Time and Calendar

Clocks

Look at the following clocks.

It has a minute hand, hour hand and sometimes a second hand also.

Analog Clock

The digits on the left side show the hours from 1 to 12 and the digits on the right side show the minutes from 00 to 59.

Digital Clock

Here are some units for measuring time:

Second (s)	
Minute (min)	1 min = 60 s
Hour (h)	1 h = 60 min
Day (d)	1 d = 24 h

Week	1 week = 7 days
Month	1 month = 28, 29, 30 or 31 days
Year	1 year = 12 months
	365 days or 366 days (leap year)

Telling the Time

1. **To the Nearest 5 Minutes**
   As you can see, there are 60 marks on the face of the clock, out of which 12 are numbered. The numerals show a duration of 5 minutes, that is, if the minute hand is at 1, it means 5 minutes past the hour; if at 2, it shows 10 minutes and so on.

   Between the numerals, we have sub-divisions. Each sub-division stands for 1 minute. So, 60 divisions on the dial shows 60 minutes. The minute

hand completes 1 round of the dial in 1 hour, i.e., 60 minutes.

Now, read the following clocks:

4:30
Half past 4

6:45
Quarter to 7

9:15
Quarter past 9

7:25
It is read as seven twenty-five or twenty-five minutes past seven.

It is read as nine twenty or twenty minutes past nine. 9:20

2:40
It is read as two-forty or twenty minutes to three.

2. **To the Nearest Minute**

Whatever we have studied in Class 3, let us recall with the help of the examples given below.

Clock A

10:23
Twenty-three minutes past ten or
Ten twenty-three

Clock B

6:22
Twenty-two minutes past six or
Six twenty-two

Clock C

4:49
Eleven minutes to five or
Four forty-nine

In Clock A, the minute hand has moved 23 divisions and the hour hand is between 10 and 11, so the time is 10:23 or twenty-three minutes past ten. Similarly, the times for Clock B and Clock C are shown above.

Tips:

- When the minute hand is before 6, we read it as past.
- When the minutehand is after 6, we read it as to...

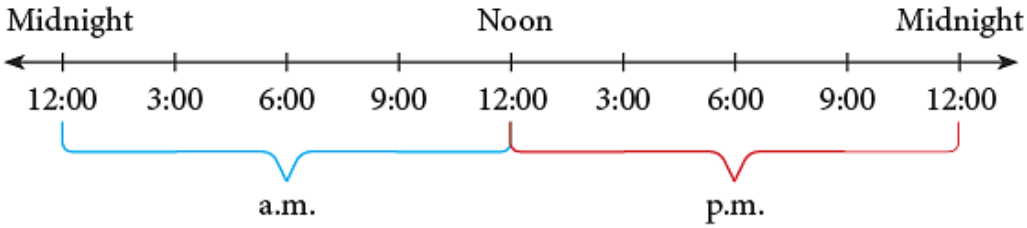
Using A.M. and P.M. Time

The time shown on the clock given alongside is 8:25, but we are not able to determine whether it is 8:25 in the morning or evening.

A day has 24 hours, so in a 12-hour clock (that we use) the hour hand goes around the clock two times and shows similar time twice a day.

To differentiate this, we use **a.m. (ante meridian)** to show time from **after midnight to before noon** and **p.m. (post meridian)** to show time from **afternoon to midnight.**

So, 8:25 in the morning is written as 8:25 a.m. and the same time at night is written as 8:25 p.m.

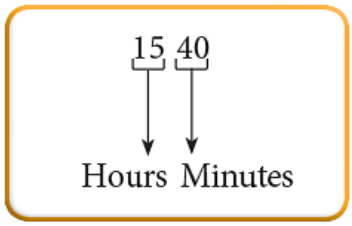


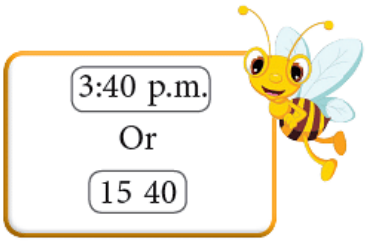
Tips: A day begins at 12 midnight and ends at 12 midnight of the following day.

24-Hour Time Notation

We have already studied the 24-hour clock in Class 3. The 24-hour time notation is represented by a '24-hour clock'.

Here, the time from **12 midnight to 12 midnight (1 day)** is given as **0000 hours to 2400 hours**, where the first two digits refer to hours and the last two digits to minutes.





The table given below shows the 24-hour time equivalent to12-hour time:

12-Hour Time	24-Hour Time	12-Hour Time	24-Hour Time
12:01 a.m.	0001 hour	12 noon	1200 hours
1:00 a.m.	0100 hours	1:00 p.m.	1300 hours
2:00 a.m.	0200 hours	2:00 p.m.	1400 hours
3:00 a.m.	0300 hours	3:00 p.m.	1500 hours
4:00 a.m.	0400 hours	4:00 p.m.	1600 hours
5:00 a.m.	0500 hours	5:00 p.m.	1700 hours
6:00 a.m.	0600 hours	6:00 p.m.	1800 hours
7:00 a.m.	0700 hours	7:00 p.m.	1900 hours
8:00 a.m.	0800 hours	8:00 p.m.	2000 hours
9:00 a.m.	0900 hours	9:00 p.m.	2100 hours
10:00 a.m.	1000 hours	10:00 p.m.	2200 hours
11:00 a.m.	1100 hours	11:00 p.m.	2300 hours
		12 midnight	2400 hours or 0000 hours

Thus,

- 8:35 a.m. = 0835 hours;
- 3:15 p.m. = 1515 hours;
- 11:40 a.m. = 1140 hours;
- 11:50 p.m. = 2350 hours.

Conversion of Time

Look at the following clocks and tell what time they show.

1:45 and 25 sec

Tips:

60 seconds = 1 minute

$1 \text{ second} = \frac{1}{60} \text{ minutes}$

60 minutes = 1 hour

$1 \text{ minute} = \frac{1}{60} \text{ hour}$

Converting from Hours to Minutes and Minutes to Hours

1. **Hours to minutes:** 1 h = 60 min
   Examples:
   (a) 5 h = 5 × 60 min = 300 min
   (b) 2 h 45 min = 2 h + 45 min = 2 × 60 min + 45 min
   = 120 min + 45 min
   = 165 min
2. **Minutes to hours:**
   $1 \text{ m} = \frac{1}{60} \text{h}$

   Examples:
   (a) 480 min = (480 ÷ 60) h = 8 h
   (b) 352 min = (352 ÷ 60) h
   = 5 h 52 min

Or

$$352 \text{ min} = 300 \text{ min} + 52 \text{ min}$$
$$= (300 \div 60) \text{ h} + 52 \text{ min}$$
$$= 5 \text{ h} + 52 \text{ min}$$
$$= 5 \text{ h } 52 \text{ min}$$

Operations on Measures of Time

1. Addition

Example 1: Add 6 hours 45 minutes and 11 hours 39 minutes.

	1	
	6 hours	45 minutes
+	11 hours	39 minutes
	18 hours	24 minutes

Thus, 6 hours 45 minutes + 11 hours 39 minutes = **18 hours 24 minutes.**

Think:

45 min + 39 min = 84 min
= 60 min + 24 min
= 1 h + 24 min

2. Subtraction

Example 2: Raju completes a painting in 6 hours 26 minutes and Rohit completes it in 4 hours 45 minutes. How much more time does Raju take to complete the painting?

You have to subtract 4 hours 45 minutes from 6 hours 26 minutes to find the required time.

	(5)	Borrow 1 h	(86)	
	~~6~~	hours	~~26~~	minutes
–	4	hours	45	minutes
	1	hour	41	minutes

Thus, Raju takes **1 hour 41 minutes** more to complete the painting.

Think:
45 min cannot be subtracted from 26 min.
Borrow, 1 h = 60 min from 6 hours.
60 min + 26 min = 86 min
86 min – 45 min = 41 min
5 h – 4 h = 1 h

Elapsed Time

Using the 24-hour time notation and our knowledge of addition and subtraction of time, we can easily find the elapsed time.
Elapsed time is the time between the two given times.

We can also find the starting time, when the finishing time and the duration of activity is given or the finishing time, when the starting time and the duration of the activity is given.

Example 3: Mr Verma's office starts at 10 a.m. and closes at 6 p.m. How many hours does the office remain open?

10 a.m. $\xrightarrow{2 \text{ hours}}$ 12 noon

12 noon $\xrightarrow{6 \text{ hours}}$ 6 p.m.

Thus, Mr Verma's office remains open for 2 hours + 6 hours = **8 hours.**

Example 4: A flight took off for Mumbai from New Delhi at 3:10 p.m. The plane landed in Mumbai at 4:55 p.m. What was the duration of the flight?

3:10 p.m. $\xrightarrow{50 \text{ minutes}}$ 4:00 p.m.

4:00 p.m. $\xrightarrow{55 \text{ minutes}}$ 4:55 p.m.

∴ Duration of the flight = 50 minutes + 55 minutes
= 105 minutes = 60 minutes + 45 minutes
= 1 hour + 45 minutes

∵ 1 hour = 60 min

Thus, the duration of the flight was **1 hour 45 minutes.**

Example 5: How long is the time from
(a) 1542 hours to 2039 hours?
(b) 4:35 a.m. to 6:20 p.m.?

(a) The elapsed time is 2039 hours – 1542 hours.

Borrow 1 h

		(19)		(99)
2039 hours	=	20 hours		39 minutes
– 1542 hours	=	– 15 hours		42 minutes
Elapsed Time	=	4 hours		57 minutes

Thus, the elapsed time is **4 hours 57 minutes.**

(b) To find the elapsed time between 4:35 a.m and 6:20 p.m., first convert the time into 24-hour time.

Borrow 1 h

		(17)		(80)
6:20 p.m.	=	18 hours		20 minutes
– 4:35 a.m.	=	– 04 hours		35 minutes
Elapsed Time	=	13 hours		45 minutes

Thus, the elapsed time is **13 hours 45 minutes.**

Example 6: Find the time using a 24-hour clock.
(a) 4 hours 25 minutes after 2040 hours
(b) 8 hours 15 minutes before 2:35 p.m.

(a) Add 4 hours 25 minutes to 2040 hours to find the required time.
20 h 40 min + 4 h 25 min
= 24 h 65 min = 24 h + 1 h + 5 min
= 1:05 a.m. (It becomes next day.) **1 h 5 min after 12:00 midnight.**

(b) 2:35 p.m. = 1435 hours = 14 h 35 min
∴ Required time = 14 h 35 min – 8 h 15 min
= 6 h 20 min
= **0620 hours or 6:20 a.m.**

Calendar

A calendar is a record of the months, weeks and days in a year. Calendar for the year 2019 is shown below.

JANUARY

M	T	W	T	F	S	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

FEBRUARY

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

MARCH

M	T	W	T	F	S	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

APRIL

M	T	W	T	F	S	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

MAY

M	T	W	T	F	S	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

JUNE

M	T	W	T	F	S	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

JULY

M	T	W	T	F	S	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

AUGUST

M	T	W	T	F	S	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

SEPTEMBER

M	T	W	T	F	S	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

OCTOBER

M	T	W	T	F	S	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

NOVEMBER

M	T	W	T	F	S	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

DECEMBER

M	T	W	T	F	S	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	25	25	26	27	28	29
30	31					

It is a record of 12 months of a year. One year has 365 days. It has 52 weeks. A day is the time that the earth takes to complete one rotation on its axis. 1 day is the standard unit of time. 1 year is equivalent to 365 days. 7 days make one week.

Starting from the first day of the week, the names of different days of the week are:

First Day	Second Day	Third Day	Fourth Day	Fifth Day	Sixth Day	Seventh Day
Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday

This cycle of days is repeated again and again.

The short forms for the days of the week are as follows:
Mon., Tues., Wed., Thurs., Fri., Sat., Sun.
If today is a Monday, after 7 days it will again be Monday.

DECEMBER 2019						
M	T	W	T	F	S	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	25	25	26	27	28	29
30	31					

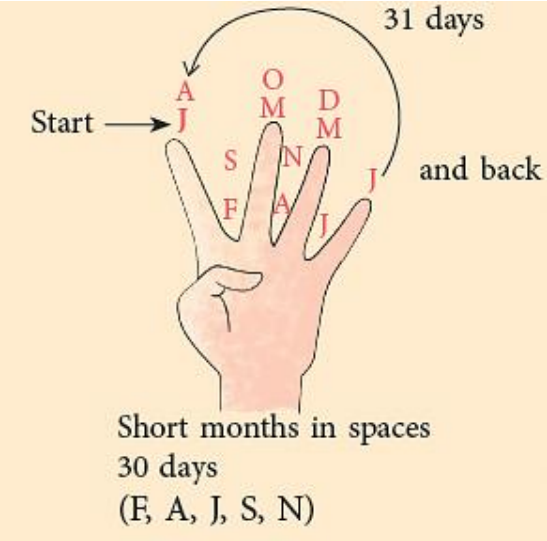
Months and Days

There are 12 months in a year. They are — **January, February, March, April, May, June, July, August, September, October, November and December.**
The number of days in various months are as follows:

Month Number	Months of the Year	Number of Days	Short Form
1st month	January	31	Jan.
2nd month	February	28 (or 29)	Feb.
3rd month	March	31	Mar.
4th month	April	30	Apr.
5th month	May	31	May
6th month	June	30	June
7th month	July	31	July
8th month	August	31	Aug.
9th month	September	30	Sep.
10th month	October	31	Oct.
11th month	November	30	Nov.
12th month	December	31	Dec.

April, June, September and November have 30 days. All the rest have 31, except February which has 28 days and 29 days in a leap year.

To find the number of days in a year:
$(7 \times 31) + (4 \times 30) + (1 \times 28) =$ _____.



There are **365** days in a year. Once in every four years has an extra day. A year with 366 days is called a **leap year.** Every fourth year is a leap year. The extra day is added to February, which then has 29 days. Here are some leap years: 2004, 2008, 2012, 2016.

FEBRUARY 2020

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

What leap year comes next after 2016? How did you find it?
1. A year is a leap year, if it is divisible by 4.
2. If a year ends in a hundred, it will not be a leap year, unless it is divisible by 400.

Thus, the year 2000 is a leap year, while 1900 is not.
To find the number of weeks in a year, divide 365 by 7, since each week has 7 days.
$365 \div 7 = 52$ weeks 1 day. There are 52 weeks and 1 day extra.

By studying the calendar, we learn that:

7 days	=	1 week	365 days	=	1 year
2 weeks	=	1 fortnight	366 days	=	1 leap year
about 52 weeks	=	1 year	about 4 weeks	=	1 month
12 months	=	1 year			
10 years	=	1 decade			
100 years	=	1 century			
1000 years	=	1 millennium			

We call the years from 1900 to 1999 the twentieth century. The years from 2000 to 2099 is the **twenty-first century.**

Months and Years

We already know that 12 months = 1 year.
We can change 1 year 7 months to months, as follows.
1 year 7 months = 12 months + 7 months = 19 months
We can change 20 months to year and months, as follows.
20 months = 12 months + 8 months = 1 year 8 months

$$\begin{array}{r} 1 \\ 12 \overline{)\ 20} \\ -\ 12 \\ \hline 8 \end{array}$$

Solved Examples

Example 7: If 10 April, 2018 was a Tuesday, what was the day on 30 April, 2018?

The same day is repeated after every 7 days. After 10 April, the next Tuesday fell on 17 April and then on 24 April.

Tues → Wed → Thu →
Fri → Sat → Sun → Mon
(7 days)

Therefore, counting ahead from 24 April, **30 April, 2018 was a Monday.**

Example 8: Rahul is 4 years 8 months old. His sister Divya is 2 years 9 months elder to him. How old is she?

Divya' s age = Rahul's age + 2 years 9 months
= 4 years 8 months + 2 years 9 months
= 6 years 17 months
= 6 years + 12 months + 5 months
= 6 years + 1 year + 5 months (12 months = 1 year)

	Years	Months
	4	8
+	2	9
	6	17

= 7 years 5 months.

Example 9: Piyush went for a project to London when he was 24 years 5 months old.

Now he is 33 years 2 months old. How long has he been there?
Piyush stayed in London for: (33 years 2 months – 24 years 5 months)

	Years		Months
	(2)	Carry 1 year = 12 months → 12 + 2 →	(14)
	3 ~~3~~		~~2~~
–	2 4		5
	8		9

Thus, Piyush stayed in London for **8 years 9 months.**
5 months cannot be subtracted from 2 months. So, we borrow one year from 33 years. 1 year = 12 months; 12 + 2 = 14.
Subtract 5 months from 14 months and 24 years from remaining 32 years.

Number of Days between Two Given Dates

We can find the number of days between two given dates as under:
For example, to find the number of days between 20 July, 1947 and 2 October, 1947, we proceed as follows.

Leaving out 20 July, take 11 days for July, that is, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30 and 31 of the month. Also leave out 2 October.
Note: Whether you should count the first or the last day or both depends on the particular situation or nature of question.

Month	July	August	September	October	**Total**
Days	11	31	30	1	74

Tips: If you have to find the number of days from (not between) 20 July to 2 Oct., then the number of days are $12 + 31 + 30 + 2 = 75$

Example 10: The football team reached England on 10 February, 2017 and stayed for 45 days. Find the date on which the team returned?
Number of days the team stayed in England in February
= 19 days (10th February is also counted.)

(Count from 10 to 28 11, 11, ..., 28)
Number of days the team stayed in England in March,
$= 45 - 19 = 26$ days
Thus, the team stayed till 26 March, 2017 and returned on **27 March 2017.**

Example 11: Nishant started reading "Charlie and the Chocolate Factory" on 15 May.

It took him 21 days to complete the book. On what day did he finish reading?
Number of days on which Nishant read the book in May $= 31 - 14 = 17$
(Here, 15 May is also counted.)
Number of days he read in June $= 21 - 17 = 4$.
Thus, Nishant finished reading the book on **4 June.**