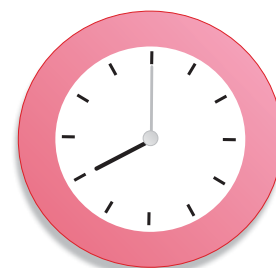


12

Time



We know that the sunrise and sunsets these days cycle changes seasons and child grows becomes sooner an old man, can so called or realised the “**Time**”. Day is divided into 24 equal divisions and each division is called an hour. An hour is also divided into 60 equal parts and each part is called minute. In this class, we shall learn about ‘seconds’.

Each minute is divided into 60 parts, each part is called a second.

The units of time are arranged from the smallest to the largest as second, minute, hour, day, week, month and year. These units have the following relation.

60 seconds = 1 minute

60 minutes = 1 hour

24 hours = 1 day

7 days = 1 week

12 months = 1 year

365 days = 1 year (called ordinary year)

10 years = 1 decade

366 days = 1 year (called leap year)

100 years = 1 century

1000 years = 1 millennium

Leap year comes after four years. To know whether the year is a leap year or ordinary year, divide the digits of the year by 4. If the digits are divisible by 4 then the year is a leap year.

For Example : In 1960, the digits are divisible by 4.

Therefore, 1960 is a leap year.

In 1966, the digits are not divisible by 4.

Therefore, 1966 is not a leap year.



How to Use a.m. and p.m.?

A day starts at 12 midnight and ends at 12 midnight of the next following day.

The time between 12 midnight to 12 noon is known as ante meridian (a.m.).





Therefore, 6 O'clock in the morning indicates 6 a.m. 7:40 in the morning indicates 7:40 a.m.

The time between 12 mid-day to 12 midnight is known as post meridian (p.m.).

Therefore, 5 O'clock in the evening indicates 5 p.m. 11:15 in the night indicates 11:15 p.m.

The 24 hours time pattern is also used at some places such as railway station.

This time pattern indicates :

- 1 p.m. as 13:00 hours
- 2 p.m. as 14:00 hours
- 3 p.m. as 15:00 hours
- 4 p.m. as 16:00 hours
- 10 p.m. as 22:00 hours
- 11 p.m. as 23:00 hours
- 12 midnight as 24:00 hours or 00:00 hours.



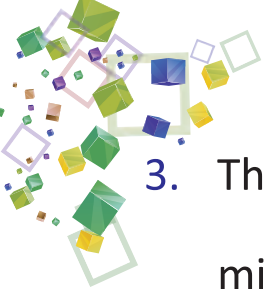
FACTS
The time at 12 midnight or time at 12 noon cannot be referred as a.m. or p.m. These time are referred as 12:00 o'clock midnight and 12:00 o'clock noon.

12-hours clock time	24-hour clock time
12 midnight	24:00 hours or 00:00 hours
1 a.m.	01:00 hours
1:30 a.m.	01:30 hours
2:50 a.m.	02:50 hours
11:10 a.m.	11:10 hours
12 noon	12:00 hours
12:15 p.m.	12:15 hours
1:00 p.m.	13:00 hours
11:30 p.m.	23:30 hours

In order to change 24-hour clock time to 12-hour clock time the following steps are taken :

1. 12 midnight is denoted by 24:00 hours or 00:00 hours.
2. 12 noon is denoted by 12:00 hours.





3. The number formed by two digits from the right denotes the number of minutes.
4. If the number formed by the first two digits from the left of 24 hour clock time is less than 12, then it denotes the number of hours before noon and therefore, a.m. is to be used with the given time.

For Example : 07:15 hours denotes **7:15 a.m.**
 10:45 hours denotes **10:45 a.m.**

Example I :

$\begin{array}{r} 21 : 45 \\ - 12 : 00 \\ \hline 9 : 45 \end{array}$	}	hours denotes 9:45 a.m.	$\begin{array}{r} 22 : 50 \\ - 12 : 00 \\ \hline 10 : 50 \end{array}$	}	hours denotes 10:50 a.m.	$\begin{array}{r} 23 : 30 \\ - 12 : 00 \\ \hline 11 : 30 \end{array}$	}	hours denotes 11:30 a.m.
--	---	-------------------------	---	---	--------------------------	---	---	--------------------------

5. If the number formed by the first two digits from the left of 24 hour clock time is less than 12 (other than 12:00), it shows the number of hours before noon, and so a.m. is to be used with the given time.

For Example : 7:30 hours denotes **7:30 a.m.**
 8:20 hours denotes **8:20 a.m.**

Example I : Denote the time by using a.m. or p.m.

- | | |
|---------------------------|------------------------------|
| a. 8:45 in the evening | b. 7:30 in the morning |
| c. 12:40 in the afternoon | d. 15 minutes after midnight |

Solution : We know that :

- | | |
|---------------------------------|------------|
| a. 8:45 in the evening is | 08:45 p.m. |
| b. 7:30 in the morning is | 07:30 a.m. |
| c. 12:40 in the afternoon is | 12:40 p.m. |
| d. 15 minutes after midnight is | 00:15 a.m. |



Example II : Write the following in terms of a.m. or p.m. or noon or midnight.

- a. 07:25 hours
- b. 12:10 hours
- c. 19:06 hours
- d. 03:25 hours

Solution : In order to change 24 hour clock time to 12 hour clock time we know that :

- a. 07:25 hours = 7:25 a.m.
- b. 12:10 hours = 12:10 p.m.
- c. 19:06 hours = 7:06 p.m.
- d. 03:25 hours = 3:25 a.m.

EXERCISE 12.1

1. Express the following time in a.m. or p.m.

- a. 4:30 in the evening
- b. 6:50 in the morning
- c. 12:15 in the night
- d. 11:00 in the night

2. Write the following given time, 3 hours after.

- a. 5:30 a.m.
- b. 10 p.m.
- c. 3:15 a.m.
- d. 1:30 p.m.

3. Write the following given time, 4 hours before.

- a. 11:40 p.m.
- b. 6:15 a.m.
- c. 8:30 p.m.
- d. 5:08 a.m.

4. Change to 24 hour clock time.

- a. 6:15 p.m.
- b. 5:50 a.m.
- c. 2:30 a.m.
- d. 10:45 p.m.

5. Change to 12 hour clock time.

- a. 11:45 hours
- b. 12:52 hours
- c. 21:10 hours
- d. 06:30 hours





Conversion of Unit

After knowing the relationship between the various units of time, we can easily convert them from one unit into the another unit.

Example III: Convert the following into hours.

- a. 4 days b. 3 days 6 hours

Solution : a. We know that :

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

$$\text{Therefore, } 4 \text{ days} = 4 \times 24 \text{ hours} = 96 \text{ hours.}$$

- b. 1 day = 24 hours

Therefore, 3 days 6 hours

$$= (3 \times 24 + 6) \text{ hours} = 72 + 6 \text{ hours} = 78 \text{ hours.}$$

Example IV: Convert the following into minutes.

- a. 12 hours b. 3 hours 34 minutes

Solution : a. We know that :

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

$$\text{Therefore, } 12 \text{ hours} = (12 \times 60) \text{ minutes} = 720 \text{ minutes.}$$

$$\begin{aligned} \text{b. } 3 \text{ hours } 34 \text{ minutes} &= (3 \times 60 + 34) \text{ minutes} \\ &= 180 + 34 = 214 \text{ minutes} \end{aligned}$$



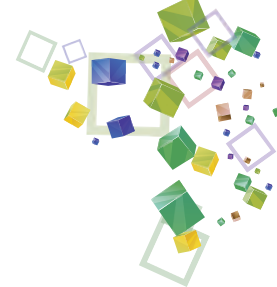
Addition of Time

Example V : Add 5 hours 32 minutes and 8 hours 25 minutes.

Solution :

	Hours	Minutes
	5	32
+	8	25
	13	57





Step 1 : Add minutes, $32 \text{ minutes} + 25 \text{ minutes} = 57 \text{ minutes}$.
Write 57 in the minutes column.

Step 2 : Add hours, $5 \text{ hours} + 8 \text{ hours} = 13 \text{ hours}$.
Write 13 in the hours column.

Therefore, $5 \text{ hours } 32 \text{ minutes} + 8 \text{ hours } 25 \text{ minutes} = 13 \text{ hours } 57 \text{ minutes}$.

Example VI: Add 7 hour 30 minutes and 6 hours 50 minutes.

Solution :

	Hours	Minutes
	①	
	7	30
+	6	50
	14	20

Step 1 : Add minutes, $30 + 50 = 80 \text{ minutes}$
or $(60 + 20) \text{ minutes}$
 $= 1 \text{ hour} + 20 \text{ minutes}$
Write 1 in hours column as carry and 20 in the minutes column.

Step 2 : Add hours, $7 + 6 + 1 \text{ (carry over)} = 14 \text{ hours}$.
Write 14 in the hours column.
Therefore, $7 \text{ hours } 30 \text{ minutes} + 6 \text{ hours } 50 \text{ minutes} = 14 \text{ hours } 20 \text{ minutes}$.

EXERCISE 12.2

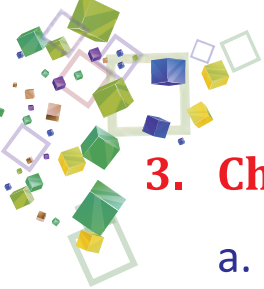
1. Convert the following into hours.

- a. 6 days 6 hours b. 8 days 10 hours

2. Change the following into minutes.

- a. 4 hours 15 minutes b. 8 hours 24 minutes





3. Change the following into seconds.

- a. 12 minutes 24 seconds b. 1 hour 2 minutes 20 seconds

4. Express the following into hours and minutes.

- a. 733 minutes b. 1845 minutes

5. Add the following time.

- a. 24 minutes 30 seconds and 18 minutes 30 seconds
 b. 14 hours 30 minutes and 12 hours 50 minutes
 c. 4 hours 15 minutes and 5 hours 24 minutes
 d. 15 minutes 24 seconds and 8 minutes 30 seconds

6. What will be the following time?

- a. 5 hours 15 minutes after 2:30 a.m. b. 7 hours after 12 noon
 c. 1 hour 45 minutes after 6:30 p.m. d. 15 minutes after 3:55 p.m.



Subtraction of Time

Example VII : Find the difference between the following :

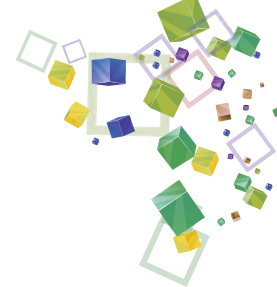
- a. 3 hours 30 minutes and 8 hours 40 minutes
 b. 3 hours 20 minutes and 7 hours 10 minutes

Solution : a.

	Hours	Minutes
	8	40
–	3	30
	5	10

Step 1 : Subtract minutes, $40 - 30 = 10$ minutes.

Write 10 in the minutes column.



Step 2 : Subtract hours $8 - 3 = 5$ hours
 Write 5 in the hours column.
 Therefore, 8 hours 40 minutes – 3 hours 30 minutes
 = 5 hours 10 minutes.

b.

	Hours	Minutes
	7	10
–	3	20
	3	50

Step 1 : 20 minutes cannot be subtracted from 10 minutes .
 Then, borrow 1 hour = 60 minutes from 7 hours.
 So, the minutes are $60 + 10 = 70$ minutes.
 Now, subtract 70 minutes – 20 minutes = 50 minutes.
 Write 50 in the minutes column.

Step 2 : Now, subtract hours, $(7 - 1)$ hours – 3 hours
 = $6 - 3 = 3$ hours.
 Write 3 in the hours column.
 Therefore, difference is 3 hours 50 minutes.

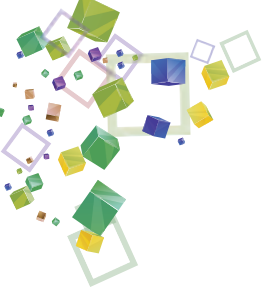
Example VIII : Find the difference (interval) between :

- 10:15 a.m. and 2:20 p.m.
- 6:50 a.m. and 10:30 a.m.

Solution : a.

	Hours	Minutes
		1 10
	14	2 0
–	10	1 5
	4	0 5





Therefore,
 difference of 14 hours 20 minutes – 10 hours 15 minutes
 = 4 hours 5 minutes.

b.

	Hours	Minutes
	9	90
	10	30
–	6	50
	3	40

Therefore,
 difference of 10 hours 30 minutes – 6 hours 50 minutes
 = 3 hours 40 minutes.

EXERCISE 12.3

1. Find the difference between the following.

- 5 hours 20 minutes and 7 hours 40 minutes
- 6 hours 10 minutes and 2 hours 30 minutes
- 9 hours 20 minutes and 7 hours 50 minutes
- 14 years 9 months and 18 years 7 months

2. Find the interval between.

- | | |
|-----------------------------|----------------------------|
| a. 7:40 p.m. and 7:50 a.m. | b. 8:40 a.m. and 2:40 a.m. |
| c. 4:15 a.m. and 11:05 a.m. | d. 7:45 a.m. and 1:20 p.m. |

3. What will be the following time?

- | | |
|--|-------------------------------|
| a. 3 hours before 5:45 a.m. | b. 5 hours before 3:40 p.m. |
| c. 4 hours 30 minutes before 7:45 p.m. | d. 6 hours before 12 midnight |



Word Problems

Example IX : An express train takes 5 hours 30 minutes to reach Delhi from Amritsar. If train starts from Amritsar at 7:45 a.m. then at what time will it reach Delhi?





Solution : The train starts from Amritsar at 7:45 a.m. and takes 5 hours 30 minutes to reach Delhi. We add 5 hours 30 minutes to 7 hours 45 minutes.

	Hours	Minutes
	7	45
+	5	30
	12	75

12 hours 75 minutes = 12 hours + (60 minutes + 15 minutes)
 = 12 hours + 1 hour + 15 minute
 = 13 hours 15 minutes = 1:15 p.m.

Therefore, the train will reach Delhi 1:15 p.m.

Example X : A school starts at 7:15 a.m. and gets over after 6 hours 15 minutes. Then, at what time does the school get over?

Solution : The school gets over 6 hours 15 minutes after 7:15 a.m.

	Hours	Minutes
	7	15
+	6	15
	13	30

Therefore, the school gets over at 1:30 p.m.

Example XI : I went to school at 9:30 a.m. and returned home at 4:30 p.m. How long was I away from the home?

Solution : We need to find interval between 9:30 a.m. and 4:30 p.m.

	Hours	Minutes
	16	30
-	9	30
	7	00

Therefore, I was away from home for 7 hours.





Example XII : An aeroplane leaves from Mumbai at 5:20 a.m. It arrives at Delhi at 7:20 a.m. How long does it take to reach Delhi?

Solution : We need to find the interval between 5:20 a.m. and 7:50 a.m.

	Hours	Minutes
	7	20
–	5	20
	2	00

Therefore, the aeroplane takes 2 hours for its journey from Mumbai to Delhi.

EXERCISE 12.4

1. A circus show starts at 4:15 p.m. It runs for 2 hours 45 minutes. At what time does it end?
2. Shorya leaves his home for school at 7:30 a.m. He reaches school after 25 minutes. At what time does he reach the school?
3. A train leaves Delhi at 18:00 hours and reaches Gorakhpur after 3 hours 30 minutes. At what time does it reach Gorakhpur?
4. Raunak leaves home for office at 9:30 a.m. and returns home at 5:15 p.m. How long does he remain away from home?
5. A match lasted 1 hour 30 minutes. If the match ended at 4:15 p.m. then at what time did it start?
6. A car leaves for Lucknow at 9:30 a.m. Just after 30 minutes another car leaves for Lucknow. At what time does the second car leave for Lucknow?
7. Sudha started doing her homework at 7:05 p.m. and finished it at 9:10 p.m. How long did it take her to do the homework?

POINTS TO REMEMBER

- ❖ The units of time are second, minute, hour, day, week, month and year.
1 minute = 60 second
1 hour = 60 minutes
1 day = 24 hours
1 week = 7 days
1 month = 30/31 day, in February 28/29 days.
- ❖ In a leap year February has 29 days and year has 366 days.
- ❖ Time from 12 o'clock midnight to 12 o'clock noon is called a.m. (ante meridian).
- ❖ Time from 12 o'clock noon to 12 o'clock midnight is called p.m.(post meridian).
- ❖ The time at 12 midnight and 12 noon can not be referred to a.m. or p.m. This time is referred to 12 o'clock midnight and 12 o'clock noon.

RECAP EXERCISE

1. Multiple Choice Questions (MCQs)

Tick (✓) the correct options:

a. In 2020, the month of the February had.....

(i) 28 days

(ii) 29 days

(iii) 30 days

(iv) 31 days

b. How many days are there in an ordinary year?

(i) 365

(ii) 366

(iii) $365\frac{1}{4}$

(iv) None of these

c. Express the time 16:20 hours in a.m. or p.m.

(i) 16:20 a.m.

(ii) 16:20 p.m.

(iii) 16:20 p.m.

(iv) 4:20 p.m.



d. The month of December contains.....

(i) 30 days

(ii) 31 days

(iii) 28 days

(iv) 29 days

e. The time 12 o'clock midnight is written as.....

(i) 12:00 hours

(ii) 00:00 hours

(iii) 12:00 a.m.

(iv) 12:00 p.m.

2. Express the following time into a.m. or p.m.

a. 7:10 in morning

b. 3:50 in afternoon

c. 10:40 at night

d. 11:59 before noon

3. Change it to 24 hour clock.

a. 5:30 a.m

b. 1:20 p.m.

c. 10:15 a.m.

d. 8:30 p.m.

4. Change it into 12 hour clock.

a. 03:45 hours

b. 17:40 hours

c. 09:15 hours

d. 22:20 hours

5. Change the following into minutes.

a. 12 hours 25 minutes

b. 9 hours 45 minutes

6. Find the difference between.

a. 10:40 a.m. and 2:20 p.m.

d. 1:20 p.m. and 10:40 p.m.

7. Sumit's school closed for summer vacation from 15 may, 2012 for 45 days. On which date will the school reopen?

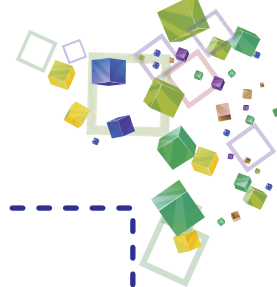
8. Aarav went to his farm house. He travelled 2 hours 15 minutes by bus and walked for 3 hours 30 minutes. How much time did he take to reach his farm house?



Rohit wakes up at 7:00 a.m. He takes 10 minutes for being fresh, 10 minutes for brushing teeth, 15 minutes for taking bath, 15 minutes for having breakfast and 10 minutes for getting ready for going to school. When does Rohit leave home for school?



Lab Activity



Objective : To build familiarity with calendar patterns.

Materials : Calendars

Presentation: Students work in pairs by taking turns.

March						
S	M	T	W	T	F	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

- ❖ One student chooses any month from a calendar.
- ❖ The student then chooses any 3×3 grid (i.e. 9 dates) on that calendar month and draws a grid around it.
- ❖ The other student uses the following 'short cut' method to find the total of all the numbers in that box :
 - a. Add 8 to smallest number in the box (i.e. $5 + 8 = 13$ in this example).
 - b. Multiply the answer by 9. This is the total of all the numbers in the box (i.e. $13 \times 9 = 117$).
- ❖ The first student now checks the total by actually adding all the numbers.

Record the Activity :

Smallest number in the box	Total of all the numbers
4	$(5 + 8) \times 9 = 117$
Check the Total : $5 + 6 + 7 + 12 + 13 + 14 + 19 + 20 + 21 = 117$	

Try this out :

- a. Now let the partner choose another box of 9 numbers from the same month, then work out the total of all numbers in the box.
- b. Work out this method for other calendar months too!

	Smallest number in the box	Total of all the numbers
a.		
Check the Total :		
b.		
Check the Total :		

