# Clock And Calendar

1. If the two hands in a clock are 3 minutes divisions apart, then the angle between them is
(a) 3° (b) 18° (c) 24° (d) 60°

2. At what approximate time between 4 and 5 am will the bands of a clock be at right angle?
(a) 4:40 am (b) 4:38am
(c) 4:35 am (d) 4:39 am

3. What will be the acute angle between hands of a clock at 2: 30?
(a) 105° (b) 115° (c) 95° (d) 135°

4. In 16 minutes, the minute hand gains over the hour .hand by
(a) 16° (b) 80° (c) 88° (d) 96°

5. A clock is set right at 1 p.m. If it gains one minute in an hour, then what is the true time when the clock indicates 6 p.m. in the same day?
(a) $55\frac{5}{61}$ minutes past 5
(b) 5 minutes past 6
(c) 5 minutes to 6
(d) $59\frac{1}{64}$ minutes past 5

6. Two clocks were set right at noon on Sunday. One gains 2 min and the other loses 3 min in 24 hours. What will be the true time when the first clock indicates 3 pm on Wednesday?
(a) 2:38 pm (b) 2:54 pm
(c) 2:23 pm (d) 2:48 pm

7. At what time between 9'O clock and 10'O clock will the hands of a clock point in the opposite directions?
(a) $16\frac{4}{11}$ minutes past 9
(b) $16\frac{4}{11}$ minutes past 8
(c) $55\frac{5}{61}$ minutes past 7
(d) $55\frac{5}{61}$ minutes to 8

8. A clock gains 15 minutes per day. It is set right at 12 noon. What time will it show at 4.00 am, the next day?
(a) 4:10 am (b) 4:45am
(c) 4:20 am (d) 5:00am

9. Find the exact time between 7 am and 8 am when the two hands of a watch meet?
(a) 7 hrs 35 min (b) 7 hrs 36.99 min
(c) 7 hrs 38.18min (d) 7 hrs 42.6mm

10. In a watch, the minute hand crosses the hour hand for the third time exactly after every 3 hrs., 18 min., 15 seconds of watch time. What is the time gained or lost by this watch in one day?
(a) 14 min. 10 seconds lost
(b) 13 min. 50 seconds lost
(c) 13min. 20 seconds gained
(d) 14 min. 40 seconds gained

11. At what time between 3 and 4 'O clock, the hands of a clock coincide?
(a) $16\frac{4}{11}$ minutes past 3
(b) $15\frac{5}{61}$minutes past 3
(c) $15\frac{5}{60}$minutes to 2
(d) $16\frac{4}{11}$minutes to 4

12. A watch which gains uniformly is 2 minutes low at noon On Monday and is 4 min 48 sec, fast at 2 p.m. on the following Monday. When was it correct?
(a) 2 p.m. on Tuesday
(b) 2 p.m. on Wednesday
(c) 3 p.m. on Thursday
(d) 1 p.m. on Friday

13. If a clock strikes 12 in 33 seconds, it will strike 6 in how many seconds?
(a) $\frac{33}{2}$ (b) 15 (c) 12 (d) 22

14. A watch which gains 5 seconds in 3 minutes was set right at 7 a.m. In the afternoon of the same day, when the watch indicated quarter past 4 O'clock, the true time is
(a) 4 p.m. (b) $59\frac{7}{12}$ minutes past 3
(c) $58\frac{7}{11}$minutes past 3
(d) $2\frac{3}{11}$ minutes past 4

15. At what time between 8 and 9 o'clock will the hands of a watch be in straight line but not together?
(a) $10\frac{11}{10}$ min. past 8 (b) $10\frac{10}{11}$ min. past 8
(c) $11\frac{10}{11}$ min. past 8 (d) $12\frac{10}{11}$ min. past 8

16. At what time between 5.30 and 6 will the hands of a clock be at right angles?
(a) $43\frac{5}{11}$ min. past 5 (b) $43\frac{7}{11}$ min.past 5

(c) 40 min. past 5 (d) 45 min. past 5

17. Find the angle between the hour hand and the minute hand o f a clock when the time is 3.2 5.
(a) 45° (b) $37\frac{1}{2}°$ (c) $47\frac{1}{2}°$ (d) 46°

18. How much does a watch lose per day, if its hands coincide every 64 minutes?
(a) $32\frac{8}{11}$ min. (b) $36\frac{5}{11}$ min.
(c) 90 min. (d) 96 min.

19. An accurate clock shows 8 O'clock in the morning. Through how many degrees will the hour hand rotate when the clock shows 2 O'clock in the afternoon?
(a) 144° (b) 150° (c) 168° (d) 180°

20. A clock is set right at 5 a.m. The clock loses 16 min. in 24 hours. What will be the true time when the clock indicates 10 p.m. on the 4th day?
(a) 11p.m. (b) 10 p.m. (c) 9 p.m. (d) 8 p.m.

21. The reflex angle between the hands of a clock at 10:2: 5 is?
(a) 180° (b) $192\frac{1}{2}°$ (c) 195° (d) $197\frac{1}{2}°$

22. A clock gains 5 minutes, in 24 hours. It was set right at 10 a.m. on Monday. What will be the true time when the clock indicates 10:30 a.m. on the next Sunday?
(a) 10 a.m.
(b) 11 a.m.
(c) 25 minutes past 10 a.m.
(d) 5 minutes to 11 a.m.

23. At what angle the hands of a clock are inclined at 15 minutes past 5 ?
(a) $72\frac{1}{2}°$ (b) 64° (c) $58\frac{1}{2}°$ (d) $67\frac{1}{2}°$

24. What will be the day of the week on 1st January, 2010?
(a) Friday (b) Saturday (c) Sunday (d) Monday

25. The calendar for the year 2005 is the same as for the year:
(a) 2010 (b) 2011
(c) 2012 (d) 2013

26. If 09/12/2001 happens to be Sunday, then 09/12/1971 would have been at
(a) Wednesday (b) Tuesday
(c) Saturday (d) Thursday

27. Find the day of the week on 16th July, 1776.
(a) Tuesday (b) Wednesday
(c) Monday (d) Thursday

28. On January 12, 1980, it was Saturday. The day of the week on January 12, 1979 was –
(a) Saturday (b) Friday
(c) Sunday (d) Thursday

29. The year next to 1991 having the same calendar as that of 1990 is-
(a) 1998 (b) 2001 (c) 2002 (d) 2003

30. Today is Monday. After 61 days it will be:
(a) Wednesday (b) Saturday
(c) Tuesday (d) Thursday

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | (b) | 5 | (a) | 9 | (c) | 13 | (b) | 17 | (c | 21 | (d) | 25 | (c) | 29 | (c) |
| 2 | (b) | 6 | (b) | 10 | (b) | 14 | (a) | 18 | (a) | 22 | (a) | 26 | (d) | 30 | (b) |
| 3 | (a) | 7 | (a) | 11 | (a) | 15 | (b) | 19 | (d) | 23 | (d) | 27 | (a) | | |
| 4 | (c) | 8 | (a) | 12 | (b) | 16 | (b) | 20 | (a) | 24 | (c) | 28 | (b) | | |

## HINTS & EXPLANATIONS

1. (b) In a clock, each minute makes 6°
∴ 3 minutes will make 6×3=18°

2. (b) Here H ×30 = 4 × 30 = 120°.
(Since initially the hour hand is at 4. ∴H = 4). Required angle A = 90° and since, H × 30 > A° so, there will be two timings.
Required time T = $\frac{2}{11}$ (H × 30 ± A) minutes past H.
∴One timing = $\frac{2}{11}$ (4 × 30 + 90) minutes past 4
= $38\frac{2}{11}$ minutes past 4.
Or 4: 38 approx.

3. (a) At 2'O Clock, Minute Hand will be 10×6 = 60° behind the Hour Hand.
In 30 minutes, Minute Hand will gain $\left(5\frac{1}{2}\right)° \times 30$
= 150 + 15 = 165°
∴Angle between Hour Hand and Minute Hand = 165 -60 = 105°

4. (c) In 1 hour, the minute hand gains 330° over the hour hand.
i.e. in 60 minute, the minute hand gains 330° over the hour hand.
∴In 16 minutes, the minute hand gains over the hour hand by $\frac{330°}{60} \times 16° = 88$

5. (a) Time interval indicated by incorrect clock = 6 p.m -1 p.m= 5 hrs.
Time gained by incorrect clock in one hour
=+1 min= $+\frac{1}{60}$ hr.
Using the formula,
$$\frac{\text{True time interval}}{\text{Time interval in incorrect clock}} = \frac{1}{1 + \text{hour gained in 1 hour by incorrect clock}}$$
$$\Rightarrow \frac{\text{True time interval}}{5} = \frac{1}{1+\frac{1}{60}}$$
$\Rightarrow$ True time interval = $\frac{5\times60}{61} = 4\frac{56}{61}$
∴ True time = 1 p. m + $4\frac{56}{61}$ hrs.
= 5 p.m + $\frac{56}{61}$ hrs. = 5 pm + $\frac{56}{61}$ ×60 min.
= $55\frac{5}{61}$ minutes past 5.

6. (b) Time from noon on Sunday to 3 pm on Wednesday = 75 hours.
24 hours 2 minutes of the first clock
= 24 hours of the correct one.
$\Rightarrow$ 1 hour of the first clock = 24 × (30/721) hours of correct one.
$\Rightarrow$75 ours of the first clock
= 24 ×30 × (75/721) hours of correct one
= 54000/721 hours = 74 hours 53.7 min
Hence the answer is 2:54 PM

7. (a) AT 9'O clock, the Minute Hand is ahead of Hour H and by 45 minutes. The hands will be opposite to each other when there is a space of 30 minutes between them.
This will happen when the Minute Hand gains 15 minutes' space over Hour Hand.
Time taken by Minutes Hand to gain 15 minutes
$= 15 \times \left(1 + \frac{1}{11}\right) = 15 + \frac{15}{11} = 15 + 1\frac{4}{11} = 16\frac{4}{11}$ minutes.
Hence the Hands are opposite to each other at $16\frac{4}{11}$ minutes past 9.

8. (a) The clock gains 15 min in 24 hours.
Therefore, in 16 hours, it will gain 10 minutes.
Hence, the time shown by the clock will be 4.10 am.

9. (c) 55 min spaces are gained in 60 min
$\Rightarrow$35 min spaces will be gained in 38.18 min;
$\Rightarrow$Answer = 7hrs + 38.18 min

10. (b) In a watch than is running correct the minute hand should cross the hour hand once in every $65 + \frac{5}{11}$ min.

So they should ideally cross 3 times once in

$3 \times \left(\frac{720}{11}\right) = \frac{-2160}{11}$ min = 196.36 minutes

But in the watch under consideration, they meet after every 3hr, 18 min and 15 seconds,

i.e., $\left(3 \times 60 + 18 + \frac{15}{60}\right) = \frac{793}{4}$min.

Thus, our watch is actually losing time (as it is slower than the normal watch). Hence when our watch elapsed

$\left(1440 \times \frac{196.36}{198.25}\right)$= 1426.27

Hence the amount of time lost by our watch in one day

= (1440 - 1426.27) = 13.73 i.e. 13 min and 50s (approx).

11. (a) Since, in one hour, two hands of a clock coincide only once, so, there will be value.

Required time T=$\frac{2}{11}$ (H×30 + A°) minutes past H.

Here H= initial position of hour hand=3 (Since 3 O'clock)

A° = required angle = 0° (Since it coincides)

T = $\frac{2}{11}$ (3×30 + 0) minute spast 3

= $16\frac{14}{11}$minutes past 3.

12. (b) Time from 12p.m. on Monday to 2 p.m. on the following Monday = 7 days 2 hours =, 1.70 hours.

The watch gains $\left(2 + 4\frac{4}{5}\right)$ min.

or $\frac{34}{5}$min in 170 hrs.

Now, $\frac{34}{5}$ min are gained in 170 hrs.

∴ 2 min are gained in $\left(170 \times \frac{5}{34} \times 2\right)$hrs = 50 hrs.

∴ Watch is correct 2 days 2 hrs, after 12 p.m. on Monday i.e. it will be correct at 2 p.m. on Wednesday,

13. (b) In order to strike 12, there are 11 intervals of equal time = $\frac{33}{11}$ =3 seconds each

Therefore, to strike 6 it has 5 equal intervals, it requires 5×3=15 sec.

14. (a) Time from 7 a.m. to quarter past 4 = 9 hours 15 min = 555 min

Now, $\frac{37}{12}$ min of this watch=3 min of the correct watch.

555 min of this watch $= \left(\frac{3\times12}{37} \times 555\right)$ min

$= \left(\frac{3\times12}{37} \times \frac{555}{60}\right)$ = 9hrs of the correct watch.

Correct time is 9 hours after 7 a.m. i.e., 4 p.m.

15. (b) At 8 o'clock, the hands of the watch are 20 min. spaces apart.

To be in straight line but not together they will be 30 min. space apart.

∴ Minute hand will have to gain 10 min. spaces 55 min. spaces are gained in 60 min.

10 min. spaces will be gained in

$\left(\frac{60}{55} \times 50\right)$ min or $10\frac{10}{11}$ min

∴ Required time = $10\frac{10}{11}$min. past 8

16. (b) At 5 O'clock, the hands are 25 min. spaces apart.

To be at right angles and that too between 5.30 and 6. the minute hand has to gain (25 + 15) = 40 min, spaces 55 min. spaces are gained in-60 min.

40 min. spaces are gained in $\left(\frac{60}{55} \times 40\right)$ min = $43\frac{7}{11}$ min.

∴Required time = $43\frac{7}{11}$ min past 5

17. (c) Angle traced by the hour hand in 12 hours = 360°

Angle traced by it in 3hrs 25 min. i.e. $\frac{41}{12}$ hrs

$= \left(\frac{360}{12} \times \frac{41}{12}\right)^{\circ} = 102\frac{1}{2}^{\circ}$

Angle traced by it in 25 min. = $\left(\frac{360}{60} \times 25^{\circ} = 150^{\circ}\right.$

Required angle = $\left(150^{\circ} \times 102\frac{1}{2}^{\circ}\right) = 47\frac{1}{2}^{\circ}$

18. (a) 55 min spaces are covered in 60 min

60 min spaces are covered in $\left(\frac{60}{55} \times 60\right.$min

$= 65\frac{5}{11}$ min

Loss in 64 min = $\left(65\frac{5}{11} - 64\right) = \frac{16}{11}$ min.

Loss in 24hrs = $\left(\frac{16}{11} \times \frac{1}{64} \times 24 \times 60\right.$min = 32 $\frac{8}{11}$ min.

19. (d) Angle traced by the hour hand in 6 hours

$= \left(\frac{360}{12} \times 6\right)^{\circ} = 180^{\circ}$

20. (a) Time from 5 a.m. on a day to 10 p.m. on 4th day is 89 hours.

Now, 23hrs 44 min of this clock are the same as 24 hours of the correct clock.

i.e., $\frac{356}{15}$ hrs. of this clock = 24hrs. of correct clock.

∴89 hrs. of this clock = $\left(\frac{24 \times 15}{356} \times 89\right)$ hrs. of correct clock

= 90hrs of correct clock.

So, the correct time is 11 p.m.

21. (d) Angle traced by hour hand in $\frac{125}{12}$ hrs.

$= \left(\frac{360}{12} \times \frac{125}{25}\right)^{\circ} = 312\frac{1}{2}^{\circ}$

Angle traced by minute hand in 25 min.

$= \left(\frac{360}{12} \times 25\right)^{\circ} = 150^{\circ}$

∴ Reflex angle = $360 - \left(312\frac{1}{2} - 150^{\circ} = 197\frac{1}{2}^{\circ}\right.$

22. (a) Time between 10 a.m. on Monday to 10:30 a.m. on Sunday = $144\frac{1}{2}$hours.

$24\frac{1}{2}$ hours of incorrect clock = 24 hours of correct time.

∴ $144\frac{1}{2}$ hours of incorrect clock = x hours of correct time.

$\therefore x = \frac{144\frac{1}{2} \times 24}{24\frac{1}{2}}$ = 144 hours i.e.,

The true time is 10 a.m. on Sunday.

23. (d) At 15 minutes past 5, the minute hand is at 3 and hour hand slightly advanced from 5. Angle between their 3rd and 5th position.

Angle through which hour hand shifts in 15 minutes is $\left(15 \times \frac{1}{2}\right)^{\circ} = 7\frac{1}{2}^{\circ}$

∴ Required angle = $\left(60 + 7\frac{1}{2}\right)^{\circ} = 67\frac{1}{2}^{\circ}$

24. (c) 2000 years have 2 odd days.

| Year | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|
| Odd days | 1 | 1 | 1 | 2 | 1 |

| 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|
| 1 | 1 | 2 | 1 |

= 11 odd days = 4 odd days

1st January, 2010 has 1 odd day. Total number of odd days = (2 + 4 + l) =7 = 0.

∴ 1st January, 2010 will be Sunday.

25. (c) Count the number of days from 2005 onwards, to get, odd day.

| Year | 2005 | 2006 | 2007 | 2008 | 2010 | 2011 |
|---|---|---|---|---|---|---|
| Odd days | 1 | 1 | 1 | 2 | 1 | 1 |

= 7 or 0 odd day.

∴ Calendar for the year 2005 is the same as that for the year 2012.

26. (d) 09/12/2001 –Sunday
No. of days between 9/ 12/71 & 9 / 12/ 2001 we know every year has 1 odd days
we know leap year has 2 odd days
Here, No. of normal years = 22
And no. of leap years = 8
So odd days = 22 + 16 =38 i.e. 3 odd days
(remainder when 38 is divided by 7, i.e. 3) Hence it was a Thursday

27. (a) 16thJuly, 1776 mean (1775years + 6months + 16days)
Now, 1600 years have 0 odd days.
100 years have 5 odd days
75 years contain 18 leap years and 57 ordinary years and therefore (36 + 57) or 93 or 2 odd days.
∴1775 years given 0 + 5 + 2 = 7 and so 0 odd days.
Also number of days from 1st Jan. 1776 to 16th July, 1776.

| Jan | Feb | March | April | May | June | July |
|---|---|---|---|---|---|---|
| 31+ | 29+ | 31+ | 30+ | 31+ | 30+ | 16 |

= 198 days = 28 weeks + 2 days = 2 odd days ∴Total number of odd days = 0 + 2 = 2.
Hence the day on 16th July, 1776 was 'Tuesday'.

28. (b) The year 1979 being an ordinary year, it has 1 odd day.
So, the day on 12th January 1980 is one day beyond on the day on 12th January, 1979.
But, January 12,1980 being Saturday.
∴January 12,1979 was Friday.

29. (c) We go on counting the odd days from 1991 onward still the sum is divisible by 7. The number of such days are 14 upto the year 2001. So, the calendar for 1991 will be repeated in the year 2002.

30. (b) Each day of the week is repeated after 7 days. So, after 63 days, it will be Monday.
∴After 61 days, it will be Saturday.