

## **\*\*Time Articles\*\***

### **1. Years Article**

The earth travels around the sun every 365.242199 days, or what we call a “solar year.” The ancient Romans devised the Julian calendar that lasted 365.25 February, 365 days, but the solar year is eleven minutes and fourteen seconds shorter. This slight difference added up over time.

By 1582, the Julian calendar was ten days behind the solar calendar. Most western nations began using the Gregorian calendar, named for Pope Gregory XIII. The Gregorian Calendar synchronized the calendar year with the solar year by skipping the next ten days. The day after October 4, 1582 was October 15, 1582. The governments of England and its American colonies did not follow the teachings of the pope, so they did not adjust to the Gregorian calendar until 1752. By this time, the Gregorian calendar was twelve days ahead of the Julian calendar.

Most of our calendar years last 365 days, but every four or eight years we add one day to February. February usually has only 28 days, but the month lasts a day longer in what we call “leap years.” Years divisible by four are usually leap years. The last four leap years were 2008, 2004, 2000, and 1996. Our next leap year will be 2012. Adding a leap year every four years would make the calendar year last 365.25 days, and the solar year is .007801 of a day shorter, so we have to make further changes. Centennial years are years that end in 00. Centennial years are not leap years unless they are divisible by 400. This means that 1700, 1800, and 1900 were not leap years, but 2000 was. The next time someone says that there are 365 days in a year; you’ll have a lot of corrections to offer!

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### **2. Time Zones Article**

Days and nights occur because the earth spins on an axis. The sun illuminates approximately half of the earth’s surface, but since the earth is constantly turning, we divide the earth into twenty-four time zones; one for each hour of the day. Some time zone boundaries zigzag so that people living in one region or country can have the same time.

Until the nineteenth century, each city kept local time. Clocks were not often very accurate, but they could be synchronized, or matched, with a sundial. Railroad engineers created the first time zones in Great Britain. Railroad would use the same tracks to send trains in different directions so an inaccurate clock could cause a disaster. A Canadian named Sanford Fleming first proposed the idea of universal time zones; by 1900, most nations began to use what became known as “standard time.”

The time along the prime meridian in Greenwich, England, is known as Greenwich Mean Time, or GMT. People communicating across two different parts of the globe often use Greenwich Mean Time. The east coast of the United States is five time zones behind GMT, so if it is midnight in Greenwich it is 7:00 p.m. in Florida. Most of the United States sets their clocks ahead one hour in the summer, so during Daylight Saving Time the east coast of the United States is four hours behind Greenwich Mean Time.

There are four time zones in the continental United States. The continental United States refers to the forty-eight contiguous states and does not include Alaska or Hawaii. The time zones are Eastern, Central, Mountain, and Pacific. You might notice that live television programs often begin at 8:00 Eastern, 7:00 Central, 6:00 Mountain and 5:00 Pacific. Alaska is an hour behind Pacific Time and Hawaii is two hours behind Pacific Time.

For convenience, almost all of Alaska uses a single time zone. During the period when Daylight Saving Time is not in use, the sun is overhead at about noon in Alaska’s capital, Juneau. Juneau is in the eastern portion of Alaska. Nome is in western Alaska, and while Nome has the same time zone as Juneau, the sun is directly overhead as late as 3:08 p.m.

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**Turn Page Over for Articles 3 and 4**

### 3. Daylight Saving Time Article

Most western nations advance the clock ahead one hour during the summer months. We call this period Daylight Saving Time. Benjamin Franklin originally suggested the idea. He wanted to take advantage of the additional daylight time in the summer when many people were sleeping.

The United States temporarily adopted Daylight Saving Time in 1918. America was fighting World War I, and American leaders concluded that the additional hour of daylight would save fuel needed for the war effort. The war ended, so the national experiment lasted only one year, but many states continued to observe Daylight Saving Time on their own. Congress set the clocks ahead again in 1942 during the Second World War and again during an energy shortage in 1973.

In addition to energy savings, many retail business owners favor Daylight Saving Time because it allows more daylight hours for shopping. There is also some evidence that suggests that additional daylight contributes to fewer automobile accidents and a decrease in violent crime.

In the United States, every state but Hawaii and Arizona observes Daylight Saving Time from the second Sunday in March to the first Sunday in November. Hawaii is closer to the equator than the other states, and since the amount of daylight does not vary much, the Hawaiians feel Daylight Saving Time is unnecessary. Summer temperatures in Arizona often reach 100°, so lawmakers in the Grand Canyon State decided it would be better to end the day early so Arizonans could enjoy an extra hour of cooler evening weather in the summer.

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### 4. Measuring Time (Bonus Reading)

It is now possible to buy a watch or clock that synchronizes itself with the United States Naval Observatory. More than fifty clocks at the Naval Observatory measure the frequency emitted by atoms of the metallic element cesium. These atomic clocks are accurate to within one second every 1,400,000 years. In fact, our ability to measure time is more accurate than the stability of the earth. Scientists from the International Earth Rotation and Reference Systems Service add a “leap second” to the clock in many years because ocean tides are causing the earth to turn slightly slower.

Humankind first measured the time of the day with sundials, but sundials were usable only on sunny days. In ancient Rome, lawyers would be scheduled to speak in the Forum ante medium-before the sun reaches its highest point, or post medium-after the sun reaches its highest point. Today the abbreviations a.m. and p.m. reflect this practice.

The first mechanical clocks in Europe had no numbers. Most people could not read, and technology to create a clock face was not initially in place. Clocks would count out the hour by ringing a large bell high in a tower. The term o'clock is a contraction for “of the clock.”

The Romans borrowed the seven-day week from the Hebrews. The week is associated with the Old Testament, where God created the world in six days and rested on the seventh. The Romans once had an eight-day week, but shortened their week when they adopted Christianity.

Our months correspond with the phases of the moon. A full moon occurs every 27 days, but in time we have adjusted the calendar in order make twelve months equal to the solar year.

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Name: \_\_\_\_\_ Date: \_\_\_\_\_ Period: \_\_\_\_\_

## Time Reading Activity

**Directions:** Fill in the blanks (several have the first letter as a hint). Answer the short answer questions based on information from the articles.

### 1. Years Article

A **s** \_\_\_\_\_ year lasts 365.242199 days, but the **R** \_\_\_\_\_ created a calendar that lasted 365.25 days. We began using the **G** \_\_\_\_\_ calendar \* \_\_\_\_\_ years ago. The Gregorian calendar **s** \_\_\_\_\_ the **s** \_\_\_\_\_ year with the **c** \_\_\_\_\_ year. Most years **d** \_\_\_\_\_ by **f** \_\_\_\_\_ are **l** \_\_\_\_\_ years, where an extra **d** \_\_\_\_\_ is added after February \_\_\_\_\_.

(A). From the list below, circle the leap years in the Gregorian calendar. Five are leap years and five are not.

2000   2006   2008   2010   2012   2013   2014   2015   2016   2020

(B). Why does the Gregorian calendar have leap years?

### 2. Time Zones Article

Time **c** \_\_\_\_\_ as you move **e** \_\_\_\_\_ and **w** \_\_\_\_\_, so we **d** \_\_\_\_\_ the earth into twenty-four time **z** \_\_\_\_\_. The Time along the Prime Meridian is called **G** \_\_\_\_\_ Mean **T** \_\_\_\_\_. It is also called “universal” time because people communicating across different **p** \_\_\_\_\_ of the **g** \_\_\_\_\_ use Greenwich Mean Time to synchronize the schedules. The time zones in the continental United States are **E** \_\_\_\_\_, Central, **M** \_\_\_\_\_, and **P** \_\_\_\_\_.

(A). If it is midnight in Greenwich, England, about what time is it along most of the International Date Line? What time is it in Florida? (Use the map on page 30 in your textbook for extra help!)

(B). Describe how life would be different if we all used a single time zone.

### 3. Daylight Saving Time

Most of the United States move the **c**\_\_\_\_\_ ahead one **h**\_\_\_\_\_ from the **s**\_\_\_\_\_ Sunday in **M**\_\_\_\_\_ to the first **S**\_\_\_\_\_ in **N**\_\_\_\_\_. The idea of “**D**\_\_\_\_\_ Saving **T**\_\_\_\_\_” was originally proposed by **B**\_\_\_\_\_ Franklin, but was not put into practice until the **\*t\_e\_t\_e\_h** century. Today every state but **H**\_\_\_\_\_ and **A\_i\_o\_a**, observes Daylight **S**\_\_\_\_\_ Time.”

(A). Do you think it a good or a bad idea to adopt Daylight Saving Time. Defend your answer.

**\*\*BONUS\*\***

### 4. Measuring Time

We now have the ability to measure **t**\_\_\_\_\_ to within one **s**\_\_\_\_\_ every 1.4 **\*m**\_\_\_\_\_ years, but **\*c**\_\_\_\_\_ have not always been that **\*a**\_\_\_\_\_. Humankind first measured the hour of the day with **s**\_\_\_\_\_, but a sundial was impractical at **n**\_\_\_\_\_ or on **\*c\_o\_dy** days. Europe’s first **m\_c\_a\_i\_a\_l** clocks used **b**\_\_\_\_\_ in place of a **d**\_\_\_\_\_ because most people could not **r**\_\_\_\_\_.

Our seven-day **w**\_\_\_\_\_ came from the **R**\_\_\_\_\_, who borrowed it from the **H**\_\_\_\_\_. Our twelve **m**\_\_\_\_\_ correspond with the **p**\_\_\_\_\_ of the **m**\_\_\_\_\_, but we have added days to the months so that a cycle of twelve months is equal to a solar year.

(A). Give an example from modern society that demonstrates how we rely on knowing the exact time.

(B). What do a.m. and p.m. mean? What do the terms translate to in English?