CHAPTER 4

Clocks and Calendars

The hour hand and the minute hand of a clock move in relation to each other continuously and at any given point of time, they make an angle between 0° and 180° with each other.

If the time shown by the clock is known, the angle between the hands can be calculated. Similarly, if the angle between two hands is known, the time shown by the clock can be found out.

When we say angle between the hands, we normally refer to the acute/obtuse angles (upto 180°) between the two hands and not the reflex angle (> 180°).

For solving the problems on clocks, the following points will be helpful.

- Minute hand covers 360° in 1 hour, i.e., in 60 minutes. Hence, MINUTE HAND COVERS 6° PER MINUTE.
- Hour hand covers 360° in 12 hours. Hence, HOUR HAND COVERS 30° PER HOUR i.e., 1/2° per minute.

The following additional points also should be remembered. In a period of 12 hours, the hands make an angle of

- 0° with each other (i.e., they coincide with each other), 11 times.
- 180° with each other (i.e., they lie on the same straight line), 11 times.
- any other angle with each other, 22 times.

Note: We can also solve the problems on clocks using the method of "Relative Velocity"

In 1 minute, Minute Hand covers 6° and Hour hand covers 1/2°.

Therefore, Relative Velocity = 6 – 1/2 = $5^{1}/_{2}$° per minute. Alternately, in 1 hour, the minute hand covers 60 minute divisions whereas the hour hand covers 5 minute divisions.

∴ Relative Speed = 60 – 5 = 55 minutes per hour.

However, adopting the approach of actual angles covered is by far the simplest and does not create any confusion.

Points to Note

- Any angle is made 22 times in a period of 12 hours.
- In a period of 12 hours, there are 11 coincidences of the two hands, when the two hands are in a straight line facing opposite directions.
- The time gap between any two coincidences is 12/11 hours or $65^{5}/_{11}$ minutes.
- If the hands of a clock (which do not show the correct time) coincide every p minutes, then

If $p > 65^{5}/_{11}$, then the watch is going slow or losing time. If $p < 65^{5}/_{11}$, then the watch is going fast or gaining time.

To calculate the angle 'θ' between the hands of a clock, we use the following formula (where m = minutes and h = hours)

(i) $\theta = \frac{11}{2}m - 30h \left(\text{when } \frac{11}{2}m > 30h \right)$

(ii) $\theta = 30h - \frac{11}{2}m \left(\text{when } 30h > \frac{11}{2}m \right)$

Solved Examples

1. What is the angle between the minute hand and the hour hand of a clock at 4 hours 30 minutes?

Solution: We have $\theta = \frac{11}{2}m - 30h$

Where θ = angle

m = minutes

h = hours

Here, m = 30 and h = 4

$\theta = \frac{11}{2} \times 30 - 30 \times 4$

$\Rightarrow \theta = 165 - 120$

$\Rightarrow \theta = 45°$

The angle between the two hands is 45°.

2. At what time between 4 and 5 O'clock will the minute hand and the hour hand make an angle of 30° with each other?

Solution: $\theta = \frac{11}{2}m - 30h$,

here $\theta = 30°$, h = 4, m

$\Rightarrow 11m = 60h + 2\theta$

$\Rightarrow m = \frac{60h + 2\theta}{11} = \frac{60 \times 4 + 2 \times 30}{11}$

$= \frac{240 + 60}{11} = \frac{300}{11} = 27\frac{3}{11}$ min past 4.

$\theta = 30h - \frac{11}{2}m$

$11m = 60h - 2\theta \Rightarrow m = \frac{60h - 2\theta}{11}$

$\Rightarrow \frac{60 \times 4 - 2 \times 30}{11} = \frac{240 - 60}{11}$

$= \frac{180}{11} = 16\frac{4}{11}$ min past 4 O' clock

Therefore, the angle between the two hands is 30° when the time is 4 hours $16\frac{4}{11}$ min and 4 hours $27\frac{3}{11}$ min.

3. At what time between 4 and 5 O' clock will the minute hand and the hour hand coincide with each other?

Solution: When the two hands coincide with each other the angle between them is 0°.

$\theta = \frac{11}{2}m - 30h$. Here $\theta = 0°$, $h = 4\ \frac{11}{2}m = 30h$

$\Rightarrow 11m = 60h \Rightarrow m = \frac{60h}{11}$

$m = \frac{60 \times 4}{11} = \frac{240}{11} = 21\frac{9}{11}$ min past 4.

The two hands of the clock coincide at 4 hours $21\frac{9}{11}$ min.

Directions for questions 4 to 6: Select the correct alternative from the given choices.

4. At what time between 5 and 6 O'clock, will the hands of a clock be at an angle of 62°?

(1) 5 hours $17^{2}/_{11}$ minutes

(2) 5 hours $38^{6}/_{11}$ minutes

(3) 5 hours 16 minutes

(4) Both (2) and (3)

Solution: $\theta = 11/2\ m - 30\ h$

$11/2\ m = \theta + 30\ h$

$11\ m = 2(62 + 30 \times 5)$

$m = {}^{424}/_{11}$ = At $38^{6}/_{11}$ min past 5 O'clock the two hands of the clock are 62° apart.

$\theta = 30\ h - 11/2\ m \Rightarrow 11/2\ m = 30\ h - \theta$

$\Rightarrow 11m = 2(30 \times 5 - 62) \Rightarrow m = 176/11$ = At 16 minutes past 5 O'clock, the two hands of the clock are 62° apart.

Choice (4)

5. A clock is set to show the correct time at 10 a.m. The clock uniformly loses 12 min in a day. What will be the actual time when the clock shows 5 p.m. on the next day?

(1) 4:25 p.m.

(2) 4:45 p.m.

(3) 5:15 p.m.

(4) 4:50 p.m.

☞ ***Solution:*** Time from 10:00 a.m. a day to 5:00 p.m. the next day = 31 hours

23 hours 48 minutes of this clock = 24 hours of the correct clock.

$23\frac{4}{5} = \frac{119}{5}$ of this clock = 24 hours of the correct clock

31 hours of this clock $= \frac{31 \times 119}{24 \times 5}$

= 31 hrs 15 min (Approx.)

The correct time is 31 hours 15 minutes after 10:00 a.m.

= 5 hours 15 minutes.

Choice (3)

6. The minute-hand of a clock overtakes the hour-hand at intervals of 62 minutes of a correct time. How much in a day does the clock gain or lose?

(1) $80^{80}/_{341}$ minutes (2) $850^{90}/_{311}$ minutes

(3) $80^{70}/_{341}$ minutes (4) $80^{60}/_{341}$ minutes

☞ ***Solution:*** In a correct clock, the hands of a clock coincide every $65^{5}/_{11}$ minutes. But in this case both the hands are together again after 62 minutes, hence the clock gains time.

Gain in 62 minutes = ($65^{5}/_{11}$ – 62) = 3 5/11 min gain.

Gain in 24 hours = 38/11 × 60 × 24 / 62

$$= \frac{19 \times 60 \times 24}{11 \times 31} = 80\frac{80}{341}$$

So the clock gains $80^{80}/_{341}$ minutes in 24 hours.

Choice (1)

Suppose, you are asked to find the day of the week on 30 June, 1974, it would be a tough job to find it if you do not know the method. The method of finding the day of the week lies in the number of "odd days".

Note: Every 7th day will be the same day count wise, i.e., if today is Monday, then the 7th day counting from Tuesday onwards will once again be Monday. Hence, by dividing the total numbers of days by 7, the remainder obtained will be called the odd days.

Example:

52 days ÷ 7 = 3 odd days.

Leap and Ordinary Year

A non-leap year has 365 days whereas a leap year has one extra day because of 29 days in the month of February. Every year which is divisible by 4 is called a leap year. Leap year consists of 366 days, (52 complete weeks + 2 days), the extra two days are the odd days. So, a leap year has two odd days because 366 ÷ 7 = 2 (remainder).

An ordinary year consists of 365 days (52 complete weeks + 1 day), the extra one day is the odd day. So, an ordinary year has one odd day.

Note: Every century, which is a multiple of 400, is a leap year.

Example:

400, 800, 1200, 1600 - - - are leap years.

Counting the number of Odd Days

100 years consist of 24 leap years + 76 ordinary years. (100 years when divided by 4, we get 25 leap years but 25th i.e., the 100th year is not a leap year, hence only 24 leap years)

= 2 × 24 odd days + 1 × 76 odd days

= 124 days = 17 weeks + 5 days

The extra 5 days are the number of odd days.

So, 100 years contain 5 odd days.

Similarly, for 200 years we have 10 extra days (1 week + 3 days).

∴ 200 years contains 3 odd days.

Similarly, 300 years contain 1 odd day and 400 years contain 0 odd days.

Counting of number of odd days, when only one date is given

Here, we take January 1st 1 AD as the earlier date and we assume that this day is a Monday. After this, the above mentioned method is applied to count the number of odd days and find the day of the week for the given date.

Counting number of odd days, when two dates are given

Any month which has 31 days. has 3 odd days.

(∵ 31 ÷ 7 leaves 3 as remainder) and any month having 30 days has 2 odd days (30 ÷ 7 leaves 2 as remainder).

Then, the total number of odd days are calculated by adding the odd days for each month. The final figure is again divided by 7 to get the final odd days. Finally, the day of the week for the second date is obtained by adding the odd days to the day of the week for earlier date.

Solved Examples

1. If you were born on 28 January 1988, which was a Sunday, on what day of the week will your birthday fall in 1989?

(1) Monday
(2) Tuesday
(3) Sunday
(4) Cannot be determined

Solution: Since, 1988 is a leap year and as your birthday is before 29 February, your birthday in the next year will be two days after Sunday (since a leap year will have two odd days), which is Tuesday.

Choice (2)

2. If 8 March, 1988, which is your date of birth, is a Monday, on what day of the week will your birthday fall in the year 1989?

(1) Tuesday (2) Sunday
(3) Monday (4) Friday

Solution: Since, 8 March, 1988 comes after 29 February the number of odd days between 8 March 1988 and 8 March 1989 is only one. Hence, in 1989 your birthday will be one day after Monday, i.e., on Tuesday.

Choice (1)

3. If 25 May, 2003 is a Sunday, what day of the week will be 25 December in that year?

(1) Monday (2) Tuesday
(3) Wednesday (4) Thursday

Solution:

Month	Number of days
May	6
+	+
June	30
+	+
July	31
+	+
Aug	31
+	+
Sep	30
+	+
Oct	31
+	+
Nov	30
+	+
Dec	25

Total number of days = 214

Number of odd days in 214 days

= 214 ÷ 7 = 30 complete weeks + 4 odd days.

25 December will be 4 days after Sunday, i.e., on Thursday.

(or)

Month	Number of odd days
May	6
+	+
June	2
+	+
July	3
+	+
Aug	3
+	+
Sep	2
+	+
Oct	3
+	+
Nov	2
+	+
Dec	4

Total number of odd days = 25 and 25/7 = 4 odd days i.e., 4 days after Sunday, i.e., Thursday.

Choice (4)

PRACTICE EXERCISE 4 (A)

Directions for questions 1 to 40: Select the correct alternative from the given choices.

1. At what angle are the hands of a clock inclined at 50 minutes past 8?

(1) 15° (2) $22^{1}/_{2}°$
(3) 35° (4) 45°

2. What is the angle between the two hands of a clock, when the clock shows 4.30 p.m.?

(1) 15° (2) 30°
(3) 45° (4) None of these

3. What is the angle between the two hands of a clock, when the time is 3.40 a.m.?

(1) 60° (2) 90°
(3) 110° (4) 130°

4. At what angle are the hands of a clock inclined at 30 minutes past 6?

(1) $7^{1}/_{2}°$ (2) $11^{1}/_{2}°$
(3) 15° (4) 23°

5. At what time between 9 O'clock and 10 O'clock are the hands of a clock in the opposite direction?

(1) 9hrs. $17^{8}/_{11}$min (2) 9hrs. $21^{9}/_{11}$min
(3) 9hrs. $23^{9}/_{11}$min (4) None of these

6. How many degrees will the minute-hand move, in the same time in which the second hand moves 300°?

(1) 6° (2) 5°
(3) 4° (4) 10°

7. A boy observes the reflection of a wall clock in a mirror. The time observed by the boy in the mirror is 3 hours 45 minutes. What is the actual time shown in the clock?

(1) 8 hours 45 minutes (2) 9 hours 45 minutes
(3) 8 hours 15 minutes (4) 9 hours 15 minutes

8. If a wall clock shows 9 hours 30 minutes, what time does it show in the mirror?

(1) 2 hours 30 minutes (2) 3 hours 30 minutes
(3) 9 hours 30 minutes (4) None of the above

9. At what time between 6 O'clock and 7 O'clock are the two hands of a clock opposite in direction?

(1) 6 hrs. $5^{11}/_{14}$ min. (2) 6 hrs. $15^{11}/_{14}$ min.
(3) 6 hrs. $50^{11}/_{14}$ min. (4) None of these

10. A clock is set to show the correct time at 4:00 p.m. The clock loses 12 minutes in 48 hours. What will be the true time when the clock indicates 6:00 p.m. the next day?

(1) 6:06 p.m. (2) 6:10 p.m.
(3) 6:20 p.m. (4) 6:12 p.m.

11. There are two clocks on a wall, both set to show the correct time at 10 a.m. Both the clocks gain 1/2 and 1 minute respectively in an hour. If the clock which gains 1/2 minute in 1 hour shows 10 p.m., what time does the other watch show?

(1) 9:48 p.m. (2) 9:56 p.m.
(3) 10:06 p.m. (4) None of these

12. There are two clocks on a wall, both set to show the correct time at 5:00 a.m. One clock loses one minute in an hour while the other gains one minute in an hour. By how many minutes do the two clocks differ at 10:00 p.m.?

(1) 30 minutes (2) 15 minutes
(3) 17 minutes (4) 34 minutes

13. A watch which gains 10 seconds in 5 minutes was set right at 9:00 a.m. When the watch indicated 20 minutes past 7 O'clock the same evening, the true time is

(1) 7:00 p.m. (2) 7:40 p.m.
(3) 7:10 p.m. (4) 8:00 p.m.

14. A clock is set to show the correct time at 11:00 a.m. The clock gains 12 minutes in 12 hours. What will be the true time when the watch indicates 1:00 p.m. on the 6th day?

(1) 10:00 a.m. (2) 11:00 a.m.
(3) 12:00 noon (4) None of these

15. A clock is set to show the correct time at 6:00 a.m. The clock loses 12 minutes in 24 hours. What will be the true time when the clock indicates 5:00 a.m. after 3 days?

(1) 57 minutes past 5:00 a.m.
(2) 3 minutes past 6:00 a.m.
(3) 48 minutes past 5:00 a.m.
(4) 12 minutes past 6:00 a.m.

16. A watch, which gains uniformly, was observed to be 5 minutes slow at 12 noon on a Sunday. On the subsequent Wednesday at 6:00 p.m. it was noticed

that the watch was 5 minutes fast. When did the watch show the correct time?

(1) On Monday at 12 noon
(2) On Monday at 3:00 a.m.
(3) On Tuesday at 3:00 a.m.
(4) On Tuesday at clock midnight

17. A clock is set to show the correct time at 9:00 a.m. The clock gains 10 minutes in a day. What will be the true time when the watch indicates 2:00 p.m. the next day?

(1) 48 minutes past 1:00 p.m.
(2) 12 minutes past 1:00 p.m.
(3) 48 minutes past 10:00 a.m.
(4) None of the above

18. A watch which gains uniformly, was observed to be 6 minutes slow at 6 p.m. on Monday. It was noticed 12 minutes fast at 6 a.m. the following Monday morning. When did the watch show the correct time?

(1) Wednesday 10:00 p.m.
(2) Thursday 10:00 a.m.
(3) Tuesday 10:00 p.m.
(4) None of the above

19. A watch showed 5 past 5 O'clock on Wednesday evening when the correct time was 5:00 p.m. It loses uniformly and was 5 minutes slow after two days, at 7:00 p.m. When did the watch show the correct time?

(1) Thursday 5 p.m. (2) Thursday 6 a.m.
(3) Thursday 6 p.m. (4) Thursday 6.30 p.m.

20. A watch which loses uniformly was observed to be 10 minutes fast at 8:00 a.m. on the 17th of a month. It showed 20 minutes less than the correct time at 8:00 p.m. on the 24th of the same month. When did the watch show the correct time?

(1) On 19th at 8:00 p.m.
(2) On 21st at 8:00 a.m.
(3) On 20th at 9:00 a.m.
(4) None of these

21. How many odd days are there in 382 days?

(1) 1 (2) 2
(3) 3 (4) 4

22. If today is Sunday, then what day of the week will be the 426th day from today?

(1) Saturday (2) Friday
(3) Tuesday (4) Wednesday

23. If today is Wednesday, what day will it be, 1 year and 10 days from today?

(1) Sunday (2) Friday
(3) Monday
(4) Cannot be determined

24. Which among the following years is a leap year?

(1) 2600 (2) 2700
(3) 2800 (4) 3000

25. If 22 April, 1982 was a Thursday, then what day of the week was 3 November, 1982?

(1) Monday (2) Wednesday
(3) Friday (4) Sunday

26. If holidays are declared only on Sundays and 19 March in a particular year was a Sunday, is 23 September a holiday in that year?

(1) Yes, 23 September is a holiday.
(2) 23 September is not a holiday.
(3) 23 September is a holiday only if it is a leap year.
(4) Cannot be determined

27. I met my friend on 3 April, 1995 which was a Monday and promised to meet him again in the month of October in the same year—but only on a Sunday. On which of the following days could I meet my friend?

(1) 7th, 14th, 21st, 28th
(2) 1st, 8th, 15th, 22nd, 29th
(3) 2nd, 9th, 16th, 23rd, 30th
(4) 3rd, 10th, 17th, 24th, 31st

28. If the first day of the year 2005 is a Saturday, then what day of the week will be 1 January, 2009?

(1) Thursday (2) Friday
(3) Sunday (4) Monday

29. If 26 February, 2014 is on Wednesday, then what day of the week is on 14 July, 2017?

(1) Friday (2) Saturday
(3) Wednesday (4) Sunday

30. If 1 January, 2012 is on Sunday, then what day of the week is 1 January, 2016?

(1) Friday (2) Sunday
(3) Wednesday (4) Saturday

31. What day of the week will 1 January, 2018 be, given that 1 January, 2012 is a Saturday?

(1) Monday (2) Saturday
(3) Sunday (4) Friday

32. If 4 August, 1996 was a Sunday, then what day of the week was 12 April, 1992?

(1) Friday (2) Saturday
(3) Monday (4) Sunday

33. If 10th April, 1963 was a Wednesday, then what day of the week was 23rd August, 1959?

(1) Sunday (2) Monday
(3) Friday (4) Tuesday

34. On which dates of March, 2008 will a Sunday come?

(1) 2, 9, 16, 23, 30 (2) 1 8, 15, 22, 29
(3) 7, 14, 21, 28 (4) 3, 10, 17, 24, 31

35. If August 15th, 2003 is on Friday, then on which day of the week would the Independence day be celebrated in the year 2103?

(1) Tuesday (2) Wednesday
(3) Friday (4) Sunday

36. What day of the week was 18 July, 1978?

(1) Sunday (2) Monday
(3) Tuesday (4) Friday

37. What day of the week would be 26 March, 2023?

(1) Sunday (2) Monday
(3) Tuesday (4) Friday

38. Two days ago my father told me, "my friend is going to visit us on the seventh day from today". If the day on which my father's friend is going to visit us is Thursday, which day of the week is today?

(1) Monday (2) Thursday
(3) Saturday (4) Tuesday

39. A doctor asked a patient to take one dose of the medicine on the day the patient consulted the doctor, a second dose after seven days, a third dose three days after that and the last dose one day after the third dose. If the patient consulted the doctor on a Friday, on which day of the week will the patient take the last dose?

(1) Wednesday
(2) Friday
(3) Monday
(4) Tuesday

40. Ravi started a work and completed it after nine days. Ramesh started a similar work three days after Ravi has started and completed it on a Wednesday. If Ravi has completed the work two days after Ramesh has completed the work, on which day did Ravi start the work?

(1) Wednesday (2) Monday
(3) Tuesday (4) Thursday

PRACTICE EXERCISE 4 (B)

Directions for questions 1 to 40: Select the correct alternative from the given choices.

1. How many degrees does an hour-hand move in 10 minutes?

(1) 10° (2) 20°
(3) 15° (4) 5°

2. How many degrees will the minute-hand move, in the same time, in which the hour-hand moves 10°?

(1) 40° (2) 80°
(3) 120° (4) 160°

3. At what angle are the hands of a clock inclined at 4 hours 20 minutes?

(1) 5° (2) 10°
(3) 20° (4) 25°

4. What is the angle between the two hands of a clock, when the clock shows 3 hours 25 minutes?

(1) 45½° (2) 46°
(3) 46½° (4) 47½°

5. At what angle are the hands of a clock inclined at 20 minutes past 7?

(1) 80° (2) 90°
(3) 100° (4) 120°

6. What is the angle between the two hands of a clock, when the time is 2 hours 35 minutes?

(1) 122½° (2) 142½°
(3) 132½° (4) 116½°

7. At what time between 6 and 7 O'clock, are the hands of a clock together?

(1) 6 hours $32^{8}/_{11}$ minutes
(2) 6 hours $33^{6}/_{11}$ minutes
(3) 6 hours $34^{5}/_{11}$ minutes
(4) 6 hours $29^{7}/_{11}$ minutes

8. At what time between 3 and 4 O'clock are the hands of a clock in the opposite direction?

(1) 3 hours $48^{6}/_{11}$ minutes
(2) 3 hours $49^{1}/_{11}$ minutes
(3) 3 hours $50^{4}/_{11}$ minutes
(4) 3 hours $47^{2}/_{11}$ minutes

9. The angle between the two hands of a clock is 70°, when the hour hand is between 7 and 8. What time does the watch show?

(1) 7 hours $50^{10}/_{11}$ minutes
(2) 7 hours $25^{5}/_{11}$ minutes
(3) 7 hours $42^{8}/_{11}$ minutes
(4) Both (1) and (2)

10. What time does the clock show when the hour hand is between 3 and 4 and the angle between the two hands of the clock is 50°?

(1) $8^{5}/_{11}$ min past 3
(2) $25^{5}/_{11}$ min past 3
(3) $24^{6}/_{11}$ min past 3
(4) Both (1) and (2)

11. The time on the watch is 4:30. If the minute hand points towards the south, the hour hand will point towards

(1) South-east (2) East
(3) West (4) North-west

12. A boy observes the reflection of a wall clock in a mirror. The time observed by the boy in the mirror is 4 hours 20 minutes. What is the actual time shown on the clock?

(1) 7 hours 15 minutes
(2) 7 hours 50 minutes
(3) 7 hours 40 minutes
(4) 7 hours 35 minutes

13. If the time in a clock is 7 hours 15 minutes, then what time does it show on the mirror?

(1) 4 hours 50 minutes
(2) 4 hours 40 minutes
(3) 4 hours 35 minutes
(4) 4 hours 45 minutes

14. There are two clocks on a wall, both set to show the correct time at 8 a.m. One clock loses two minutes in an hour while the other gains one minute in one hour. By how many minutes do the two clocks differ at 12 noon on the same day?

(1) 6 minutes (2) 9 minuets
(3) 12 minutes (4) 15 minutes

15. A clock is set to show the correct time at 8:00 a.m. The clock gains 10 minutes in a day. What will be the approximate time, when the watch indicates 4:00 p.m. the next day?

(1) 3 hours 36 minutes (2) 3 hours 47 minutes
(3) 3 hours 50 minutes (4) 3 hours 54 minutes

16. There are two clocks on a wall, both set to show the correct time at 12 noon. Both the clocks gain 1 minute and 2 minutes respectively in an hour. If the clock which gains 1 minute in one hour shows the time as 8 minutes past 8:00 p.m. on the same day, then what time does the other watch show?

(1) 8 hours 4 minutes (2) 8 hours 8 minutes
(3) 8 hours 16 minutes (4) 7 hours 52 minutes

17. A watch, which loses uniformly was observed to be 12 minutes fast at 4:00 a.m. on 6th of a month. It showed 20 minutes less than the correct time at 6 p.m. on the 10th of the same month. When did the watch show the correct time?

(1) 9:15 p.m. on the 7th.
(2) 9:5 a.m. on the 8th.
(3) 9:35 p.m. on the 9th.
(4) 9:20 p.m. on 7th.

18. A watch, which gains uniformly, was observed to be 4 minutes, slow at 6:00 a.m. on a Monday. On the subsequent Thursday at 7:00 p.m. it was noticed that the watch was 6 minutes fast. When did the watch show the correct time?

(1) 5:00 p.m. Tuesday
(2) 4:00 p.m. Tuesday
(3) 6:00 p.m. Tuesday
(4) 3:00 p.m. Tuesday

19. A watch, which gains uniformly, was observed to be 5 minutes slow at 12 noon on Monday. It was noticed 10 minutes fast at 6 p.m. on the next day. When did the watch show the correct time?

(1) 9:00 p.m., on the same day.
(2) 9 hours 30 minutes p.m., on the same day.
(3) 10 hours 30 minutes p.m., on the same day.
(4) 10:00 p.m., on the same day

20. A watch showed 5 minutes past 3 O'clock on Sunday evening when the correct time was 3 O'clock. It loses uniformly and was observed to be 10 minutes slow on the subsequent Tuesday at 9:00 p.m. When did the watch show the correct time?

(1) 8:00 a.m. Monday
(2) 10:00 a.m. Monday

(3) 7:00 a.m. Monday
(4) 9:00 a.m. Monday

21. If today is Monday, what day will it be 350 days from today?
(1) Sunday
(2) Monday
(3) Tuesday
(4) None of these

22. If today is Tuesday, what day will it be after 1 year and 150 days from today?
(1) Monday
(2) Wednesday
(3) Friday
(4) Cannot be determined

23. If 8 March, 1985 was a Friday, then what day of the week was 26 July, 1985?
(1) Monday (2) Tuesday
(3) Thursday (4) Friday

24. If 30 June, 1991 was a Sunday, then what day of the week was 7 April, 1992?
(1) Sunday (2) Monday
(3) Tuesday (4) None of these

25. If 19 September, 1995 was a Tuesday, then what day of the week was 16 November, 1997?
(1) Tuesday (2) Wednesday
(3) Friday (4) Sunday

26. If 10 August, 1991 was a Saturday, then what day of the week will this day be after 3 years?
(1) Wednesday (2) Thursday
(3) Friday (4) None of these

27. If 4 May, 1992 was a Monday, then what day of the week was 1 January, 1991?
(1) Friday (2) Thursday
(3) Tuesday (4) Monday

28. If 1 January, 1997 was a Wednesday, then what day of the week was 1 January, 1996?
(1) Sunday (2) Tuesday
(3) Thursday (4) Monday

29. If 31 July, 1997 was a Thursday, then what day of the week was 30 June, 1996?
(1) Friday (2) Sunday
(3) Wednesday (4) None of these

30. If 16 January, 1980 was a Wednesday, then what day of the week was 16 January, 1981?
(1) Saturday
(2) Friday
(3) Tuesday
(4) Sunday

31. On what day of the week did India celebrate its first Republic Day, i.e., 26 January, 1950?
(1) Sunday (2) Tuesday
(3) Thursday (4) None of these

32. What day of the week will 1 January, 2008 be, given that 1 January 2000 is a Saturday?
(1) Sunday (2) Wednesday
(3) Tuesday (4) None of these

33. What day of the week was 18 March, 1924 given that 1 October, 1987 was a Thursday?
(1) Sunday (2) Friday
(3) Saturday (4) None of these

34. Which will be the next leap year after 2096?
(1) 2100 (2) 2102
(3) 2104 (4) 2108

35. If 20 January, 2000 was a Thursday, then what day of the week was 26 February, 1997?
(1) Tuesday (2) Sunday
(3) Wednesday (4) Thursday

36. If 30 June, 1989 was a Friday, then what day of the week was 17 September, 1993?
(1) Monday (2) Wednesday
(3) Friday (4) Sunday

37. I met one of my school friends in America on 16 August, 1997 which was a Saturday and promised to meet him again in the month of December, 1999, but only on a Sunday. On which of the following dates can I meet my friend?
(1) 24 December, 1999
(2) 26 December, 1999
(3) 27 December, 1999
(4) None of the above

38. Imagine that in a calendar year, there were 436 days and 9 days in a week, then how many odd days will be there in that year?
(1) 1 (2) 2
(3) 3 (4) 4

39. Kavya was born two years after Kavita was born, who was born five years before Kumari was born, who was born three years after Komali was born, who was born eight years before Karuna was born. What is the difference between the ages of Kavya and Karuna?

(1) 8 years (2) 10 years
(3) 5 years (4) 6 years

40. In a city, market remains closed on every Sunday and on all public holidays. Market remains open on all other days. Suresh who arrived in the city noticed that the markets are closed on 3rd day, 6th day and on 13th day after his arrival. On which day of the week did he arrive in the city?

(1) Monday (2) Wednesday
(3) Sunday (4) Saturday

ANSWER KEYS

PRACTICE EXERCISE 4 (A)

1. 3	**2.** 3	**3.** 4	**4.** 3	**5.** 4	**6.** 2	**7.** 3	**8.** 1	**9.** 4	**10.** 1
11. 3	**12.** 4	**13.** 1	**14.** 2	**15.** 3	**16.** 3	**17.** 1	**18.** 1	**19.** 3	**20.** 1
21. 4	**22.** 1	**23.** 4	**24.** 3	**25.** 2	**26.** 2	**27.** 2	**28.** 1	**29.** 1	**30.** 1
31. 3	**32.** 4	**33.** 1	**34.** 1	**35.** 2	**36.** 3	**37.** 1	**38.** 3	**39.** 4	**40.** 1

PRACTICE EXERCISE 4 (B)

1. 4	**2.** 3	**3.** 2	**4.** 4	**5.** 3	**6.** 3	**7.** 1	**8.** 2	**9.** 4	**10.** 2
11. 1	**12.** 3	**13.** 4	**14.** 3	**15.** 2	**16.** 3	**17.** 1	**18.** 2	**19.** 4	**20.** 4
21. 2	**22.** 4	**23.** 4	**24.** 3	**25.** 4	**26.** 1	**27.** 3	**28.** 4	**29.** 2	**30.** 2
31. 3	**32.** 3	**33.** 4	**34.** 3	**35.** 3	**36.** 3	**37.** 2	**38.** 4	**39.** 1	**40.** 4