A NEW RULER FOR SPACE MEASUREMENT
(An intro by instructor; students are encouraged to take notes to use to complete an upcoming worksheet.)

Light has been measured about 350 years ago to travel about 186,000 miles a second.<u>*</u> If the distance around the earth (its circumference) is approximately 30,000 miles and we could bend light to go around the earth, **about how many times around the earth would the speed of light go in one second?**

Group input sought at this time.

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Possible methods: Some see this is a simple division problem of how many times does 30000 "fit into" 186000? **Or one can set up a simple ratio and proportion to solve this.** That's about 6 times around the world in ONE second! This rate is 186000mi./1 sec and so the proportion to solve this would be x

$$\frac{186000\text{mi.}}{1 \text{ second}} = \frac{30{,}000\text{mi.}}{x \text{ seconds}} \quad X = \frac{186000}{30000} \quad X = \underline{\quad}$$

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In space distances are so long that a different unit of measurement was invented. It was called a LIGHT YEAR. **A Light Year is how far light would travel in one year**. How do we figure that out?

Here (below) are a few questions to discuss with students and prepare for the upcoming worksheet.

QUESTIONS ABOUT SECONDS IN TIME:

#1: How many seconds are in a minute? There are _____ seconds in a minute.

#2: How many minutes are in an hour? _____

How many seconds are in an hour? _____ (Show what you might put in a calculator—-bravo if you can do it by hand.)

_____

#3: How many hours are there in a whole day? (Day and night together) _____

How many seconds are in a day? _____
(Show work below or on your note page.)

#4 What's the *word name* for this number?
Example: the word name for 3, 374, 524 is <u>3 million, 374 thousand, 524</u>.

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#5: How many days are in a year?[1] _____ What is a year the measurement of? A year is the time it takes the earth _____

#6: How many seconds are there in a year? (Show what you would enter into a calculator. Check by estimation.)
actual numbers: _____
estimation: _____
There are _____ seconds in a year.

How do you say this number as a *word name*?
_____

FIGURE OUT HOW FAR A LIGHT YEAR IS. (This answer may use <u>scientific notation</u> if it doesn't fit into calculator.)

number of seconds in a year ---> _____
        multiplied by
distance light travels in a second --> _____

miles light travels in a year-> _____

Give the *word name* for this number:
——_____

ANSWERS FOR THIS PAGE: #1: 60 sec. #2: 60 and 3,600 #3: 24; #4: 86,400 #5: 365 #6: 31,536,000 sec. in a year.   There are approximately 5,878,000,000,000 **miles in one light year, read as 5 trillion,878 billion.**

Individual <u>worksheet</u>(s) on this concept and its <u>answers</u>. (For the instructor's reference)

BELOW: KEY VOCABULARY/ CONCEPTS.

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[1] More accurately there are 365.25 days in a year, the time it takes earth to orbit the sun. (discuss leap year)

VOCABULARY, CONCEPTS, AND BASIC FACTS STUDENTS SHOULD KNOW.

A second. Approximate time it takes to say "one thousand one"

Seconds in a minute: 60

Minutes in an hour: 60

Hours in a day: 24

How do we get a day: the time it takes the earth to rotate (spin) on its axis

Days in a year: 365….more exactly 365.25. Every 4 years (called a Leap Year) we get an extra day and so have to add one as February 29.

Ratio: is a "an ordered pair of numbers a and b, written a / b where b does not equal 0"

A Proportion: when two ratios are equal, a useful tool in solving problems.

Scientific Notation: A simple way of writing and working with large numbers familiar, and a topic most pre-algebra, algebra students are familiar with. Involves the use exponents.

ADDITIONAL NOTES FOR POSSIBLE DISCUSSION: Medium-distanced stars are 2000 light years from earth. That's 2000 x the distance in a light year. The light of those stars started out 2000 years ago and are just arriving for us to see. We are viewing something 2000 years old! The star could have exploded 10 years ago (earth time), and we would never know for another 1990 years that it was gone. Stars are really very "far out"!

"Because of its great scale, the light year is one of the units of distance used for astronomical objects. For example, Andromeda Galaxy, which is the nearest spiral galaxy from the Milky Way, is approximately 2.5 million light years away. Alpha Centauri, the nearest star system from our own Solar System is only 4.37 light years away."
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