CLOCKS & CALENDAR

Clocks & Calendar

Clocks form an integral part of the question paper of the following list of Govt. & Management exams that include:

Management Entrance Exam

SSC Staff Selection Commission

SBI PO

SBI SO

SBI Clerk

IBPS Specialist Officer

IBPS PO

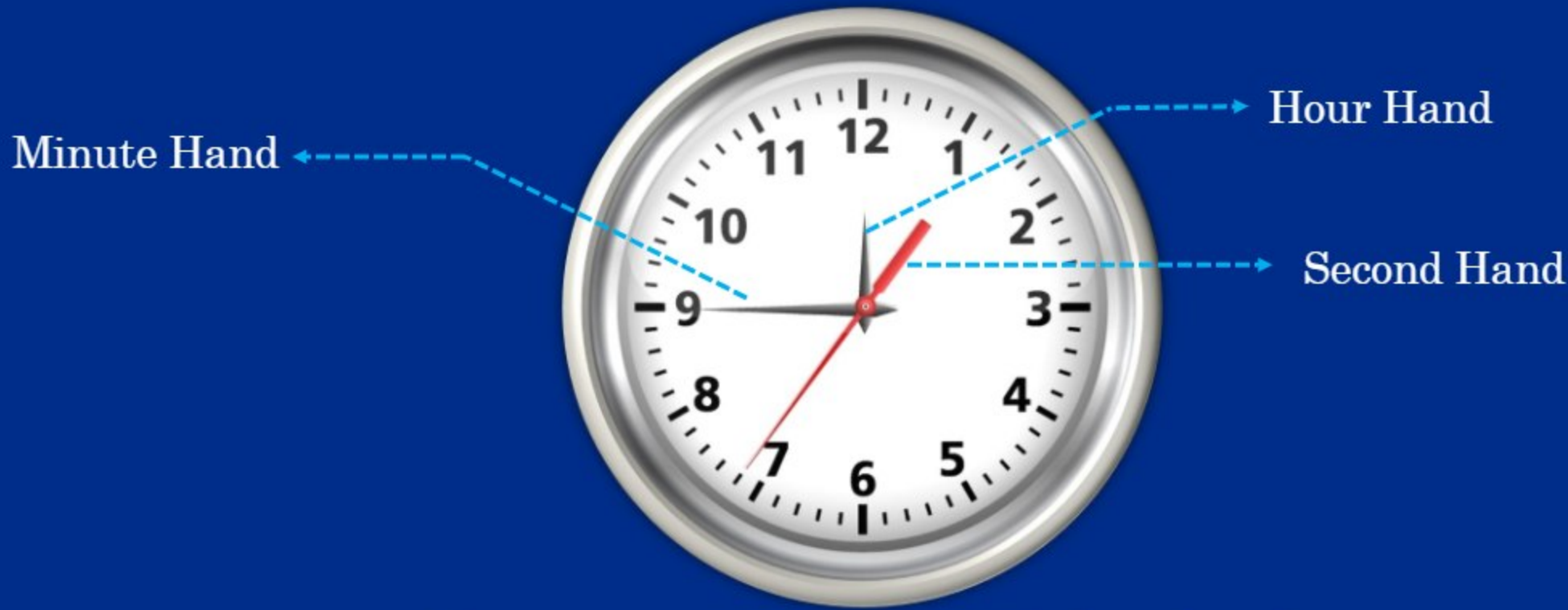
IBPS Clerk

RRB Assistant Loco Pilot

VYAPAM

What is a clock ?

A Clock is a circular device provided with three hands viz. an hour hand, minute and second hand. The study of the clock is known as “Horology”.



A basic structure of a clock with three hands

Structure of a Clock

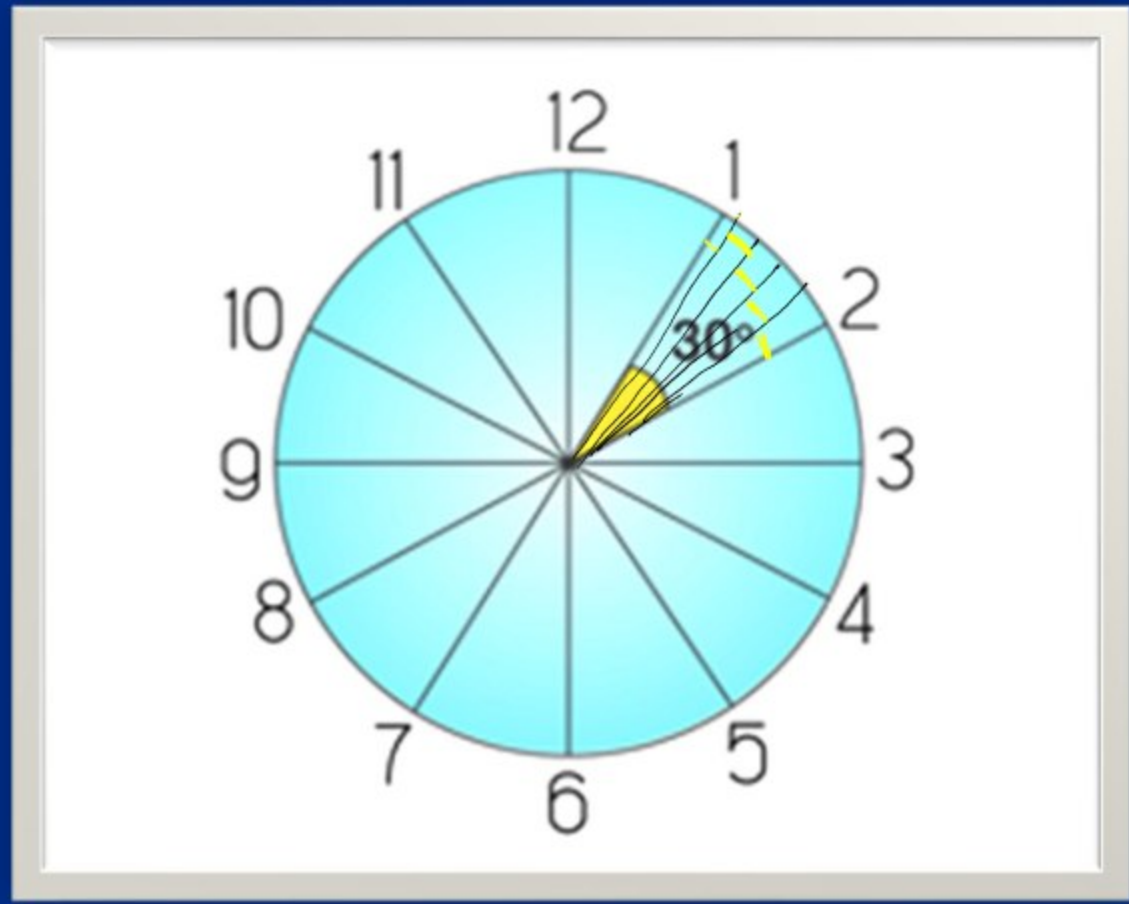
A clock is composed of 360 degrees and divided into 12 equal divisions. The angle between the consecutive divisions is obtained by dividing the total angle of clock 360° by the number of divisions i.e. 12.

Twelve equal divisions of a clock

The angle between any two consecutive divisions = (360°)/12 = 30°

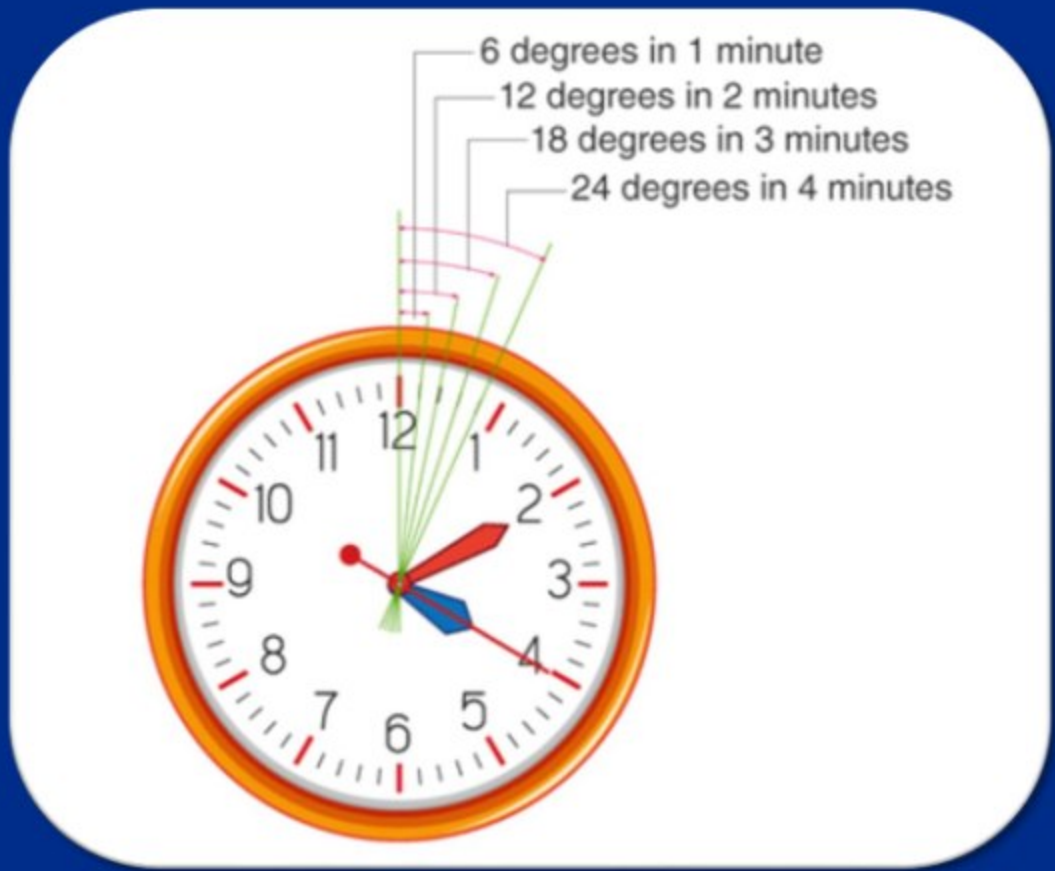
$\frac{360^\circ}{12} = 30^\circ$

$= \frac{30}{5} = 6^\circ$



Angle divisions of a clock

If we closely observe to a clock, it reveals that an angular space between any two consecutive divisions has further five more divisions. The area between the two divisions corresponds to a value of 5 minutes. Hence, dividing the 30° by five will result in the angular value of a minute.



Angular value of a minute = (30°)/5= 6°

Speed of the Hands

A clock has three hands and all three hands move at different rates. The speed of moving object depends on the distance travelled and the time taken to cover a specific range.

The speed is calculated by:

$$\text{Speed} = \frac{Distance}{Time\ taken}$$

The speed of a minute hand:

A minute hand travels 360° in one hour. i.e. it travels through all the 12 divisions around the clock every hour. (1 hour = 60 minutes)

$$\text{Speed of a minute hand} = \frac{360^0}{60\ minute}$$

Speed of a minute hand = 6° per minute.

The speed of an hour hand:

An hour hand travels 30° in an hour. i.e. it covers a distance of 5 minutes (the gap between consecutive divisions) in 60 minutes.

Speed of an hour hand = (30°)/(60 minutes)

Speed of an hour hand =1/2 ° per minute.

Speed of Minute hand = 6°/min

Speed of Hour hand = $\frac{1}{2}^\circ$/min

$\therefore$ Relative speed = $(6 - \frac{1}{2})^\circ$/min

= $5\frac{1}{2}^\circ$/min

Comparison of Speed of hands

The difference in the speed = 6°– (1/2°) = 5.5° per minute

Comparing the speed of the minute hand and an hour hand, we can conclude that the minute hand is always faster than the hour hand by 5.5° or an hour hand is always slower than the minute hand by 5.5°

Note: The evaluation of the speed of second hands is not necessary as it travels a corresponding distance of 1 second in a second.

Frequency of coincidence and collision of hands of a clock:

As we know the hands of a clock moves at different speeds, they coincide and collide and also make different angle formations among themselves at various times in a day.

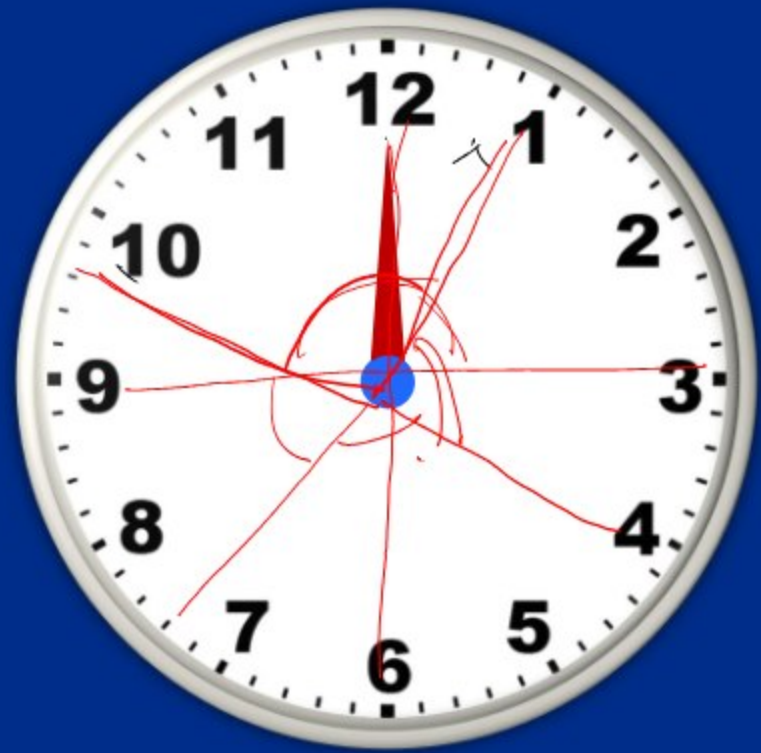
Quick Looks:

1. 60-minute space = 360° = 1 hour
2. 1-minute space = 6° = 1 minute
3. 5-minute space = 6° x 5 = 30° = 5 minutes

4. Right Angle or Perpendicular = 15-minute spaces apart

$\frac{22}{12} = 1.83$

(1)



Right Angle or Perpendicular = 22 times in 12 hours or 44 times in 24 hours (1 day)

6. Straight Angle or Straight Line or 180° = 30-minute space apart

Straight Angle = 11 times in 12 hours or 22 times in 24 hours (1 day)

Finding the time when the angle is known:

When the angle between the hands are not perfect angles like 180°, 90° or 270°, the solving of the questions becomes difficult and time-consuming at the same time. The logic below provides a trick to address problems involving angles of hands for other than standard aspects.

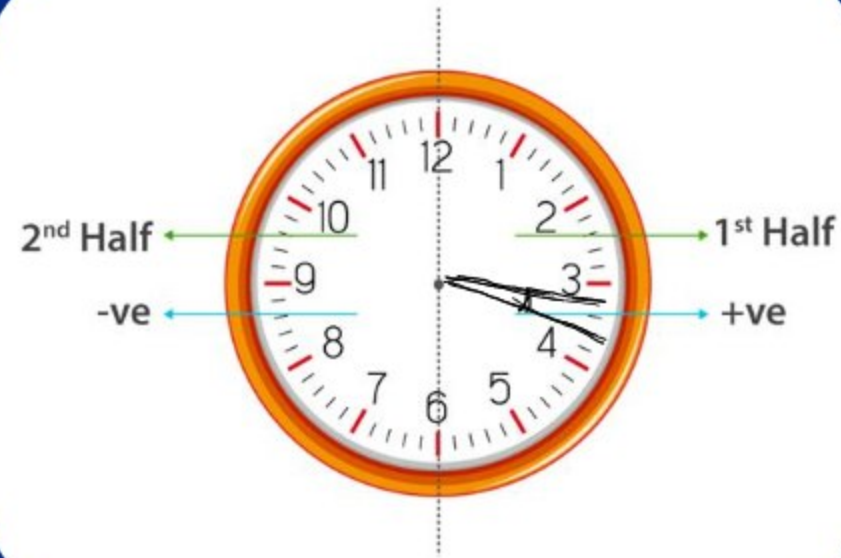
$T = 2/11\ [H*30 \pm A]$

Where:
T stands for the time at which the angle formed.
H stands for an hour, which is running.
(If the question is for the duration between 4 o'clock and 5 o'clock, it's the 4th hour which is running hence the value of H will be '4'.)

A stands for the angle at which the hands are at present.
(The value of A is provided in the question generally)

The clock is divided into two parts:
1st and 2nd half.

If the time given in the question lies in the first half, then the positive sign is considered while evaluating the time else, then the negative sign is used.



Q3: At what time between 3 and 4 o'clock, the hands makes an angle of 10 degrees?

Solution:

Given: H = 3 , A = 10

Since both three and four lies in the first half considered a positive sign.

$$T = \frac{2}{11}[H_1 \times 30 \pm A] = \frac{2}{11}[3 \times 30 \pm 10]$$

$$= \frac{2}{11}[90 + 10]$$

$$= \frac{200}{11} = 18\frac{2}{11}$$

$\frac{2}{11} \times 60$

3 o'clock $18\frac{2}{11}$ min

3 hr 18 min 10.9 sec

Correct clock v/s Wrong clock:

This section involves the comparison of time in the accurate clock with the wrong watch. The wrong time indicates that a clock is either slow or fast compared to the correct time. The wrong clock can either be fast or delayed by a few seconds/minutes/ hours or sometimes by a few days and weeks.

Q.4 A clock gains 5 seconds for every 3 minutes. If the clock started working at 7 a.m. in the morning, then what will be the time in the wrong clock at 4 p.m. on the same day?

In 3 min → 5 sec. gain
↓
60 min → 100 sec gain
↓
1 hr → 100 sec gain

No. of hrs between 7 am to 4 pm = 9 hrs

∴ 9 hr → 900 sec gain

$= \frac{900}{60}$ min gain

= 15 min gain.

5. At what time between 2 O'clock and 3 O'clock, will the minute hand and hour hand of the clock be exactly opposite to each other?

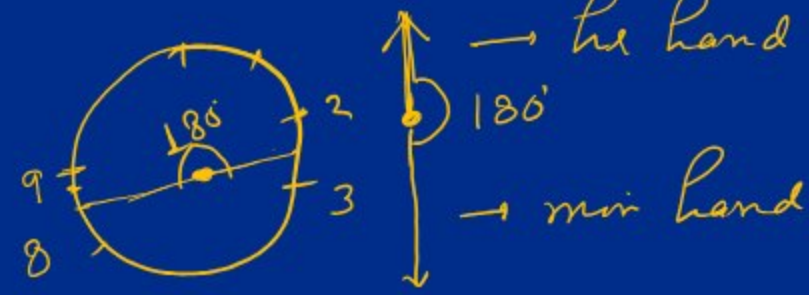
A. 02:46 B. 02:47 6 /11 C. 02:43 7 /11 D. 02:47

$$M = \frac{2}{11}(2 \times 30 \pm 180)$$

$$= \frac{2}{11}(60 + 180)$$

$$= \frac{480}{11} = 43\frac{7}{11}$$

$$2 + 43\frac{7}{11}$$



6. At what time between 12 (H_1) O'clock and 1 O'clock, will the minute hand and hour hand of the clock make right angles ?

12 : 81 = 1 : 21

A. 12:46 B. 12:15 6 /11 C. 12:17 3 / 11 ~~D. None of these~~

$A = 90^\circ$, $H_1 = 12$

$$M = \frac{2}{11}(12 \times 30 \pm 90)$$

$$= \frac{2}{11}(360 - 90)$$

$$M = \frac{2}{11}(360 - 90)$$

$$= \frac{540}{11} = 49$$

$$12.49\frac{1}{11}$$

11) 540 (49
44
100
99
1

$49\frac{1}{11}$

12 – 1 pm

8:20 pm

7 What will be the angle between hr hand and min. hand al-

$$M = \frac{2}{11}(H_1 \times 30 \pm A)$$

$$20 = \frac{2}{11}(8 \times 30 \pm A)$$

$$20 = \frac{480 \pm 2A}{11}$$

$$220 = 480 \pm 2A$$

$$\pm 2A = 220 - 480$$

$$\pm 2A = -260$$

$$2A = -260$$

$$A = -130^\circ \times$$

$$\pm 2A = \pm 260$$

$$A = 130^\circ$$

12 : 81 = 1 : 21

130°

7. At what time between 2 O'clock and 3 O'clock, will the minute hand and hour hand of the clock make right angles?

A. 02:32 B. 02:29 6 /11 C. 02:27 3 /11 D. 02:36

2 to 3 $\longrightarrow$ 90°

$\downarrow$ $\quad$ $\downarrow$

H_1 $\quad$ A

$$\therefore \quad M = \frac{2}{11}[H_1 \times 30 \pm A]$$

$$= \frac{2}{11}[2 \times 30 \pm 90]$$

$$= \frac{2}{11}[60 \pm 90]$$

$$= \frac{2}{11}[150]$$

$$= \frac{300}{11} = 27\frac{3}{11} \text{ min}$$

$$= 2:27\frac{3}{11} \text{ min}$$

8. At what time between 4 O'clock and 5 O'clock, will the minute hand and hour hand of the clock make right angles ?

A. 04:36 B. 04:38 2 /11 C. 04:42 4 /11 D. 04:39

9. Find the mirror image of the clock when the time is 01:40

A. 11:20 B. 10:22 C. 10:20 D. 11:22

Image time = 12:00 − Real time

= 12:00 − 1

= 11 =

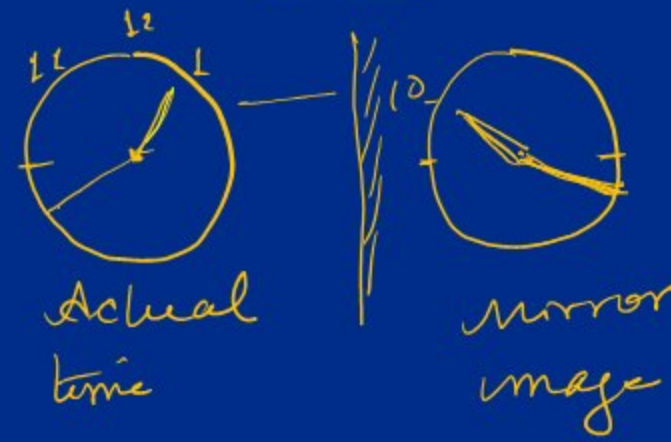


Image time = 11:60 − 1:40

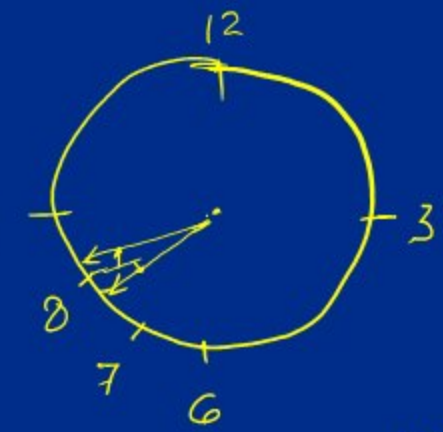
= 10:20

12:00 = 11:60

10. Find the mirror image of the clock when the time is 02:40

A. 09:20 B. 10:22 C. 09:25 D. 09:22

11. Between 7 to 8 o'clock, at what time will both the hands be equidistant from 8?



7 6

last time = 8 o'clock

$\therefore$ 8 + 1 = 9 = 45 minute

$\therefore$ $45 \times \frac{12}{13}$ min = $41\frac{7}{13}$ min

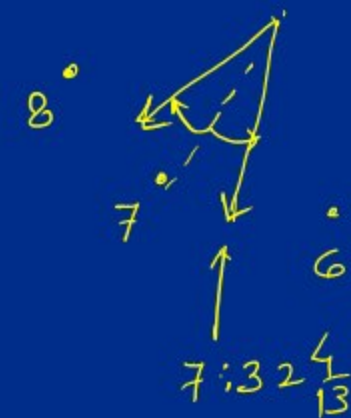
$\therefore$ at 7 o'clock $41\frac{7}{13}$ min, both the hands will be equidis-
from 8

12. Between (7) to 8 O'clock, at what time will both the hands are equidistant from 7. ?

Here Initial time = 7 O clock $\therefore$ 7 = 35 min

$= 35 \times \frac{12}{13}$

$= 32\frac{4}{13}$



Q.4 A clock gains 5 seconds for every 3 minutes. If the clock started working at 7 a.m. in the morning, then what will be the time in the wrong clock at 4 p.m. on the same day?

Solution:

A clock gains 5 seconds for every 3 minutes, then it will gain 50 seconds in 30 minutes, or it will acquire 100 seconds in 60 minutes. i.e. it will gain 100 seconds in 1 hour. Since the clock was started at 7 a.m. in the morning and right now the correct time is 4 p.m. the total time the clock has worked is 9 hours. We know that in 1 hour it gains 100 seconds then in 9 hours it increases 900 seconds. The conversion of 900 seconds to minutes will be 15 minutes. This increase indicates that a clock is faster by 15 minutes as the clock is gaining. Hence, the time in the watch would be 4:15 p.m.

Solved examples:

1. An accurate clock shows 7 a.m. Through how many degrees will the hour hand rotate when the clock shows 1 p.m.?

A. 154° B. 180°

C. 170° D. 160°

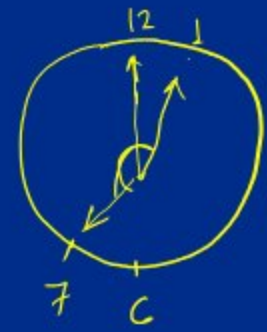
Solution:

We know that angle traced by hour hand in 12 hrs. = 360°

From 7 to 1, there are 6 hours.

Angle traced by the hour hand in 6 hours =6*(360/12)=180°

Option B is the correct answer.



2. By 20 minutes past 4, the hour hand has turned through how many degrees? If then the clock is 12 p.m.

A. 100° B. 110°

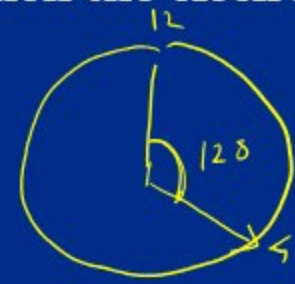
C. 120° D. 130°

Solution:

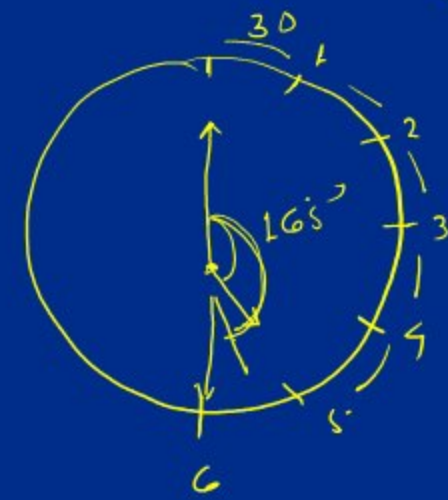
At 4 o'clock the hour hand is at 4 and has an angle of 30°*4=120°

An Hour hand travels 1/2° per minute In 20 minutes it will travel 20 *(1/2°) = 10°. Adding both we get 120° + 10° = 130°

Option D is the correct answer.



3. At what time between 5.30 and 6 will the hands of a clock be at right angles?
A. 44 minutes past 5 B.44 (7/11) minutes past 5
C.43 (7/11) minutes past 5 D. 43 minutes past 5
Solution:
Given: H = 5 and A = 90, since 5 and 6 lies in the first half, a positive sign is considered.
T = 2/11 [H*30±A]
T = 2/11 [5*30+90]
T = 2/11 [240] = 480/11= 43(7/11)
Option C is the correct answer.



4. What is the angle between the minute hand and the hour hand of a clock at 5.30?
A. 05° B. 15°
C. 25° D. 35°
Solution:
At 5 'o'clock the hour hand is at 5 and hence has made 30° angle.
From 5 to 5.30 its will travel for 30 minutes with a speed of ½ ° Therefore the total distance travelled will be 30 minutes* 1/2 = 15°
The full angle made by the hour hand will be 150°+15° = 165°.
The minute hand at 5 o'clock is at 12, and hence the angle made is zero. In 30 minutes, it will travel a distance of 30 minutes with a speed of 6° per minute. Therefore, the total distance travelled will be 30 minutes*6° = 180 °.
The angle between the minute and hour hand is 180 – 165 = 15
Option B is the correct answer.

5. How many times in a day, the hands of a clock are straight?

A. 22 B. 24

C. 44 D. 48

Solution:

The hands of clocks make a straight line of 180° about 22 times in 24 hours. Also, the hands coincide 22 times in 24 hours, the coincidence of the hands also forms a straight line. Hence, the total straight lines are 22+22 = 44.

Option C is the correct answer.

6. A house has two wall clocks, one in kitchen and one more in the bedroom. The time displayed on both the watches is 12.A.M right now. The clock in the bedroom gains five minutes every hour, whereas the one in the kitchen is slower by five minutes every hour. When will both the watches show the same time again?

Solution:

The faster clock runs 5 minutes faster in 1 hr.

The slower clock runs 5 minutes slower in 1 hr.

Therefore, in 1 hour, the faster clock will trace 5+5=10 min more when compared to the slower clock.

T = 2/11 [H*30±A]
T = 2/11 [3*30+10]
T = 2/11 [90+10]
T = 2/11 [100]
T = 200/11
T =18 2/11

The answer indicates that the hands of a clock will make an angle of 10 between 3 and 4 o'clock at exactly 3:18:2/11 (3' o clock 18 minutes and 2/11 of minutes = 2/11*60 = 10.9 seconds

Facts about Leap year

Who added the extra day for leap year?

Ans. Emperor Julius Caesar

45 BC: Emperor Julius Caesar invents the Julian Calendar and orders the calendars to add an extra 24 hours to February 24th every four years so that the seasons will come at the same time every year.

In 1582, Pope Gregory XIII further refined the calendar with the rule that leap day would occur in any year divisible by four as described previously.

365 and 6 hr

Calender

↓

Year

↙ Normal → 365 days → 365 days

Solar year → 365 day 5 hr 48 min 47.5 sec

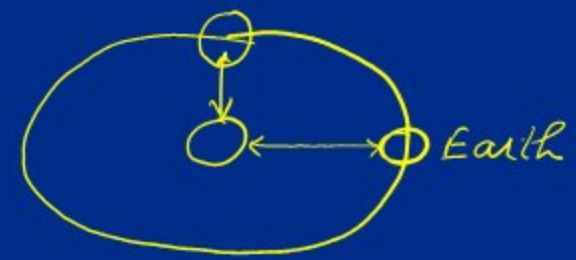
→ 365.2422 days

$0.2422 \times 4 = 0.9688 \simeq 1$ day

$1 - 0.9688 = 0.0312$ day extra in 1 leap year

Leap ← Feb = 1 ← 24 hr = 1 day ← 6 + 6 + 6 + 6 = 24 hr

366



365 d

400

100 leap yrs → 400 years → 3 days extra

100 | 200 | 300 | 400

day 1 | 1 | 1 | 1 leap century year

In 400 years → 100 leap years

= 100 × 0.0312 extra day in 1 leap

= 3.12 days

400 → 100 leap

$\frac{100}{4} = 25$

400 → 100 | 200 | 300 | 400

Non-leap year ✗ ✗ ✗

0.12 day diff.

0.12 × 3323 yr = 1 day

3323 years
− 2022
1301

400 → century years

Actual leap year = 100 − 3

In 400 years → = 97 leap yr

400 years

100 | 200 | 300 | 400

100, 200, 300 → Non-leap

400 → leap century year

400, 800, 1200, 1600 → Leap century year

1600 / 400

Leap-year

Leap year

We divide by 4 to get leap year

1984 → leap year

Leap century year

We divide it by 400 to get leap century year

400) 2000 → leap century year

Ex 1800 → century year

1900 → century year

1992 → leap year

1982 → Non leap

Extra days

Extra days	0	1	2	3	4	5	6
Days	7	8	9	10	11	12	13

$7 \overline{)35} (5 \rightarrow$ weeks

35

$0 \rightarrow$ Extra days

10 days

7

3 days Extra

$7 \overline{)8} (1$

7

$1 \rightarrow$

Ex: How many extra days are there in (22) days

$7 \overline{)22} (3 \rightarrow$ weeks

21

$1 \rightarrow$ Extra day

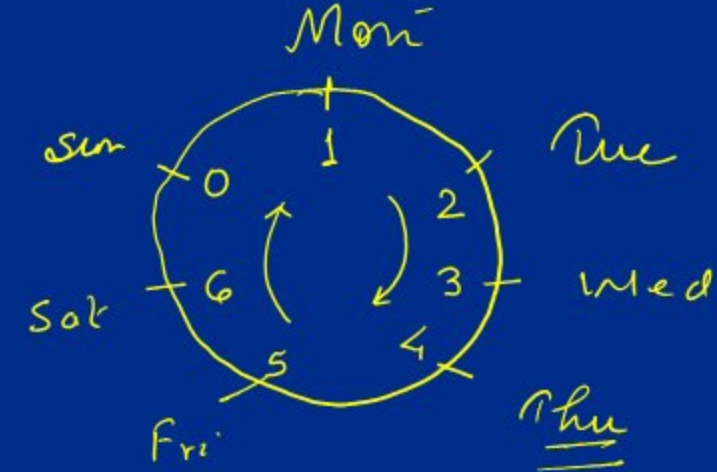
Mon Mon

1, 2, 3, 4, 5, 6, 7, 8, 9, 10

1st Jan year 1 = Mon.

01 | 01 | 0001

Uses of Extra days



Some Important Facts –

① In a normal year 1st day and last day are same

If 1st Jan 2003 = Wednesday then

31st Dec 2003 = —, —

1st Jan 2004 = Thursday

② In a leap year, there is 1 day more

∴ diff of 1 day

Ex: 1st Jan 2004 → Thursday

31st Dec 2004 → Friday

∴ 1st Jan 2005 → Saturday

31st Dec 2005 → Saturday

$52 \times 7 = 364$, 1

$7 \overline{)365} \; (52$, 35, $1s$, 14, 1

Normal year	Leap year
↓	↓
365 d →	366 d
↓	↓
52 Week + 1	52 weeks + 2
↓	↓
Extra	Extra

1st Jan 2021 → Friday

31st Dec 2021 → Friday

1st Jan 2022 → Saturday

31st Dec 2022 → Saturday

1st Jan 2023 → Sunday

For NORMAL YEAR —

(3) Months having their 1st day same

(I) Jan - Oct
Mond Mond
1 - 10

(II) Feb - March - NOV.
2 - 3 - 11

(III) April - July
4 - 7

(IV) Sep - Dec.
9 - 12

1st day rule → 7 | 31 (28) | 4 mon → last day
3

(4) In a leap year, months having their 1st day same

(I) Jan - Apl - July
1 - 4 - 7

(II) Feb - Aug.
2 - 8

(III) March - Nove
3 - 11

(IV) Sep - Dec.
9 - 12

Extra days :— (I) Normal year → 365 days → 1 day extra

(II) Leap year → 366 day → 2 day extra

(III) Months having 31 days → ∴ Extra days = $\frac{31}{7}$ = 3 days

(IV) — , — , — 30 days → — — = $\frac{30}{7}$ = 2 day

(V) — , — , 29 days → — , — = $\frac{29}{7}$ = 1 day

(VI) — , — — 28 days → — — = $\frac{28}{7}$ = 0 day

365
52 W + 1 day Extra

366
52 W | 2 days extra

100 years = 76 Normal + 24 leap year

100 = 75 + 25

75 : +1 → 76

25 : −1 → 24

= 76 (1) + 24 (2) extra

76 + 48 = 124 days

124 = 17 weeks + 5 days extra

1 8 15 22 29 30 31 (1)

Nov

200 year = 2 × (100 years)

= 2 × 5 days

= 10 days (1 week + 3 day)

= 3 days extra

300 years = 3 × 5 = 15 day (2 weeks + 1 day)

= 1 day

400 years = 4 × 5 = 20 day But 400 yr is a leap century year)

100 = 4 × 25

25 = 75 + 24 → 76

100 = 75 N.L.Y + 25 L.Y

75 N.L.Y → 76

25 L.Y → 24

S M T W T F S S M T

7) 124 (17

7

54

49

5

7) 365 (52

35

15

14

1

$\therefore$ = 20 + 1 days

= 21 (3 Week + 0 day)

= 0 extra day

400 = 4 × 100

365 → 366

52 W 1 D | 52 | 2 d

14 crore 98 lakh

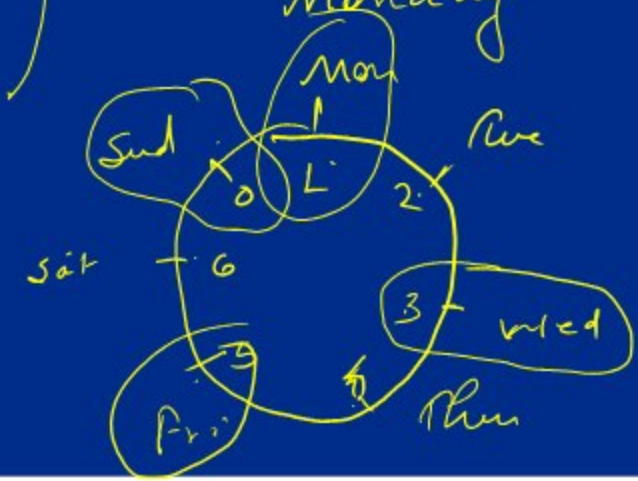
Century year	→	Extra day	→	last day
100	→	5	→	Friday
200	→	3	→	Wed.
300	→	1	→	Mon
400	→	0	→	Sun.

31st Dec 2400

01 Jan year 1

↓

Monday



1st day of 1st century = Monday

Last — , — , — = Friday (5 days extra)

1st day of 2nd century = Saturday

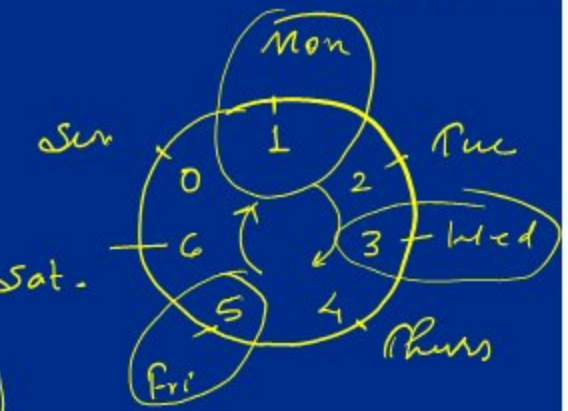
Last day of — , — = Wednesday (3 days extra)

1st day of 3rd century = Thursday

Last — , — , — = Monday (1 day extra)

1st day of 4th century = Tuesday

Last — , — — = Sunday (0 day extra)



1. If 1st Jan 1910 ⟶ Friday
   on 1st Jan 1901 ⟶ ?

a. Mon b. Tuesday
c. Wed d. Sunday.

1901 ← 1910
? 4 day → Friday

∴ Diff in years = 9 years

9 | 8 | 1 (2)

7 Normal + 2 leap year

7(1) + 2(2)

7 + 4 = 11 = 4 day extra

Fri − 4 ≡ Monday ⟶ On 1st Jan 1901

OR ↳ Friday + 3 = Monday

1901 1902 1903 1904 1905
1906 1907 1908 1909 1910
Friday

4 — Fri + 3

2. If on 1988, it was independence day on Wednesday then on which day it will be celebrated on 1989?

(a) Saturday (b) Tuesday (c) Friday (d) Thursday

1989
45
1
203 5
7
290

★ 15th Aug 1988 → Wed.
15th Aug 1989 → Thu
} 1 year diff → 365 + 1

Shortcut: 15th Aug

15 + 8 + 1989 + 22
↳ Date + Month + year + Leap year
7

Normal year
365 d + 1 day extra
Wed + 1 = Thursday

Normal: 1st Jan – 31st Dec → 1st Jan

15th Aug 1988 — 14th Aug 1989 → 15th Aug 1989
Wed — Wed + 1 = Thursday

3. If it was Monday on 20th March 1999, which day will be on 21st March 1599

a. Mon b. Tue
c. Wed d. Thu

Sol. 20th March 1999 → Monday

Now 20th March 1999 to 20th March 1599 = 400 years

19th March 1599
20th March 1599

20th March - 1999 → Mond
19th March - 1599 → Sund
20th March - 1599 → Mon

100 - 5
99 - 4

∴ In 400, zero days extra

∴ 20th March 1599 will also be Monday

∴ 21st ——→ —— be Monday + 1 = Tuesday

4. Which day was on 1st Jan 2000

(a) Sunday
(b) Saturday
(c) Tuesday
(d) Friday

1st Jan 2000 → 1999 year + 1 day

1600 + 300 + 99

Extra → 0 + 1 + 4 = Total 5 days extra

∴ 5 days + 1st Jan = 6 days extra
= Saturday

(5) 1st Jan 2001 → year 2000 (31st Dec) + 1st Jan 2001

Leap Cen. year → 0 days + 1 extra

Sunday + 1 day

Monday

(6) ✓ 1st Nov → Monday then 25th Nov = ?

1st Nov +7 → 8 +7 → 15 +7 → 22 +3

Mon Mon Mon Mon

Mon → 7)25(3 → Sun

21

4 → 0+4

Thurs

Q. If the 3rd saturday of a month was on 17th what date will be on 4th wednesday.

1 ← 3 ← 10 ← 17

Thur, Sat, Sat, Sat

1, 8, 15, 22, 28, 29

Th, Th, Th, Th, W, Th

28 → Wed

3rd – saturday
+4 → 7th – Wed × 4 = 28th
1st Wed × 4

100 → 5 days
88 + 1
22 + 1 +

Q. Which day was on 10th March 1989 →

Formula = $\frac{Day + M + year + Leap}{7}$ = $\frac{10+3+89+22}{7}$

= $\frac{124}{7}$ = 17 → 5 Rem → Frid

1900 + 89

1600 + 300 + 89

0 + 1 + 6

7 days

89 → 67, 22 leap

67 + 44 = 111

100 → 5 days extra

7) 111 (15 → Rem 6

Q Mahesh was born on 19th Nov. 1981. On which date he will be 24 years 3 month and 15 days old..

Year	Month	Day/Date
1981	11	19
24	3	15
2005	14	34

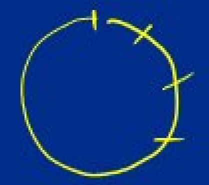
Normal add → 2005

Month: 14 − 12 = 02 → 1 carried to year: 2005 + 1 = 2006

Day: 34 − 28 = 06 → 02 + 1 = 03 (month)

Year: 2006 ↓ 2006

Month: 03, Day: 06



13 14 15

12 12 12

1 2 3

14 month → 12, 2

12 → 1 year

Q Ramesh was born on 25th Nov. 1989. On which date he will be 15 years 1 month and 7 days old.

Year	Month	Day/Date
1989	11	25
+ 15	+ 1	+ 7
2004	12	32
	+ 1	− 31
2004	13	01
1 ←	− 12	
2005	01	01

Normal add. →

31 days in Dec = 1 month

Q Ram is 178 days older than Ramesh. If Ramesh was born on Tuesday. On which day was Ram born.?

Ram $\xleftarrow[\text{older}]{178}$ Ramesh

↓

Tuesday

Extra days $= \frac{178}{7}$

$= 25 \text{ weeks} + 3$

∵ {Ram is older than Ramesh, it means Ram was born before Ramesh, so we need to go back date.}

∴ Ram was born on = Tuesday - 3

= Saturday.

Q Mahesh is 200 days older than shyam. If Mahesh was born on Monday. Then on which day was shyam born.?

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

Mahesh ← 200 — shyam

Monday +4 ⟶ Friday ✓

∴ Extra days =

$\frac{200}{7} = 28\,W + 4\,d$

Q Arun is 157 days older than Ravi, Ravi is 165 days older than Avinash. If Ravi was born on Saturday, then on which days were Arun and Avinash born?

Arun $\xleftarrow[\text{older}]{157}$ Ravi $\xleftarrow[\text{older}]{165}$ Avinash

Wed. $\xleftarrow{-3}$ Saturday $\xrightarrow{+4}$ Wed

Extra days

$\frac{157}{7} = 22w + 3d$

$\frac{165}{7} = 23w + 4d$

Q Manish started his journey on any day. He returned after 145 days on Tuesday. On which day he started his journey?

(i) (a) Tuesday (b) Monday (c) Thurs (d) Friday

Tues − 5 = Thurs.

Extra days

$\frac{145}{7} = 20\ w + 5\ d$

$7 \overline{)145} (20$
140
5

(ii) If he goes again after 120 days for his journey. Then on which he will start his journey?

Extra days

$\frac{120}{7} = 17 + 1$

Tuesday + 1 → Wed

Q. If it was 17th on 3rd Monday in any month, then which day will repeat 5 times in that month.

(a) Tues (b) Thurs (c) Friday (d) sat.

Sat $\xleftarrow{-2}$ Mon $\xleftarrow{-7}$ Mon $\xleftarrow{-7}$ Mon

↓ 1st ↓ 3rd ↓ 10th ↓ 17th

If:

Saturday → 1, 8, 15, 22, 29

Sunday → 2, 9, 16, 23, 30

Monday → 3, 10, 17, 24, 31

28 days

30 — —

31 — — —

	1	2	3	4	→
Feb	1 Mon	8	15	22	
March	1	8	15	22	29
	2	9	16	23	30
	3	10	17	24	31
Apl →	1 Mon	8	15	22	29
	2 Tue	9	16	23	30
	3 Wed	10	17	24	31

Q If the 3rd day of any month is Monday. then which of the following will be the 5th day from 21st

(a) Thurs (b) Mon (c) Tues (d) Wed

Mon
3rd → 10th → 17th → Fri 21 → Mon 24 / Tues 25

∴ 5th day from 21st = 21+4 = 25 (Tuesday)

5th day after 21
= 21+5 = 26

5th day from 21
= 21+4 = 25

21, 22, 23, 24, 25, 26

Q. 1. Mahesh was born on 10th Jan 1996 on Wednesday. On which coming years, he will celebrate his birthday on Thursday?

(a) 1997 (b) 2002 (c) 2001 (d) 2003

10th Jan 1996 → Wed.
10th Jan 1997 → Friday (+2 days)
10th Jan 1998 → Saturday (+1d)
10th Jan 1999 → Sunday (+1d)
10th Jan 2000 → Monday (+1d)
10th Jan 2001 → Wednesday (+2d)
10th Jan 2002 → Thursday (+1)

Leap year → 366 days
- 52 Weeks
- 2 days (Extra)

24

1996

4

Q 2. Ravi was born on 20th Feb, Saturday in any year. What will be his age on 20th Feb 2005, Sunday ?

(a) 7 years (b) 8 years (c) 6 years (d) 9 years.

20th Feb 2005 — Sunday] - 2 days
20th Feb 2004 — Friday] - 1
20th — — 2003 → Thursday] - 1
— — — 2002 → Wed.] - 1
— — — 2001 → Tues.] - 2
— — 2000 — Sund] - 1
— — 1999 — Saturday

Q.3. Minu was born on last day of feb 1992. On which year she will celebrate her 4th birthday?

Sol: year 1992 is a leap year.

∴ Last day of Feb will be on 29th

∴ Her 1st birthday → 29th Feb 1996

2nd — , — → 29th Feb 2000 (+4)

3rd — , — → 29th Feb 2004 (+4)

4th — , — → 29th Feb 2008 (+4)

1992

↓

1996 → 1st B.day

↓

2000 → 2nd --

↓

2004 → 3rd --

↓

2008 → 4th --

Repeatition of calendar

Q. On which year will the calendar of 1993 be repeated?

$2\overline{13}$
$9\overline{4}$
$\overline{4}$

Let

year	1st day	Last day
1993	Sun	Sun
1994	Mon	Mon
1995	Tue	Tue
1996	Wed	Thurs.
1997	Frid	Frid
1998	Satu	Satur.
1999	Sun	Sun

→ Same Calendars &

Q.5 When will the calender of 1997 be used again.

Year	Extra days	Total Extra days
1997	1	1
1998 →	1	2
1999 →	1	3
2000 →	2	5
2001 →	1	6
2002 →	1	7
2003 —	1	(8) →

Note: { Normal year calendar will repeat in — Running year + 6
Leap —— , —— , —— , → — Running year + 28

Q 5. When would the Calendar of 1991 be used again

	Extra day	Total Extra days
1991	1	1
1992	2	3
1993	1	4
1994	1	5
1995	1	6
1996	2	8
1997	1	9
1998	1	10
1999	1	11
2000	2	13
2001	1	14
2002	1	15

$4\overline{)191}(22$
28
3

1997

$\frac{91}{4}$ =

$4\overline{)97}(24$
96
$1 \rightarrow$ Rem

(i) Here rem = 1
∴ Calendar will repeat in 'Running year + 6

(ii) If rem = 2
Running year + 11

(iii) If rem = 3
Running year + 11

Q. When would the calendar of 1995 be used again?

$\frac{1995}{4}$ = 4)95(23
92
3 → Rem

∴ Calendar will repeat in

∴ Running year + 11

∴ 1995 + 11 = 2006

505 + (2)
2022
4

Note ✱

1981 ÷4 → Rem = 1 → Running year + 6 years
1987 ÷4 → Rem = 3 → Running + 11
1998 ÷4 → Rem = 2 → Running + 11
Leap 1996 ÷4 → Rem = 0 → Running + 28

1996 →	1st day ↓	last day
	Mon	Tue
1997	Wed	Wed
1998	Thurs	Thurs
1999	Friday	Friday
↓		
2024		

1. If it was Monday on 10th Jan 2003, which day will be on 10th Jan 2004. ?

(a) Monday (b) Tuesday (c) Wed (d) Thurs.

10th Jan 2003 to 9th Jan 2004 = Monday

∴ 10th Jan 2004 = Monday + 1 = Tuesday

365 → 364 + 1

7 | 365 (52
35
15
14
1 ← Extra day

(2.) Mahesh was born on 18th Feb. If it was Monday on Republic day. On which day was Mahesh born ?

(a) Mon (b) Tue (c) Wed (d) Thurs.

26th Jan → Republic Day → Monday

26th Jan to 31st Jan → 5 days
1st Feb to 10th Feb → 10 days

⊕ 15 days → 2 weeks + 1 day Ex.

∴ On 10th Feb = Mon + 1 = Tues.

③ Ramesh is 178 days older than Mahesh. If Mahesh was born on Wednesday. On which day was Ramesh born.?

ⓐ Wed ⓑ Tue ⓒ Thurs ⓓ Monday ⓔ None

$$7 \overline{)178} \ (25$$
$$14$$
$$38$$
$$35$$
$$3 \text{ extra}$$

Mahesh → Wed

Ramesh → Wed − 3 → Sunday

OR

Wed + 4 → Sunday.

④ Mohan → 19th Dec 1981 on which date he will be 23 years 2 months and 12 day old ? ⇒ 1981 − 12 − 19

$$23 - 2 - 12$$
$$2005 - 14 - 31$$
$$2005 - 12 - 31$$
$$2005 - 02 - 31$$
$$-28$$

$$\begin{array}{rrrr} 1981 & - & 12 & - & 19 \\ 23 & - & 2 & - & 12 \\ \hline 2004 & - & 14 & - & 31 \\ +\ 1 & & -12 & & \\ \hline 2005 & - & 02 & - & 31 \\ & & 1 & & -28 \\ \hline 2005 & - & 03 & - & 03 \end{array}$$

④ Sohan → 15th Nov 1979, 23 years 1 month 18 day old.

$$\begin{array}{rrrr} 1979 & - & 11 & - & 15 \\ +\ 25 & - & 01 & - & 18 \\ \hline 2004 & - & 12 & - & 33 \\ & & & \rightarrow & 31 \text{ (Dec)} \\ 1 & & 1 & & \\ 2005 & - & 13 & - & 02 \\ & & 12 & & \\ \hline 2005 & - & 01 & - & 02 \end{array}$$

⑤ Mahesh was born on 17th oct 1985. On which date he will be 22 yrs 5 months 18 days old. ?

⑥ Suresh is 314 days older than Rajendra, Kamla is 70 weeks older than Suresh. If Kamla was born on Wednesday. On which day was Rajendra born ?

ⓐ Monday
ⓑ Tuesday
ⓒ Thursday
ⓓ Friday
ⓔ None

Kamla ← 70 w ← Suresh ← 314 d ← Rajendra

Kamla ↓ Wed | 0 days extra | Suresh ↓ Wed | Extra day | 314/7 = 6 days

∴ Rajendra = Wed + 6

= Tuesday ans

⑦ If it was 23rd on Sunday of any month. which day will be 2 weeks and 4 days before?

23rd Sunday.

2 weeks & 4 days = 14 + 4 = 18 days

∴ 23 − 18 = 5th day

↓

Sund

23rd → Sunday — (7×3) → 2nd → Sund

2nd 5th 9th 16th 23rd

Sun Sun Sun Sun Sun

— 18 days

∴ Sun + 3 = Wed (5th)

⑧ If it was wednesday, 3 days before yesterday; which day will be 2 days after tomorrow?

(a) Mon.

(b) Tue

(c) Frid

(d) Wed

(I) Wed. Thu Fri Sat → Sund Mon Tue Wed

Sat ↓ yester

Sund ↓ Today

Mon Tom.

Wed ↓ ans

OR

(II)

3d befor	yes	Toda	Tom	after 2 day
Wed	+3	+1	+1	+2

∴ Wed + 7 = Wed

Rise Education

Thank You