

5

Time

After studying this chapter you will be able to,

- ★ identify a leap year
- ★ identify a century or one hundred years
- ★ add and subtract of units of time.

Month	Jan:	Feb:	Mar:	Apr:	May:	Jun:	Jul:	Aug:	Sep:	Oct:	Nov:	Dec:
Number of days of each month	Year 2001											
	31	28	31	30	31	30	31	31	30	31	30	31
	Year 2002											
	31	28	31	30	31	30	31	31	30	31	30	31
	Year 2003											
	31	28	31	30	31	30	31	31	30	31	30	31
	Year 2004											
	31	29	31	30	31	30	31	31	30	31	30	31
	Year 2005											
	31	28	31	30	31	30	31	31	30	31	30	31
Year 2007												
31	28	31	30	31	30	31	31	30	31	30	31	

5.1 A Leap year

Observe how many days there are for each month according to the calendars of years 2004 and 2007 given on the next page. Now find the total number of days for the years 2004 and 2007.

Here you will understand clearly that the number of days for the year 2004 is 366 and the number of days for the year 2007 is 365.

Accordingly which is the month that has had an extra day in the year 2004?

M	2	9	16	23	
Tu	3	10	17	24	
W	4	11	18	25	
Th	5	12	19	26	
F	6	13	20	27	
S	7	14	21	28	
Su	1	8	15	22	29

M	5	12	19	26
Tu	6	13	20	27
W	7	14	21	28
Th	1	8	15	22
F	2	9	16	23
S	3	10	17	24
Su	4	11	18	25

The above are calendars of months of February of the years 2004 and 2007. So it is clear that there are 29 days for the month of February of the year 2004 and only 28 days for the month of February of the year 2007.

Activity 5.1

Collect calendars of past 10 years from year 2007 and fill in the blanks of the table given below.

Using the table, answer the given questions.

Year	Number of days in February	Total number of days for the year
1998		
1999		
2000		
2001		
2002		
2003		
2004		
2005		
2006		
2007		

- 1) Are there 366 days for each year?
- 2) Are there 29 days for the month of February of each year?
- 3) Will there be 366 days for those years, when the month of February has 29 days?
- 4) How do you name the years in which the number of days for February is 29?

The Earth takes one day or 24 hours to rotate once on its own axis. While rotating as mentioned above it takes one solar year or 365 days, 5 hours, 48 minutes and $47 \frac{1}{2}$ seconds to revolve around the sun. When the number of days for an year is considered as 365 days the above mentioned time is more than one year. When this extra time is multiplied by 4, the answer is approximately equal to 24 hours.

Due to this reason, once in four years, one day is added to a year. So it has 366 days. Such an year is called a "leap year".

This extra day is added to the month of February. Therefore there are 29 days for the month of February in a leap year.

As discussed earlier in this lesson, there were 29 days for the month of February in the year 2004. Hence it was a leap year.

If the number which indicates a year, can be divided by 4 without a remainder, then that year is a leap year.

Also years like 2000, 2100, which are multiples of 100, will be leap years only if they are divisible by 400 without a remainder.

Example 1

Is the year 2004 a leap year? Recollect how to find numbers which are divisible by 4 which you learnt under divisibility, in the lesson Factors and Multiples. Accordingly 2004 is a number divisible by 4. Hence 2004 is a leap year.

Example 2

Is the year 2007 a leap year ?

Example 3

Is the year 1800 a leap year?

The number 1800 is a multiple of 100. So we must investigate whether it is divisible by 400 without a remainder. 1800 is not divisible by 400. So it is not a leap year.

Exercise 5.1

- (1) Select leap years from the list of years given below.
2012, 1900, 1990, 1992, 1996
- (2) Write down the number of days of the month of February in each year of the list given below.
2010, 1800, 1804, 2500, 2512, 2000
- (3) Nimal was born in January 1993. Since then he has celebrated his birthday every year. During how many leap years had he celebrated his birthday by the year 2008?

Do you know ?

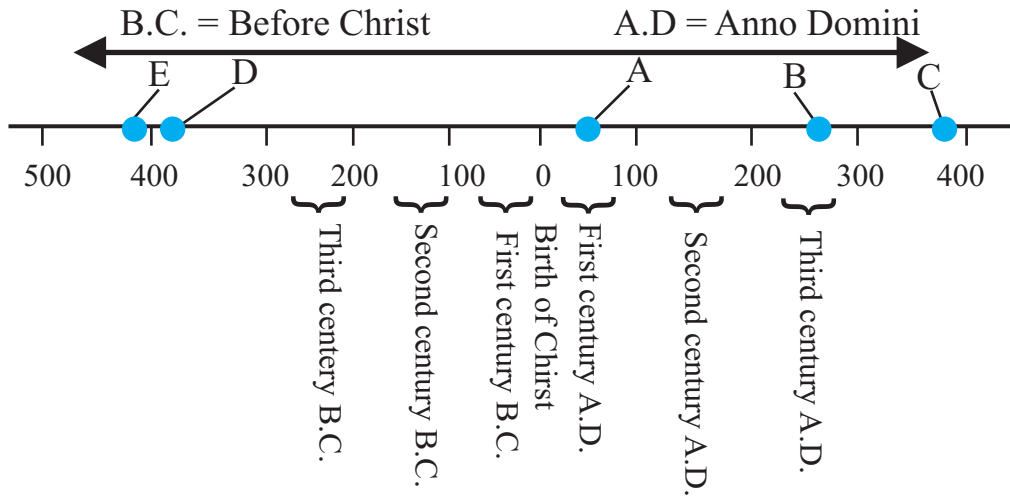
If it is counted correctly, there are only 97 leap years for every 400 years. Therefore in every 400 years, the first 3 years which are multiples of 100, are not leap years. The reason for that is the reduced amount of time as indicated above.

5.2 A Century or one hundred years

A period of 100 years is called a century or one hundred years.

As we do not know exactly the commencement or termination of time, the year of birth or the year of passing away of religious leaders has been used as a starting point for measuring periods of time in the world.

Observe the given number line which is scaled with multiples of 100 and answer the questions on the next page.



The above letters A, B, C, D, and E indicate years as shown below.
 Fill in the blanks of the sentences writing to which century each belongs.

- (1) A - The year 50 A.D. belongs to thecentury A.D.
- (2) B - The year 260 A.D. belongs to thecentury A.D.
- (3) C - The year 390 A.D. belongs to thecentury A.D.
- (4) D - The year 390 B.C. belongs to thecentury B.C.
- (5) E - The year 410 B.C. belongs to thecentury B.C.
- (6) The year 1910 A.D. belongs to thecentury A.D.

Years from 0001, 0002, ..., 0099, A.D. upto 0100 belong to the first century.
 Years from 0101, 0102, ..., 0199, A.D. upto 0200 belong to the second century.
 Years from 1901, 1902, ..., 1999, A.D. upto 2000 belong to the twentieth century.
 Years from 2001, 2002, ..., 2099, A.D. upto 2100 belong to the twenty first century.

Accordingly 2007 A.D. belongs to the 21st century.

The period of time from 00 00hr of 01st January of 2001 A.D upto 2400hr of 31st December of 2100 A.D. is regarded as the 21st century.

Example 4

Write down, the centuries to which the year 2000 A.D. and the year 2001 A.D. belong.

You can find these easily by recollecting the number line.

$$2000 \div 100 = 20.00$$

The year 2000 A.D. belongs to 20th century.

$$2001 \div 100 = 20.01$$

The above answer exceeds the limit 20. Therefore the year 2001 A.D. belongs to the 21st century.

Exercise 5. 2

- (1) To which century, does the day 12. 04. 1999 belong?
- (2) To which century, does the year 1801 A.D. belong ?
- (3) What are the first day and the last day of the 21st century?

5.3 Calculations related to Time

You know that a day has 24 hours and a year has 365 days.

There are 60 minutes for an hour and 60 seconds for a minute.

Therefore the smallest unit which is used to measure time is the second. Relationship among time units can be indicated as shown below.

$$60 \text{ seconds} = 1 \text{ minute}$$

$$60 \text{ minutes} = 1 \text{ hour}$$

$$24 \text{ hours} = 1 \text{ day}$$

$$365 \text{ days} = 1 \text{ year}$$

Example - 5

Add

Year	Month	Day
08	07	18
04	08	06
+		
13	03	24

12	15	
1		③

In this example, when adding numbers of the month column, the result is equal to 15, so observe how that can be separated into one year and 3 months and 1 year has to be added to the numbers of the year column.

Total = 13 years 3 months 24 days

Example 6

Subtract

Days	Hours	Minutes
①	24	①
↑	↓	→
04	10	21
- 02	- 18	- 37
<hr/> <hr/>		

37 cannot be subtracted from 21 in the minutes column. Therefore we can take 1 hour from the hours column to the minutes column, and it is converted into minutes. Then add it to 21. Then observe how the calculation is done. In the same way observe that the remaining number in the hours column is 9 and 18 cannot be subtracted from a 9. Now we can take 1 day from the days column and add it to 9. Now we can subtract.

Difference = 1 Day 15 Hours 44 Minutes

Example 7

Kamal's birthday is 25th May 1994. Find his age at 12th September 2008. First let us find the difference as shown below.

Years	Months	Days
2008	09	12
- 1994	- 05	- 25
<hr/> <hr/>		

Kamal's age = 14 years 03 months 17 days

As 25 cannot be subtracted from 12, observe that 01 month is carried over and added as 30 days in the days column. Also observe how 05 months are deducted from 8 months and years 1994 deducted from years 2008.

Exercise 5.3

(1) Add

$$\begin{array}{r} \text{(i) Years Months Days} \\ 05 \quad 04 \quad 21 \\ + 02 \quad 09 \quad 15 \\ \hline \hline \end{array}$$

$$\begin{array}{r} \text{(ii) Days Hours} \\ 10 \quad 20 \\ + 03 \quad 14 \\ \hline \hline \end{array}$$

$$\begin{array}{r} \text{(iii) Hours Minutes Seconds} \\ 02 \quad 25 \quad 18 \\ + 03 \quad 35 \quad 32 \\ \hline \hline \end{array}$$

$$\begin{array}{r} \text{(iv) Days Hours Minutes} \\ 08 \quad 15 \quad 38 \\ + 02 \quad 12 \quad 22 \\ \hline \hline \end{array}$$

$$\begin{array}{r} \text{(v) Months Days Hours} \\ 02 \quad 18 \quad 15 \\ + \quad \quad \quad \\ \hline \hline \end{array}$$

(2) Subtract

$$\begin{array}{r} \text{(i) Hours Minutes Seconds} \\ 04 \quad 15 \quad 20 \\ - 02 \quad 08 \quad 30 \\ \hline \hline \end{array}$$

$$\begin{array}{r} \text{(ii) Years Months Days} \\ 10 \quad 08 \quad 18 \\ - 02 \quad 10 \quad 22 \\ \hline \hline \end{array}$$

$$\begin{array}{r} \text{(iii) Months Days Hours} \\ 03 \quad 10 \quad 18 \\ - 01 \quad 15 \quad 20 \\ \hline \hline \end{array}$$

$$\begin{array}{r} \text{(iv) Days Hours Minutes} \\ 04 \quad 02 \quad 10 \\ - 01 \quad 06 \quad 15 \\ \hline \hline \end{array}$$

- (3) Nimal's age is 12 years and 09 months, Ganesh's age is 11 years and 04 months. Find the sum of their ages.
- (4) School bus leaves the school premises at 1.40 p.m. It reaches the city after 45 minutes. At what time will it reach the city?
- (5) The table below shows the lengths of time that Amal, Sumana, Nadeema, Radha have spent in a bookshop. Find at what time each of them came to the bookshop.

Name	Time spent in the bookshop	Time of leaving the bookshop
Amal	40 minutes	1. 25 p.m.
Sumana	1 hour 15 minutes	11. 10 a.m.
Nadeema	50 minutes	12. 20 p.m.
Radha	1 hour 30 minutes	9. 20 a.m.

- (6) Hiruni's birthday is on 23rd July 1985. Her sister was born on 12th October 1987. Find the difference of their ages.
- (7) Kasun's father is older than Kasun by 27 years 2 months and 24 days. If Kasun's date of birth is 1983 - 09- 30. Find Kasun's father's date of birth.

(8) Fill in the blanks and find the number of days in 100000 seconds approximately.

1 minute	→	1 × 60	=	60 seconds
1 hour	→	60 × 60	= seconds
1 day	→	24 × 60 × 60	= seconds
10 days	→	10 × 24 × 60 × 60	= seconds
30 days	→	30 × 24 × 60 × 60	= seconds
365 days	→	365 × 24 × 60 × 60	= seconds

Summary

- ★ A year with 366 days is called a leap year, and the extra day is added to the month of February.
- ★ If the number which represents a year is divisible by 4 without a remainder, (and if it is not a multiple of 100) that year is a leap year.
- ★ If the number which indicates a year is a multiple of 100, that number should be divisible by 400 without a remainder for that year to be a leap year.
- ★ When doing additions and subtractions of months, days and hours the relevant conversions of months, days and hours should be done.
- ★ Also when doing additions and subtractions of years, months and days the relevant conversions of years, months and days should be done.