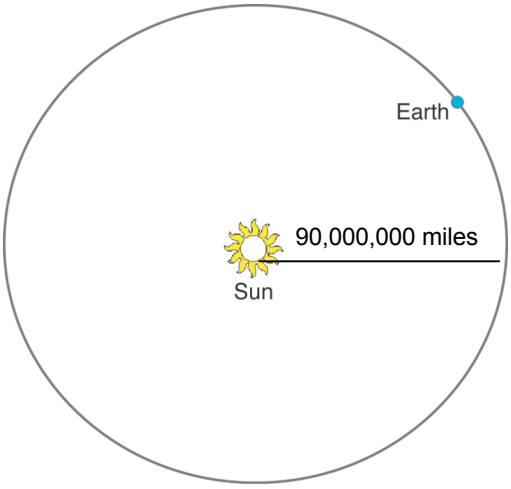
1 year = _____ days

1 day = _____ hours

1 hour = _____ minutes

A person standing at the equator moves about _____

miles in 24 hours, or about _____ miles in 1 hour.



Note: The orbit of the earth is really an oval, not a circle.

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.

1 minute = _____seconds

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

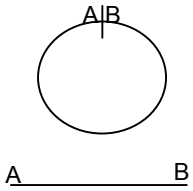
Opening question: Is it possible to be moving and not moving at the same time????? [yes, while riding in a car (or any vehicle)] [our classroom is moving and not moving at the same time]
How about all of us in this classroom, are we moving now?
[yes, we are spinning. how do you know we are spinning
we 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.

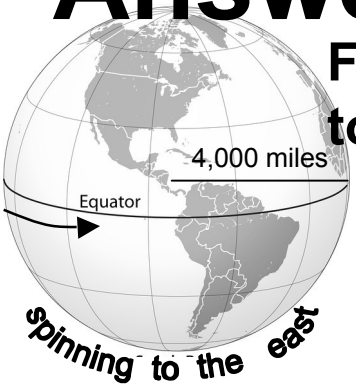
Start with left side and put in info about year, day, hours, and at bottom, seconds. Just work through handout one question at a time.

All answers are on separate page.

Answers

How Fast Are We Going???

For this worksheet, round off all numbers to get estimates.



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 x π x r or 2 x 3 x 4000 = 24,000_(use π = 3)____ miles.

The Earth spins once every ___24_____ hours.

$C = 2 \times \pi \times r$

$\text{rate} = \frac{\text{distance}}{\text{time}}$

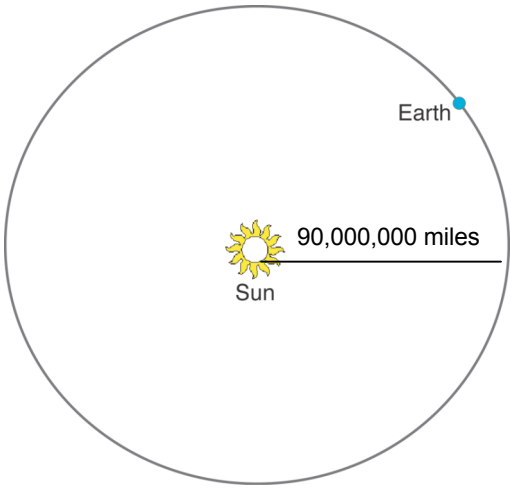
1 year = ___365__ days

1 day = __24__ hours

1 hour = ___60_ minutes

A person standing at the equator moves about _____24,000_____

miles in 24 hours, or about _____1,000_____ miles in 1 hour.



Note: The orbit of the earth is really an oval, not a circle.

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 x π x r or

____ 2 x 3 x 90,000,000 = 540,000,000___ 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.

1 minute = __60_seconds

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