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# Counting the Years

People have been numbering and counting since ancient times. Counting days is mentioned in the first chapter of Genesis: “And there was evening, and there was morning — the first day.” The seven days of the creation week are counted in Genesis 1:5–2:2.

For measuring time, people in the ancient world needed an event that repeated itself exactly. It also had to be clearly visible. The sun made a perfect choice for measuring time. Its motion followed a regular path in the sky that anyone could track. The sun rose, wheeled across the sky, and set. Then after a period of darkness it rose again. The time from sunrise to sunrise made one day.

Although people followed the sun to count days, the motion of the sun that they saw was actually due to the earth spinning on its axis. The sun did not go around the

## PROBLEMS

1. How can time be measured without a clock or calendar?
2. How did farmers know the best time to plant and harvest crops?
3. How did 11 days vanish?

*Can You Propose Solutions?*



*The earth spins on its axis; each complete rotation takes one day.*

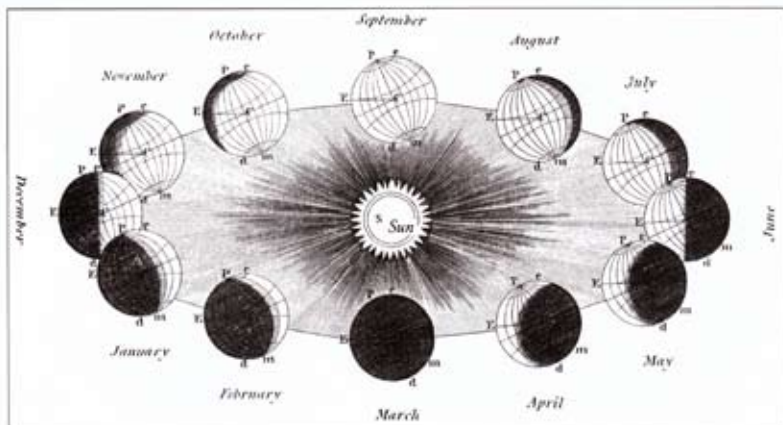
earth. Instead, the earth rotated on its axis like a top. The sun appeared to move. The time for the earth to make a complete spin gave the sun the apparent motion that marked the passage of one day.

Keeping track of time by days can become cumbersome. Except for small babies, listing a person's age in days gives rise to large numbers. How old is a student who is 4,380

days old? A year is 365 days (for simplification, don't include leap years), so divide 4,380 days by 365 days per year to change days to years. A student who is 4,380 days old is 12 years old:  $4,380 \text{ days} \div 365 \text{ days per year} = 12 \text{ years}$ . A person who has lived to be 72 years old would be 26,280 days old:  $72 \text{ years} \times 365 \text{ days per year} = 26,280 \text{ days}$ .

Ancient people quickly saw that the moon could be a celestial timekeeper. The moon passed from a particular phase, such as full moon, back to the same phase in about 29.5 days. The word month comes from the word moon.

A month was convenient for measuring longer periods of time. The United States and Canada have four distinct seasons: winter, spring, summer, and autumn. The time from one season to the next was about three moons, or three months. People could also plan events for those nights when the moon was full. The harvest moon was the full moon falling closest to the first day of autumn (about September 21). It gave farmers light to gather crops at night.



*The earth's orbit around the sun and the tilt of the axis create the seasons and the imaginary lines of the equator and the tropics. Each complete revolution takes one year.*

(From George Adams *Astronomical and Geographical Essays*, London 1795)



**E X P L O R I N G**

# THE WORLD OF MATHEMATICS

**N**umbers surround us. Just try to make it through a day without using any. It's impossible: telephone numbers, calendars, volume settings, shoe sizes, speed limits, weights, street numbers, microwave timers, TV channels, and the list goes on and on. The many advancements and branches of mathematics were developed through the centuries as people encountered problems and relied upon math to solve them. For instance:

- What timely invention was tampered with by the Caesars and almost perfected by a pope?
- Why did ten days vanish in September of 1752?
- How did Queen Victoria shorten the Sunday sermons at chapel?
- What important invention caused the world to be divided into time zones?
- What simple math problem caused the Mars Climate Orbiter to burn up in the Martian atmosphere?
- What common unit of measurement was originally based on the distance from the equator to the North Pole?
- Does water always boil at  $212^{\circ}$  Fahrenheit?
- What do Da Vinci's *Last Supper* and the Parthenon have in common?
- Why is a computer glitch called a "bug"?

It's amazing how ten simple digits can be used in an endless number of ways to benefit man. The development of these ten digits and their many uses is the fascinating story you hold in your hands: *Exploring the World of Mathematics*.

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