

Milestone: Keeping Time: Homework 6

Due: 16 October 2020

Many of these questions are based on material that can be found in chapters 11 and 12 of *Time's Pendulum* by Barnett. Additional information can be found in chapter 12 of *From Sundials to Atomic Clocks* by Jespersen.

1 Standardizing time in England

Prior to 1840 in England, cities and towns generally used local time. This means that the clocks in any city were set, checked and reset according to when noon occurred (Sun at its highest in the day) in that city. The proliferation of local times became increasingly problematic during by 1840.

- a) Write a paragraph explaining why this system of timekeeping would not have been problematic before 1800 and why it became problematic by 1840.
- b) Write a paragraph explaining how time in England came to be standardized by 1848. Your paragraph should address which entities or people were central to the push for standardized time in England.

2 Standardizing time in the United States

As in England, by the early 19th century, cities and towns in the United States also set their clocks using local time. The process of arriving at standardized time in the United States was slightly different.

- a) There is a fundamental difference between the United States and England that makes time standardization more complicated in the United States than in England. Briefly describe what this fundamental difference is and why it creates additional complications in the United States.
- b) In the United States as in England the railways were partly responsible for the push for standardizing time. Who else was also instrumental in the push to create a standardized time system in the United States?
- c) Briefly explain why it might have been difficult to simply decree a particular standard time in the United States in the 19th century.

3 Communicating standard time

Checking and maintaining standard time used to require very accurate observations of the stars and the Sun and this could only be done at a good observatory. Thus a few observatories became timekeepers.

- a) Briefly describe how the observatories communicated the time to various cities and towns in the 19th century.

- b) Briefly explain whether this standard time was available for free.

4 Standardized time in the United States

Currently in the United States we use a system of standard time that involves four time zones in the contiguous United States.

- a) In your usual daily activities do you need to know the time in states in other time zones (e.g. New York, Illinois, Texas, California)?
- b) Are there times where it is useful for you to know the time in a state in a different time zone? Explain what these are or might be.
- c) Suppose that there was not a system of four time zones and each state used its own standard time and thus had its own time zone. Suppose that these were based on the longitude of the state capital. Roughly how many time zones would the US have in this case? Explain how this might create complications in your life.

5 “Natural” system of time

For at least the last 100 years the United States has officially had a system of standardized time. Before about 1850 the United States mostly used local times. Which seems more “natural” and comfortable to you? Why? Explain which would have seemed more natural to someone living in the United States in 1800.

6 Standardized time around the world

The International Meridian Conference of 1884 recommended the use of time zones based on the Greenwich meridian and Greenwich Mean Times.

- a) Which countries already used standard time based on this system in 1884?
- b) Did all countries that existed at the time adopt this system within 20 years?

Most countries use standard time that is offset (differs) by a whole number of hours from Greenwich Mean Time. There are some which are offset by half and quarter hours. The technical term for this system of time is Coordinated Universal Time (UTC) and the particular time offsets are called UTC time offsets. Information about this can be found on Wikipedia.

- c) List two or three countries whose time offset is not a whole number.
- d) Search Wikipedia or another source for historical time offsets that are not a whole number of hours, half hours or quarter hours. Describe one of these.