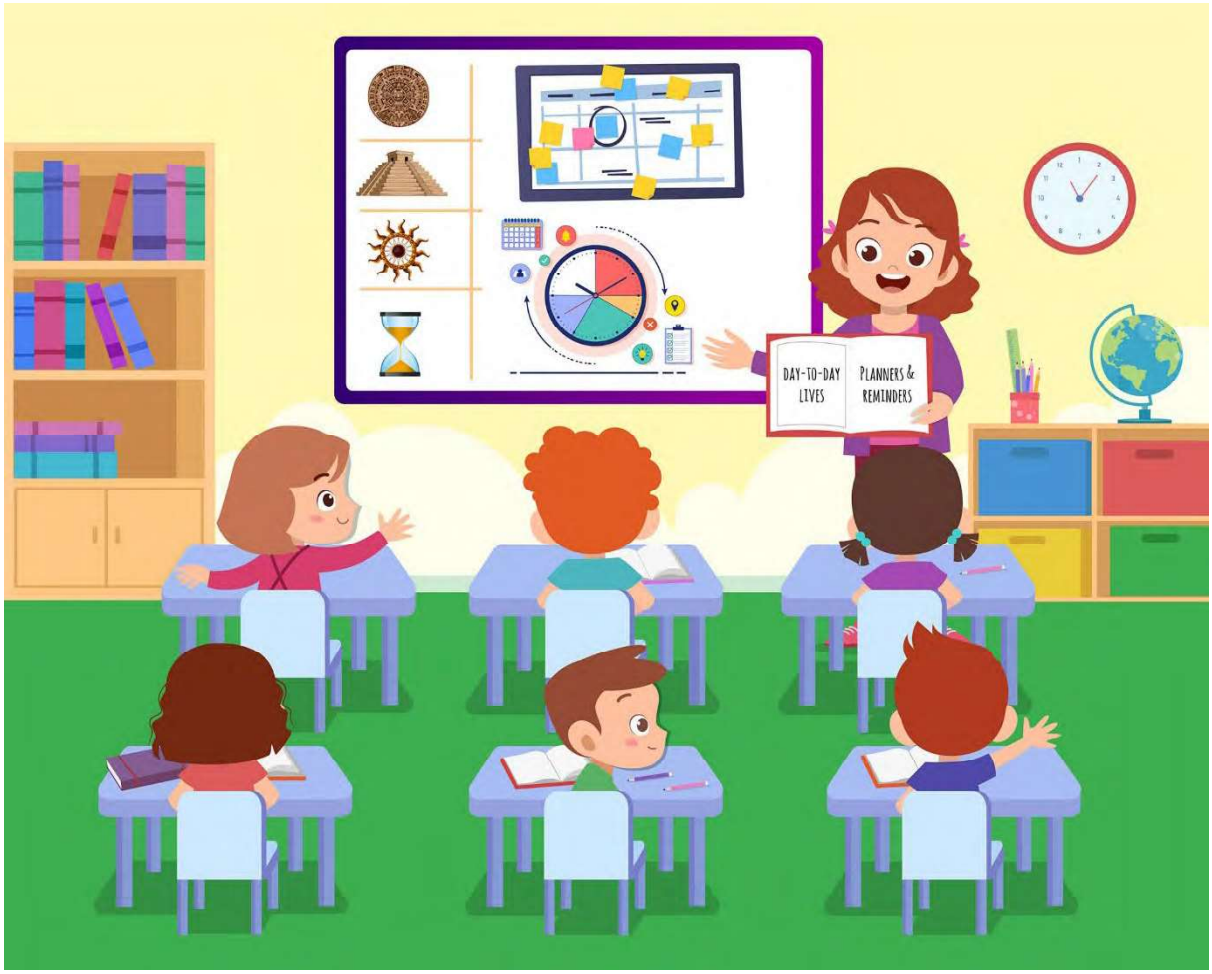
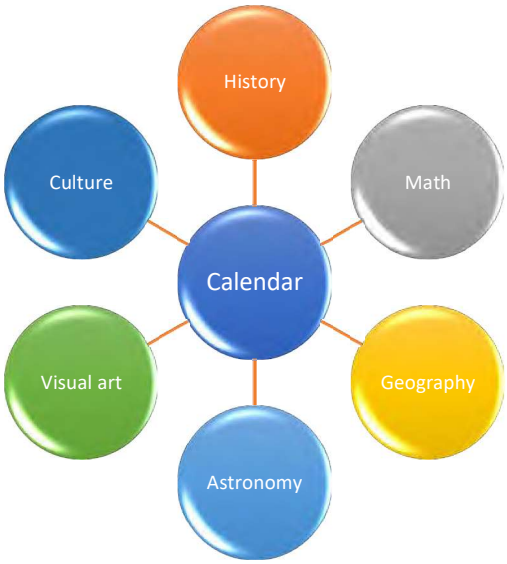
A tool to measure time: Introducing students to the calendar

~ Sujata C



You will find it hanging on the wall or sitting on the table. The ubiquitous calendar is present in every office, every shop, every establishment and every home. It not only tells us the day and date of every month, but also serves as a useful notepad to scribble reminders and make notes of important day-to-day events. Planners, organisers and diaries are often the collaterals that go along with the calendar. Learning opportunities from the calendar are many and cut across disciplines: history, visual art, mathematics, storytelling, culture, astronomy, geography and so on.



The calendar is a measure of time to keep track of the days, weeks and months that make up a year. To the curious mind, the first question that strikes when looking at a calendar is: *Why are there seven days in a week and thirty days in a month?* Help your students discover how the movement of the sun and the moon shape our lives. The astronomical events of sun rising and setting, moon waxing and waning, helped ancient man to keep track of days, weeks and months. The days of the week are named after the astronomical bodies. It is possible that in ancient times only five planets might have been identified and hence the five days together with the sun and moon made up a week.

The history of calendars is ancient and diverse. Each part of the world developed its own methods of keeping track of the movement of planets and stars, and hence of the passage of time. There are different types of calendars that evolved and developed in different parts of the world at various points in history. Students can research and explore the evolution of the various calendars of the world: Julian, Gregorian and many others along with religious calendars like Hindu *Panchang*, Islamic, Hebrew, Zoroastrian, Christian, etc.

The Chinese/Eastern Calendar

Mayan Calendar

It might pose a good opportunity to explore the Mayan calendar and the controversy that the world was supposed to end on December 21, 2012 because the Mayan calendar ended there. It is difficult to ignore this matter, especially with the hype about the doomsday scenario. It pushed some people to the brink and while others made a quick buck by cashing in on the fears of the people.

The Hindu calendar is nearly 5000 years old and finds its roots in the works of astronomer, Aryabhatta with details of the planetary positions, units of time, days of week, names of months, including leap months in verses. The scholar also explains the reason behind a month having a certain number of days. Here one can recollect the old English ditty which is used to help remember how many days each month has.

Thirty days of September,
April, June and November,
All the rest have 31,
February alone has 28.

The idea behind 'Common Era' (CE) earlier called *Anno Domini* and 'Before Common Era' (BCE) previously referred to as *Before Christ* can be explored in class along with students, making history come alive in class. Explain the three concepts of "Lunar", "Solar" and "Lunisolar" that are used to make calendars, and why in North India, the lunar month begins with the full moon while it is with the *amavasya* (the lunar phase of the new moon in Sanskrit) in South India.

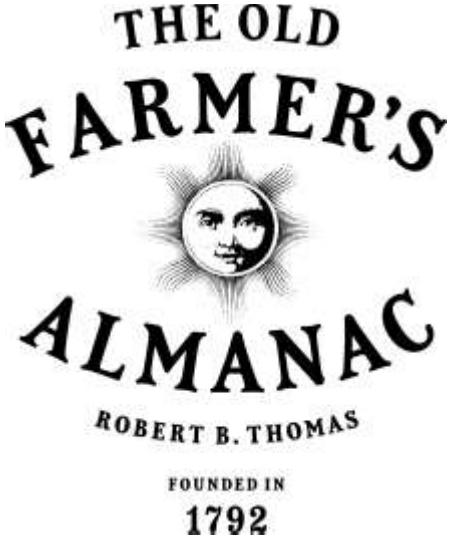
Other types of calendars: While we follow the calendar year that starts with the month of January, the financial calendar followed by governments and business houses to calculate budgets, profits and losses and tax to be paid begins on April 1 and ends on March 31. While there are many speculations as to why the financial year or 'fiscal year' begins from April, till date no one has been able to find the exact reason. Some say it is an inheritance from British rule, while others say it corresponds with the Hindu New Year, and yet others believe that it is linked to agricultural seasons.

Fisherman's calendar

How does a fisherman know whether he will come back home with a good catch when he sets out to sea every morning? The answer lies in the position of the sun and the phase of the moon, so to speak. This calendar gives the best time and place to find the catch.

Farmer's almanac

The farmers need a guide to help them plan their activities. The farmer's almanac forecasts the major seasons that are important for farmers – sowing, growing, ripening, harvesting, etc. This is an ancient concept and the Old Farmer's Almanac (an American publication) is 228 years old and still in print.



Source: https://commons.wikimedia.org/wiki/File:Old_Farmer%27s_Almanac_logo.svg

Cultural identity through calendars: Calendars have a history to lend a cultural identity to a population. Religious figures are quite popular in calendars. The reason behind it may be unravelled through the concept of time, and the human need of believers to seek divine blessings as they look to the calendar to make appointments, start a journey, or plan an event. Popular as it may seem, calendar art is part of curriculum of "Visual Art Studies". Landscape paintings, sunrise and sunset scenery used to be the most popular calendar art once upon a time, and as the decades advanced calendar art has also become modern and contemporary.

Mathematics in calendars: The dates of each month on a calendar lend themselves to whole lot of fun mathematics. By exploring the patterns in the arrangement of the numbers 1 to 30/31, students can discover the fun in mathematics and develop a liking for the subject. The calendar is full of magic squares and rectangles as explained by P K Srinivasan in his booklet **Number**

fun in calendars. For instance, there are sequences of numbers vertically, horizontally and diagonally. Rows run horizontally while columns run vertically, and these can be used to help students discover how the mean of a sequence of numbers is the middle number in that line.

$$1+2+3+4+5+6+7 = 28$$

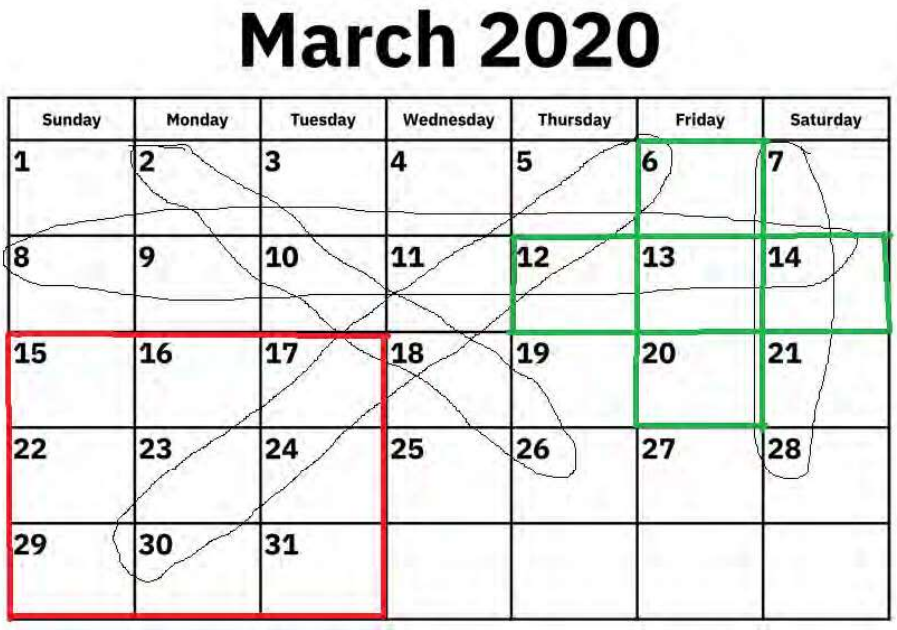
Divide the sum by the number of digits, i.e., 7.

$$28/7 = 4$$

The quotient is 4 which is the middle number in that sequence.

Similarly, this can be used in class with all the sequence of numbers in one month.

Below is the calendar sheet of March. On studying the marked sequences, students may discover that some sequences have only four numbers, so what is the mean number in such cases. The lesson can proceed through questioning, discovering and learning.



The idea of arithmetic progression can be easily explained through a calendar. In a row, the numbers increase by one, and in a column, they increase by seven. Senior students can explore and solve the star puzzles, cross puzzles and magic squares that can be found in calendars. Studying numbers in this manner could kindle further interest and children might want to delve deeper, so help them along on their journey.

To wrap up the project on calendars you could explain the fascinating concepts behind perpetual calendar and its history. Who would have known that calendars could prove such a useful tool to help students grasp various concepts – whether it is mathematical ideas, or historical events and their representation, socio-cultural practices and so on? Teachers can also help students understand that while a calendar does bring a degree of order to life, it should not become a straitjacket that takes away the magic of life.

Source: *https://commons.wikimedia.org/wiki/File:50yearcalendar.JPG*

Sujata C is a writer and editor with more than thirty years of experience. She writes on children, food, environment, society, as well as technology. She has also been a copywriter with advertising agencies for over fifteen years.

Lesson Plan: Introducing calendar as a tool for measuring time in class

~ *Sujata C*

Some activities possible through a calendar to keep the class engaged have been explained in the main article. Here are a few additional activities that can be assigned to the class.

1. Ask students to find the origin of the word *calendar*.
2. *Then and Now*: Make them prepare a presentation on themes like, *modern and old pictures of the city you live in*.
3. Help students learn story behind the names of the months.
4. Encourage them to explore personality traits related to each month.
5. Why does February have only 28 days?
6. Assign them to make a moon calendar, depicting the various phases of the moon.
7. Set an assignment to find names of months in the Hindu/Islamic /other calendars.
8. Ask students to write an essay on the topic, *why dates of Hindu festivals change every year?* OR *Why do some festivals like Pongal and Tamil New Year fall on the same day every year?*
9. Refer to the book by P K Srinivasan, *Number Fun with a Calendar* for many more mathematical activities.
10. Craft work: Make students who are artistically inclined to create a silhouette painting of the *Four Seasons* and fix it on a calendar.
11. Every full moon has a name. Ask students to find out more on this and create a chart.

12. Creative writing: Seasons switch when we go from the North hemisphere to the South hemisphere. Help students explore the peculiarity of experiencing winter in May and summer in December through an essay or poem.
13. Ask the class to look for any poems or sayings about the Hindu/ Islamic calendar months in their mother tongue by talking to the elder family members.
14. Prepare a powerpoint presentation on the evolution of calendar art.

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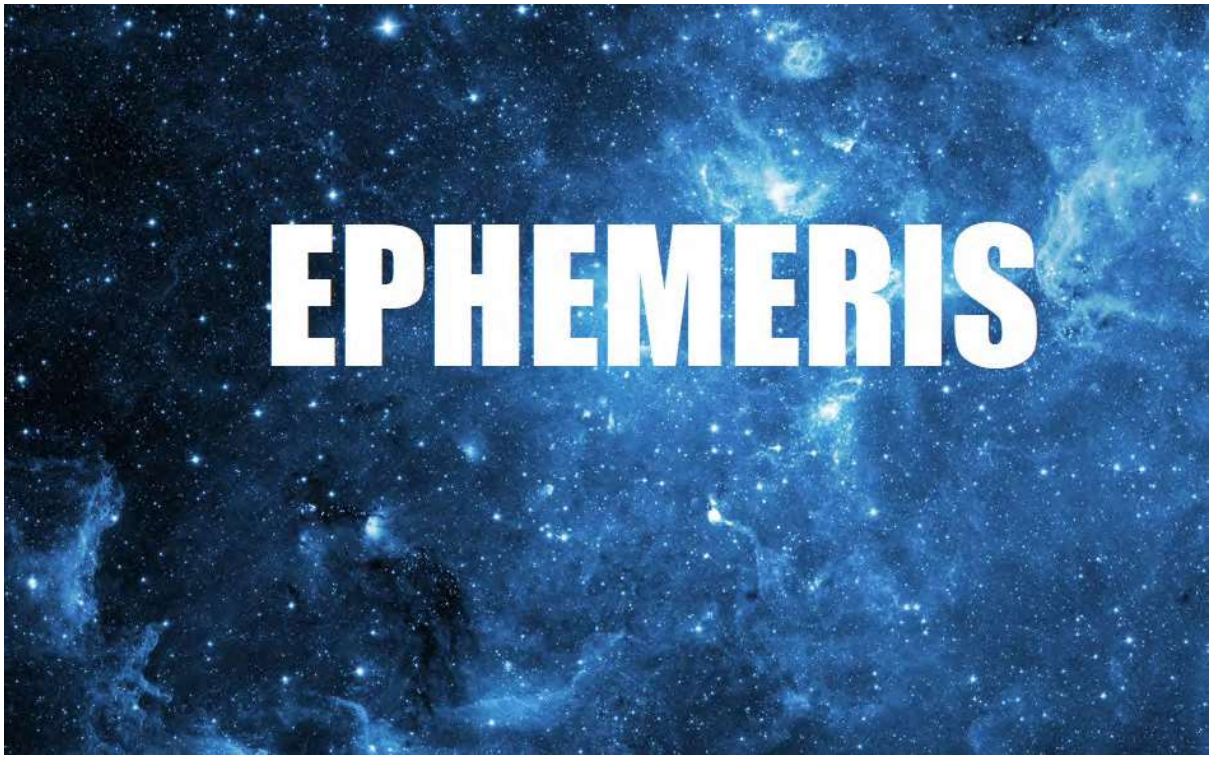
Ephemeris (noun)



Pronunciation: /ɪˈfiːm(ə)rɪs/

Plural: Ephemerides

Meaning: A table or data file giving the calculated positions of a celestial object at regular intervals throughout a period.

Origin and additional information: The word originates in the 16th century from Greek “ephēmeros” (meaning, lasting only a day). Ephemerides were constructed as early as the 4th century BC and are still essential today to astronomers and navigators. Up until the 20th century, tables of logarithms used to be the chief tools and aid for such computation. Gradually with the introduction and development of electronic calculators and computers, calculating the ephemerides have become faster and more accurate.

Word section: Across the world, several ephemerides are published regularly, but the earliest one was begun by German astronomer, Johannes Kepler in 1617. The *Connaissance des temps*, first founded in Paris in 1679, was a direct

successor of Kepler's version. Soon Britain and the USA entered the scenario with the publication of *Nautical Almanac and Astronomical Ephemeris* (1766) and *The American Ephemeris and Nautical Almanac* (1852) respectively. Since 1960, to avoid duplication of costs, the two almanacs have been unified and renamed as *The Astronomical Ephemeris*.

Usage:

1. *The GPS position solution can be improved by using a better satellite ephemeris.*
   (Source: https://www.lexico.com/definition/ephemeris)

2. *The navigation message contains the satellite ephemeris, which is a numerical model of the satellite's orbit.*
   (Source: https://www.lexico.com/definition/ephemeris)

3. *Global networks of tracking stations produce the observations that make generation of the precise ephemerides possible.*
   (Source: https://www.lexico.com/definition/ephemeris)