

## 10. Measuring Time



### Revision

#### Problem Set 43

1. Write the time shown in each clock in the box given below it.










2. Draw the hands of the clock to show the time given in the box.



Four thirty



Quarter past nine



Quarter to five



20 minutes past 11

3. If a bus that leaves Nashik at 5 o'clock in the morning reaches Pune that same day at ten thirty in the morning, how long does the journey take ?
4. A play that was to start at nine fifteen at night was delayed by half an hour because of a power outage. What time did the play start ?
5. If a train leaves Mumbai at ten fifteen at night and reaches Nagpur at one forty the next afternoon, how long does the journey take ?

### Learning about seconds



This clock is showing 5 minutes past 3. We know this because of the position of the hour and minute hands. There is another hand in the picture called the second hand. This hand moves swiftly. The second is a very small unit used to measure time less than a minute.

The face of a clock is a circle divided into 60 equal parts. When the second hand moves one part, it takes one second. When it completes one round of the clock face, it moves across all 60 parts. This takes 60 seconds. In the same time, the minute hand moves one place, which means that one minute is over.

It means that, 1 minute is equal to 60 seconds.

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

The clock in the picture above shows 5 minutes and 50 seconds past 3.



20 minutes and  
10 seconds past 7



15 minutes and  
40 seconds past 10

Seconds are used on various occasions such as measuring temperature with a thermometer, measuring heartbeats or timing a race.

### ☐ Ante meridiem and post meridiem

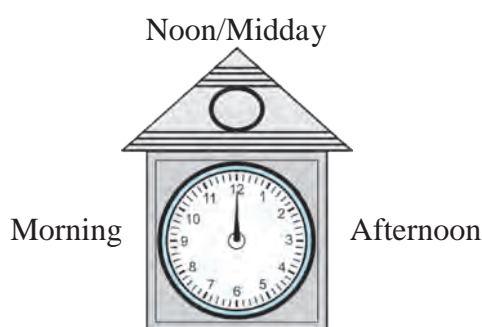
Shripati was sitting at home at night, tired. There were guests at home. They asked, “You must have worked very hard in the fields today. How long were you working ?”

Shripati said, “I was in the field from six o’clock to eight o’clock.”

Someone asked, “You’re this tired even though you were in the field for only two hours ?”

Shripati said, “No, no, I was in the field from 6 in the morning till 8 at night ! Now tell me how many hours I spent in the field.”

The guests had not understood what Shripati said at first. To avoid such mistakes, it has been internationally agreed that as the clock strikes 12 midnight, one day ends and the next day begins. From that moment on, the clock shows the time for the next day. When one hour passes after 12 midnight, it is 1 o’clock. After that, it is 2, 3, 4, ..., 12 o’clock in serial order. After 12 noon, again it is 1, 2, 3, ..., 12 o’clock in serial order. The time before 12 noon is stated as ante meridiem or am. The time after 12 noon is stated as post meridiem or pm.



This method of measuring time is called the 12 hour clock.











Shripati was in the field from 6 am to 8 pm or for 14 hours.

### ☐ The 24 hour clock

The 24 hour clock is used to avoid this division of the day into ante meridiem and post meridiem. This method is used in timetables for trains, planes, buses and long distance boat journeys. In this method, instead of starting again from 1, 2, 3 after 12 noon, we continue with 13, 14, 15, ..., 24. In a 24 hour digital watch, time is shown only in the form of numbers. It does not have hands. In such a clock, 20 minutes past 6 in the morning is shown as ‘6:20’ and 20 minutes past 6 in the evening is shown as ‘18:20’.

23:59 means 59 minutes after 23 and one minute later, 24 hours will be complete. The digital clock will show this time as 00:00 at midnight and the day will change. At that time, a 12 hour clock shows 12 midnight.

Study the following table to see how different times of the day are shown in the 12 hour and 24 hour clocks.

12 hour clock	24 hour clock	12 hour clock	24 hour clock
0:05 am	 00:05	12:05 pm	 12:05
5 minutes past 12 midnight		5 minutes past 12 noon	
1:20 am	 01:20	1:20 pm	 13:20
20 minutes past 1 during night time		20 minutes past 1 in the afternoon	
6:55 am	 06:55	6:55 pm	 18:55
55 minutes past 6 in the morning		55 minutes past 6 in the evening	
10:15 am	 10:15	10:15 pm	 22:15
15 minutes past 10 in the morning		15 minutes past 10 in the evening	
12:00	 12:00	12:00	 00:00 means 24:00
12 noon		12 midnight	

The timetables of some trains going from Badnera to Nagpur are given below. Observe the use of the 24 hour clock in the timetable.

Name of the train	Train number	Departure time	Arrival time
Howrah Mail	12809	07:45	11:05
Shalimar Express	18024	09:45	13:10
Mumbai Mail	21028	13:05	17:20
Malda Town Express	13426	23:10	01:55

### Problem Set 44

1. The time below is given by the 12 hour clock. Write the same by the 24 hour clock.

30 minutes past 10 in the morning  10 minutes past 8 in the morning   
 20 minutes past 1 in the afternoon  40 minutes past 5 in the evening

2. Match the following.

#### 12 hour clock

9:10 am

2:10 pm

5:25 pm

11:10 pm

7:25 am

#### 24 hour clock

23:10

7:25

14:10

9:10

17:25

### Examples of time measurement

**Example (1)** If Abdul started working on the computer at 11 in the morning and finished his work at 3:30 in the afternoon, how long did he work?

**Method 1 :** From 11 in the morning to 12 noon, it is 1 hour. From 12 noon to 3:30 in the afternoon, it is 3 hours and 30 minutes. Therefore, the total time is 4 hours and 30 minutes.

**Method 2 :** According to the 24 hour clock, 11'o'clock in the morning is 11:00 and 3:30 in the afternoon is 15:30.

Hr	Min
15	30
– 11	00
4	30

Abdul worked for a total of 4 hours and thirty minutes, or four and a half hours.

**Example (2)** Add :

4 hours 30 min + 2 hours 45 min

Hr	Min
4	30
+ 2	45
6	75
7	15

75 min  
= 1 hour 15 min

**Example (3)** Subtract :

5 hr 30 min – 2 hr 45 min

Hr	Min
4	60 + 30
<del>5</del> – 2	30 45
2	45

45 minutes cannot be subtracted from 30 minutes. Therefore, we borrow 1 hour and convert it into 60 minutes for the subtraction.

**Example (4)** Amruta travelled by bus for 3 hours 40 minutes and by motorcycle for 1 hour 45 minutes. How long did she spend travelling ?

Hr	Min
3	40
$+$ 1	45
4	85
5	25

Travel time by bus

Travel time by motorcycle

Total travel time

(60 + 25) minutes are 85 minutes,  
that is, 1 hour and 25 minutes.

Let us add this 1 hour to 4 hours.

Therefore, Amruta travelled for a total of 5 hours and 25 minutes.

### Problem Set 45

- Add the following :
  - 2 hours 30 minutes + 4 hours 55 minutes
  - 3 hours 50 minutes + 4 hours 20 minutes
  - 3 hours 45 minutes + 1 hour 35 minutes
  - 4 hours 15 minutes + 2 hours 50 minutes
- Subtract the following :
  - 3 hours 10 minutes – 2 hours 40 minutes
  - 5 hours 20 minutes – 2 hours 35 minutes
  - 4 hours 25 minutes – 1 hour 55 minutes
  - 6 hours 15 minutes – 2 hours 45 minutes
- A government office opens at 7 in the morning and closes at 3 in the afternoon. How long is this office open ?
- A movie starts at 45 minutes past 3 in the afternoon and finishes two and a half hours later. At what time does the movie end ?
- Sakharam was ploughing the field from 8 in the morning. At 12:30 in the afternoon he stopped and started for home. He reached home at 1:30. How long was he ploughing the field ? How long did it take him to reach home from the field ?
- Rambhau started the water pump at ten thirty at night and put it off the same night at a quarter to twelve. How long was the water pump on ?
- Geeta taught in the classroom for 2 hours and 25 minutes in the morning and 1 hour and 45 minutes in the afternoon. How long was she teaching in all ?
- If a bank is open for business from 10 in the morning to 4:30 in the evening, how long is it open ?
- If a shop is open from 9:30 am to 10 pm, how long is it open ?
- If the Maharashtra Express leaving from Kolhapur at 15:30 arrives at Gondia the next day at 20:15, how long is the journey from Kolhapur to Gondia ?