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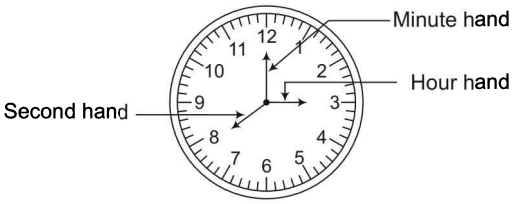
Clock and Calendar

Clock

- A clock is an instrument used for indicating and maintaining the time. It is an electronic device that presents the duration of hour, minute and second.
- The basic structure of a clock is as follows



- The clock represents two things i.e. minute and hour. The minute is a unit of time equal to $\frac{1}{60}$ th of an hour or 60 s i. e. 1 min = 60 s
- An hour is a unit of measurement for the time duration of 60 min or 3600 s.
  i.e. 1 h = 60 min = 3600s

Important Points

- The hands are in the same straight line, when they are coincident or opposite to each other.
- When the two hands are at right angles (90°), they are 15 min space apart.
- When the hands are in opposite directions or at the angle of 180° they are 30 min space apart.
- Both hands of a clock occur at right angle twice in one hour, 22 times in 12 h and 44 times in 24h.
- Both hands of a clock occur in a straight line or are opposite once in one hour, 11 times in 12h and 22 times in 24h.
- Both hands of a clock coincide once in an hour, 11 times in 12h and 22 times in 24 h.

Example 1 A bus for Delhi leaves every 30 min from a bus stand. An enquiry clerk, Rambabu told Shyamlal, a passenger that the bus has already left 10 min ago and the next bus will leave at 9 : 35 am. At what time did the enquiry clerk give this information to Shyamlal?

(a) 9 : 15 am (b) 9 : 10 am
(c) 9 : 20 am (d) 9 : 05 am

Sol. (*a*) As next bus leaves at 9 : 35 am.

∴ Previous bus left at (9 : 35 – 0 : 30) = 9 : 05 am.

The time when enquiry clerk gave this information

= 9:05 + 0:10 = 9:15 am

Calendar

A calendar is a systematic arrangement of day, week and month in a defined pattern with which we can easily recognise the required date, month or week of a particular day.

The basics related to the calendars are given as follows

Day

A day is the 7th part of a week. It has 24 h. It is the smallest unit of a calendar.

Week

A week is the 52nd part of a year. It is a group of 7 days.

Months of the year

We know that, there are 12 months in a year.

January, March, May, July, August, October and December have 31 days each. April, June, September and November have 30 days each, February has 28 days in an ordinary year and 29 day in a leap year.

Century

A block of 100 yr is a called a century. A century has, thus a total of 100 Yr. Thus, each one of the years 1100, 1800, 2000,2100 is a century.

Ordinary Year

An ordinary year is a year which has 365 days (52 weeks +1 odd day). Such years are not divisible by 4. e.g. 2001, 2002, 2003, 2005, etc. Ordinary years in the form of century are not exactly divisible by 400. e.g. 100, 200, 500, etc.

Leap year

A leap year is a year which has 366 days (52 weeks + 2 days) such years are exactly divisible by 4. e.g., 2004, 2008, 2012, etc. Leap year in the form of a century are exactly divisible by 400. e.g., 400, 800, 1200, etc

Important Points

- In any two consecutive ordinary years, date of the next year will be one day ahead of the same date of previous year, e.g. If 2nd March, 2010 is Tuesday, then 2nd March, 2011 will be Wednesday.
- In an ordinary year, the first and last days of the year are same e.g., if 1st Jan falls on Monday, then 31st December will also be Monday. And the last day of a leap year is one day ahead of the first day e.g., if 1st January, 2004 falls on Monday, then 31st december, 2004 will be on Tuesday.
- If a leap year comes immediately after ordinary year, date of the next year will be two days ahead of the same date of previous year (from March to December) and one day ahead of the same date of previous year (in January and February) e.g. If 24th February 2015 is Monday, then 24th February, 2016 is Tuesday and if 16th March , 2015 is Wednesday, then 16th March, 2016 Friday.
- The first day of century cannot be Wednesday, Friday and Sunday.
- The last day of century cannot be Tuesday, Thursday and Saturday.

Example 2 Mohan correctly remembers that his father's birthday is before 20th January but after 16th January whereas his sister correctly remembers that their father's birthday is after 18th January but before 23rd January. On which data in January is definitely their father's birthday?

(a) 18th (b) 19th
(c) 20th (d) Data inadequate

Sol. (*b*) Days according to Mohan = 17th, 18th or 19th January.

Days according to Mohan sister = 19th, 20th, 21st or 22nd January.

Required day is 19th January as it is common in both the groups.

Example 3 If 1st January, 2001 was Monday, then what day of the week was it on 31st December, 2001?

(a) Wednesdsay (b) Friday
(c) Monday (d) Saturday

Sol. (*c*) Year 2001 was an ordinary year and in an ordinary year

First day = Last day

1st January = 31st December

As, given that, 1st January = Monday

Hence, 31st December = Monday

Example 4 2 days before yesterday was Friday, then what day of the week will be day after tomorrow?

(a) Monday (b) Sunday
(c) Saturday (d) Wednesday

Sol. (*d*) 2 days before yesterday = Friday

$\therefore$ Yesterday = Friday + 2 = Sunday

$\therefore$ Today = Sunday + 1 = Monday

$\therefore$ Day after tomorrow = Monday + 2

= Wednesday

1. How many times do the hands of a clock coincide in a day?

(a) 24 (b) 22 (c) 21 (d) 20

2. How many times the hand of a clock are at right angle in a day?

(a) 24 (b) 48 (c) 22 (d) 44

3. How many times in 24 h the hands of a clock are in straight line but in opposite directions?

(a) 20 (b) 22 (c) 24 (d) 48

4. How many times in 24 h the hands of a clock are straight?

(a) 48 (b) 44 (c) 24 (d) 22

5. The priest told the devotes, 'the bell is rung at regular intervals of 45 min. The last bell was rung 5 min ago. The next bell is due to be rung at 7 : 45 am. At what time did the priest give the information to be devotes?

(a) 6 : 55am (b) 7 : 00 am
(c) 7 : 05 am (d) 7 : 40 am

6. Aseem leaves his house at 20 min to 7 in the morning reaching Kaushal's house in 25 min, they finish their breakfast in another 15 min and leave for their office which takes another 35 min. At what time do they leave Kaushal's house to reach their office?

(a) 7 : 55am (b) 8 : 15am
(c) 7 : 45am (d) 7 : 20 am

7. The train for Chandigarh leaves every two and a half hour from New Delhi Railway Station. An announcement was made at the station that the train for Chandigarh had left 40 min ago and the next train will leave at 18 h. At what time was the announcement made?

(a) 17 : 05 h (b) 17 : 20 h
(c) 16 : 10 h (d) 15 : 30 h

8. Raveena left house for the bus stop 15 min earlier than usual. She takes 10 min to reach the stop. She reached the stop at 8: 40 am. What time does she usually leave home for the bus stop?

(a) 8 : 55 am
(b) 8 : 45 am
(c) 8 : 30 am
(d) 8 : 05 am

9. A tortoise walks 1 km in 4h. He takes rest of 20 min after every kilometer. So, you have to find out, how much time would be taken by tortoise to complete 3.5 km journey?

(a) 14 h
(b) 13 h
(c) 15 h
(d) 12 h

10. The digits and numbers from 1 to 12 represented by the dial of a clock are replaced by the letters of English alphabet. The replacement is started with the letter C. Find the letter which is represented by 9 O' clock. Consider hour hand only.
(a) N (b) J (c) H (d) K

11. Which of the following is a leap year?
(a) 2800 (b) 1800 (c) 2600 (d) 3000

12. The last day of a century cannot be either
I. Tuesday II. Thursday
III. Saturday IV. Sunday
(a) I and II (b) I and IV
(c) I, II and III (d) I, III and IV

13. Meena correctly remembers that her father's birthday is after 18th May but before 22nd May. Her brother correctly remembers that their father's birthday is before 24th May but after 20th May. On which date in May was definitely their father's birthday?
(a) 20th (b) 19th (c) 18th (d) 21st

14. Nitin correctly remembers that Nidhi's birthday is before Friday but after Tuesday. Deepak correctly remembers that Nidhi's birthday is after Wednesday but before Saturday. On which of the following days does Nidhi's birthday definitely fall?
(a) Monday (b) Tuesday
(c) Wednesday (d) Thursday

15. If 1st January, 2007 was Monday, then what day of the week lies on 1st January, 2008?
(a) Monday (b) Tuesday
(c) Wednesday (d) Sunday

16. If 1st January, 2008 is Tuesday, then what day of the week lies on 1st January, 2009?
(a) Monday (b) Wednesday
(c) Thursday (d) Sunday

17. Find the number of days from 26th January, 2011 to 23rd September, 2011 (both days are included).
(a) 214 (b) 241 (c) 249 (d) 251

18. If 4th Saturday of a month was 22nd day, then what was the 13th day of that month?
(a) Tuesday (b) Wednesday
(c) Thursday (d) Friday

19. Sudha went to watch movie 9 days ago. She goes to watch movies only on Thursday. What is the day of the week today?
(a) Thursday (b) Saturday
(c) Sunday (d) Monday

20. Today is Monday, it will be ..... after 61 day.
(a) Wednesday (b) Saturday
(c) Tuesday (d) Thursday

21. If a day before yesterday was Thursday, then when will Sunday fall?
(a) Today
(b) 2nd day after today
(c) Tomorrow
(d) A day after tomorrow

22. If day after tomorrow is Tuesday, then what day of the week will it be on 2 days after the day after tomorrow?
(a) Monday (b) Wednesday
(c) Saturday (d) Thursday

Answers

1	*(b)*	2	*(d)*	3	*(b)*	4	*(b)*	5	*(c)*	6	*(d)*	7	*(c)*	8	*(b)*	9	*(c)*	10	*(d)*
11	*(a)*	12	*(c)*	13	*(d)*	14	*(d)*	15	*(b)*	16	*(c)*	17	*(b)*	18	*(c)*	19	*(b)*	20	*(b)*
21	*(c)*	22	*(d)*																

Hints & Solutions

1. (b) We know that, hands of a clock coincide once in every hour but between 11 O'clock and 1 O'clock they coincide only once. Therefore, the hands of clock coincide 11 times in every 12 h.

Hence, they will coincide (11×2) i.e. 22 times in 24h.

2. (d) We know that the hands of a clock are at right angle twice in every hour but between 2 and 4 O' clock there is a common position at 3 O'clock and also between 8 and 10 O'clock there is a common postion at 9 O'clock. So, they are at right angles 22 times in 12 h and therefore in 24 h or in a day they are at right angle 44 times.

3. (b) The hands of a clock are in the same straight line (but opposite in direction) 11 times in every 12 h, because between 5 and 7 they point in opposite direction at 6 O'clock only. Therefore, in a day (24h) the hands points in the opposite direction $(2 \times 11) = 22$ times.

4. (b) The hands are in opposite direction (at angular distance of 180^o) or coincide (at 0^o angualar distance) 22 times in every 12h. Hence, in 24 h, hands are straight (coincide or in opposite direction) $22 \times 2 = 44$ times.

5. (c) Time of ringing last bell

$= (7 : 45 - 0 : 45) = 7 : 00$ am.

But it happened 5 min before the priest gave the information to the devotees.

$\therefore$ Time of giving information

$= 7 : 00 + 0 : 05 = 7 : 05$ am

6. (d) Aseem leaves his house at 20 min to 7, i.e. at 6 : 40 am

He reaches Kaushal's house at

$6 : 40 + 0 : 25 = 7 : 05$ am

They finish their break fast at

$= 7 : 05 + 0 : 15 = 7 : 20$ am

Hence, both leave for office at 7 : 20

7. (c) Time of the last train leaving the station

$= (18:00 - 2:30)\text{h} = 15:30\text{h}$

But this happens 40 min before the announcement is made.

$\therefore$ Time of making announcement

$= (15:30 + 0:40) = 16:10\text{h}$

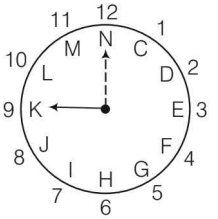
8. (b) Clearly, Raveena left home 10 min before 8 : 40 am i.e., at 8 : 30 am but it was 15 min earlier than usual, so she usually leaves for the bus stop at $(8 : 30 + 0 : 15) = 8 : 45$ am

9. (c) Total time taken by tortoise

$= (4 + 4 + 4 + 2)$ h and $(20 + 20 + 20)$ min

$= 14\text{h} + 60\text{min} = 15\text{h}$

10. (d) According to the question, replacement is as follows



$\therefore$ At 9 O'clock the hour hand points towardsk.

11. (a) The century year which is completely divisible by 400, is a leap year. Thus, the year 2800 is a leap year.

12. (c) The last day of century cannot be Tuesday or Thursday or Saturday.

13. (d) Days according to Meena = 19th 20th or 21st May.

Days according to her brother = 21st, 22nd or 23rd May.

Clearly, 21st May is common in both the groups and hence it is the required day.

14. (d)

According to	Nitin's Birthday
Nitin	Wednesday, Thursday
Deepak	Thursday, Friday

Here, Thursday is common to both. Hence, correct day is Thursday.

15. (b) 2007 is an ordinary year and in an ordinary year 1st January=31 st December

As, 1st January=Monday

$\therefore$ 31st December=Monday

$\therefore$ 1st January, 2008=Monday + 1 odd day

=Tuesday

16. (c) Since, 2008 is leap year.

In a leap year, last day= 1st day+1 odd day

= Tuesday + 1 odd day

= Wednesday = 31 st December

$\therefore$ 1st January, 2009 = Wednesday + 1 odd day
= Thursday

17. (b) According to the question,

26th January to 31 st January = 6 days

February = 28 days
March = 31 days
April = 30 days
May = 31 days
June = 30 days
July = 31 days
August = 31 days
1st September to 23rd September = 23 days
Total days = 241

$\therefore$ Required days = 241

18. (c) 4th Saturday = 22nd day
3rd Saturday = 22 – 7 = 15th day

$\therefore$ 13th day = Saturday – 2 = Thursday

19. (b) Day 9 days ago = Thursday

$\therefore$ Today + Thursday + 9 = Thursday + 7 + 2
= Thursday + 2 = Saturday

20. (b) $\because$ Today = Monday

$\therefore$ Monday will fall again after
7, 14, 21, 28, 35, 42, 49, 56, 63 days.

$\therefore$ It will be monday after 63 days.

Now after 61 day it will be (Monday – 2)
= Satarday

21. (c) A day before yesterday = Thursday

Yesterday = Thursday + 1 = Friday
Today = Friday + 1 = Saturday

$\therefore$ Sunday = Saturday + 1 = Tomorrow

22. (d) A day after tomorrow = Tuesday

$\therefore$ Two days after the day after tomorrow
= Tuesday + 2 = Thursday