

CALENDAR & CLOCKS

MODULE OBJECTIVE:

The module **calendar** is used to find many problems related to odd days, leap year, and counting of odd days and many.

The module **clock** is used to find many problems related to find angle between hour and minute hand of a clock, at what time the hands of clock will be together and many.

Prerequisites:**CALENDAR**

- *Odd Days:*

We are supposed to find the day of the week on a given date.

For this, we use the concept of 'odd days'.

In a given period, the number of days more than the complete weeks are called *odd days*.

- *Leap Year:*

(i). Every year divisible by 4 is a leap year, if it is not a century.

(ii). Every 4th century is a leap year and no other century is a leap year.

Note: A leap year has 366 days.

Examples:

- Each of the years 1948, 2004, 1676 etc. is a leap year.
- Each of the years 400, 800, 1200, 1600, 2000 etc. is a leap year.
- None of the years 2001, 2002, 2003, 2005, 1800, 2100 is a leap year.

- *Ordinary Year:*

The year which is not a leap year is called an *ordinary years*. An ordinary year has 365 days.

- *Counting of Odd Days:*

1. 1 ordinary year = 365 days = (52 weeks + 1 day.)

∴ 1 ordinary year has 1 odd day.

2. 1 leap year = 366 days = (52 weeks + 2 days)

∴ 1 leap year has 2 odd days.

3. 100 years = 76 ordinary years + 24 leap years

= (76 x 1 + 24 x 2) odd days = 124 odd days.

= (17 weeks + days) ≡ 5 odd days.

∴ Number of odd days in 100 years = 5.

Number of odd days in 200 years = (5 x 2) ≡ 3 odd days.

Number of odd days in 300 years = (5 x 3) ≡ 1 odd day.

Number of odd days in 400 years = (5 x 4 + 1) ≡ 0 odd day.

Similarly, each one of 800 years, 1200 years, 1600 years, 2000 years etc. has 0 odd days.

• *Day of the Week Related to Odd Days:*

No. of days:	0	1	2	3	4	5	6
Day:	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.

Some codes to remember the months and weeks:

a) Week

Sunday – 1

Monday – 2

Tuesday – 3

Wednesday – 4

Thursday – 5

Friday – 6

Saturday – 0

b) Month

jan – 1 july – 0

feb – 4 Aug – 3

Mar – 4 Sep – 6

Apr – 0 Oct – 1

May – 2 Nov – 4

june – 5 Dec – 6

CLOCK:

The Face or dial of a watch is a circle whose circumference is divided into 60 equal parts, called *minute spaces*.

A clock has two hands, the smaller one is called *the hour hand* or *short hand* while the larger one is called the *minute hand* or *long hand*.

- i) In 60 minutes, the minute hand gains 55 minutes on the hour hand.
- ii) In every hour, both the hands coincide once.
- iii) The hands are in the same straight line when they are coincident or opposite to each other.
- iv) When the two hands are at right angles, they are 15 minute spaces apart.
- v) When the hands are in opposite directions, they are 30 minute spaces apart.
- vi) Angle traced by hour hand in 12 hrs = 360° .
- vii) Angle traced by minute hand in 60 min. = 360° .
- viii) Too Fast and Too Slow: If a watch or a clock indicates 8.15, when the correct time, 8 is said to be 15 minutes too fast.

On the other hand, if it indicates 7.45, when the correct time is 8, it is said to be 15 minutes too slow.

Solved Examples:**CALENDAR:**

1. It was Sunday on Jan 1, 2006. What was the day of the week Jan 1, 2010?

- [A.](#) Sunday
- [C.](#) Friday

- [B.](#) Saturday
- [D.](#) Wednesday

Answer: Option C

[RRB 2001]

Solution:

On 31st December, 2005 it was Saturday.

Number of odd days from the year 2006 to the year 2009 = $(1 + 1 + 2 + 1) = 5$ days.

\therefore On 31st December 2009, it was Thursday.

Thus, on 1st Jan, 2010 it is Friday.

2. What was the day of the week on 28th May, 2006?

- [A.](#) Thursday
- [C.](#) Saturday

- [B.](#) Friday
- [D.](#) Sunday

Answer: Option D

Solution:

28 May, 2006 = (2005 years + Period from 1.1.2006 to 28.5.2006)

Odd days in 1600 years = 0

Odd days in 400 years = 0

5 years = (4 ordinary years + 1 leap year) = $(4 \times 1 + 1 \times 2) \equiv 6$ odd days

Jan. Feb. March April May
 (31 + 28 + 31 + 30 + 28) = 148 days

\therefore 148 days = (21 weeks + 1 day) \equiv 1 odd day.

Total number of odd days = $(0 + 0 + 6 + 1) = 7 \equiv 0$ odd day.

Given day is Sunday.

3. What was the day of the week on 17th June, 1998?

[A.](#) Monday

[B.](#) Tuesday

[C.](#) Wednesday

[D.](#) Thursday

[Sathyam 2000]

Answer: Option C

Solution:

17th June, 1998 = (1997 years + Period from 1.1.1998 to 17.6.1998)

Odd days in 1600 years = 0

Odd days in 300 years = $(5 \times 3) \equiv 1$

97 years has 24 leap years + 73 ordinary years.

Number of odd days in 97 years $(24 \times 2 + 73) = 121 \equiv 2$ odd days.

Jan. Feb. March April May June
 (31 + 28 + 31 + 30 + 31 + 17) = 168 days

\therefore 168 days = 24 weeks = 0 odd day.

Total number of odd days = $(0 + 1 + 2 + 0) = 3$.

Given day is Wednesday.

4. What will be the day of the week 15th August, 2010?

[A.](#) Sunday

[B.](#) Monday

[C.](#) Tuesday

[D.](#) Friday

[TCS 2006]

Answer: Option A

Solution:

15th August, 2010 = (2009 years + Period 1.1.2010 to 15.8.2010)

Odd days in 1600 years = 0

Odd days in 400 years = 0

9 years = (2 leap years + 7 ordinary years) = (2 x 2 + 7 x 1) = 11 odd days \equiv 4 odd days.

Jan. Feb. March April May June July Aug.
(31 + 28 + 31 + 30 + 31 + 30 + 31 + 15) = 227 days

\therefore 227 days = (32 weeks + 3 days) \equiv 3 odd days.

Total number of odd days = (0 + 0 + 4 + 3) = 7 \equiv 0 odd days.

Given day is Sunday.

5. Today is Monday. After 61 days, it will be:

[A.](#) Wednesday

[B.](#) Saturday

[C.](#) Tuesday

[D.](#) Thursday

Answer: Option B

Solution:

Each day of the week is repeated after 7 days.

So, after 63 days, it will be Monday.

\therefore After 61 days, it will be Saturday

6. If 6th March, 2005 is Monday, what was the day of the week on 6th March, 2004?

[A.](#) Sunday

[B.](#) Saturday

[C.](#) Tuesday

[D.](#) Wednesday

Answer: Option A

[I-CET-2007]

Solution:

The year 2004 is a leap year. So, it has 2 odd days.

But, Feb 2004 not included because we are calculating from March 2004 to March 2005.
So it has 1 odd day only.

\therefore The day on 6th March, 2005 will be 1 day beyond the day on 6th March, 2004.

Given that, 6th March, 2005 is Monday.

\therefore 6th March, 2004 is Sunday (1 day before to 6th March, 2005).

7. On what dates of April, 2001 did Wednesday fall?

A. 1st, 8th, 15th, 22nd, 29th
C. 3rd, 10th, 17th, 24th

B. 2nd, 9th, 16th, 23rd, 30th
D. 4th, 11th, 18th, 25th

Answer: Option D

[INFOSYS 2003]

Solution:

We shall find the day on 1st April, 2001.

1st April, 2001 = (2000 years + Period from 1.1.2001 to 1.4.2001)

Odd days in 1600 years = 0

Odd days in 400 years = 0

Jan. Feb. March April

$(31 + 28 + 31 + 1) = 91 \text{ days} \equiv 0 \text{ odd days.}$

Total number of odd days = $(0 + 0 + 0) = 0$

On 1st April, 2001 it was Sunday.

In April, 2001 Wednesday falls on 4th, 11th, 18th and 25th.

8. How many days are there in x weeks x days?

A. $7x^2$
C. $14x$

B. $8x$
D. 7

Answer: Option B

Solution: x weeks x days = $(7x + x)$ days = $8x$ days.

CLOCK:

9. 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°

[RRB 2009]

[C.](#) 168°

[D.](#) 180°

Answer: Option D

Explanation:

Angle traced by the hour hand in 6 hours = $\left(\frac{360}{12} \times 6\right)^\circ = 180^\circ$.

10. The reflex angle between the hands of a clock at 10.25 is:

[A.](#) 180°

[B.](#) $192\frac{1}{2}^\circ$

[C.](#) 195°

[D.](#) $197\frac{1}{2}^\circ$

Answer: Option D

Explanation:

Angle traced by hour hand in $12\frac{25}{60}$ hrs = $\left(\frac{360}{12} \times 12\frac{25}{60}\right)^\circ = 312\frac{1}{2}^\circ$.

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

\therefore Reflex angle = $360^\circ - \left(312\frac{1}{2} - 150\right)^\circ = 360^\circ - 162\frac{1}{2}^\circ = 197\frac{1}{2}^\circ$.

11. A clock is started at noon. By 10 minutes past 5, the hour hand has turned through:

[A.](#) 145°

[B.](#) 150°

[C.](#) 155°

[D.](#) 160°

Answer: Option C

Explanation:

Angle traced by hour hand in 12 hrs = 360°.

Angle traced by hour hand in 5 hrs 10 min. i.e., $5\frac{1}{6}$ hrs = $\left(\frac{360}{12} \times 5\frac{1}{6}\right)^\circ = 155^\circ$.

12. 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.](#) 59 $\frac{7}{12}$ min. past 3

[B.](#) 4 p.m.

[AAO EXAM 2003]

[C.](#) 58 $\frac{7}{11}$ min. past 3

[D.](#) 2 $\frac{3}{11}$ min. past 4

Answer: Option B

Explanation:

Time from 7 a.m. to 4.15 p.m. = 9 hrs 15 min. = $\frac{37}{4}$ hrs.

3 min. 5 sec. of this clock = 3 min. of the correct clock.

$\Rightarrow \frac{37}{720}$ hrs of this clock = $\frac{1}{20}$ hrs of the correct clock.

$\Rightarrow \frac{37}{4}$ hrs of this clock = $\left(\frac{1}{20} \times \frac{720}{37} \times \frac{37}{4} \right)$ hrs of the correct clock.

= 9 hrs of the correct clock.

\therefore The correct time is 9 hrs after 7 a.m. i.e., 4 p.m.

13. 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.

Answer: Option A

[CTS 2005]

Explanation:

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

14. At what time between 7 and 8 o'clock will the hands of a clock be in the same straight line but, not together?

A. 5 min. past 7

B. $5\frac{2}{11}$ min. past 7

C. $5\frac{3}{11}$ min. past 7

D. $5\frac{5}{11}$ min. past 7

Answer: Option D

Explanation: When the hands of the clock are in the same straight line but not together, they are 30 minute spaces apart.

At 7 o'clock, they are 25 min. spaces apart.

∴ Minute hand will have to gain only 5 min. spaces.

55 min. spaces are gained in 60 min.

5 min. spaces are gained in $\left(\frac{60}{55} \times 5\right)_{\text{min}} = 5\frac{5}{11}$ min.

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

15. 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

[IAS 1997]

Answer: Option B

Explanation:

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 $\left(\frac{60}{55} \times 40\right)_{\text{min}} = 43\frac{7}{11}$ min.

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

Exercise Problems:**CALENDAR:**

1. The last day of a century cannot be

A. Monday

C. Tuesday

B. Wednesday

D. Friday

Answer: Option C

Solution: 100 years contain 5 odd days.

∴ Last day of 1st century is Friday.

200 years contain $(5 \times 2) \equiv 3$ odd days.

∴ Last day of 2nd century is Wednesday.

300 years contain $(5 \times 3) = 15 \equiv 1$ odd day.

∴ Last day of 3rd century is Monday.

400 years contain 0 odd day.

∴ Last day of 4th century is Sunday.

This cycle is repeated.

∴ Last day of a century cannot be Tuesday or Thursday or Saturday.

2. On 8th Feb, 2005 it was Tuesday. What was the day of the week on 8th Feb, 2004?

A. Tuesday

C. Sunday

B. Monday

D. Wednesday

Answer: Option C

[CTS-2000]

Solution:

The year 2004 is a leap year. It has 2 odd days.

∴ The day on 8th Feb, 2004 is 2 days before the day on 8th Feb, 2005.

Hence, this day is Sunday.

3. The calendar for the year 2007 will be the same for the year:

[A.](#) 2014

[B.](#) 2016

[C.](#) 2017

[D.](#) 2018

Answer: Option D

Solution:

Count the number of odd days from the year 2007 onwards to get the sum equal to 0 odd day.

Year	:	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Odd day	:	1	2	1	1	1	2	1	1	1	2	1

Sum = 14 odd days \equiv 0 odd days.

\therefore Calendar for the year 2018 will be the same as for the year 2007.

4. Which of the following is not a leap year?

[A.](#) 700

[B.](#) 800

[C.](#) 1200

[D.](#) 2000

Answer: Option A

[TCS 2003]

Solution:

The century divisible by 400 is a leap year.

\therefore The year 700 is not a leap year.

5. On 8th Dec, 2007 Saturday falls. What day of the week was it on 8th Dec, 2006?

[A.](#) Sunday

[B.](#) Thursday

[C.](#) Tuesday

[D.](#) Friday

Answer: Option D

Solution:

The year 2006 is an ordinary year. So, it has 1 odd day.

So, the day on 8th Dec, 2007 will be 1 day beyond the day on 8th Dec, 2006.

But, 8th Dec, 2007 is Saturday.

∴ 8th Dec, 2006 is Friday.

6. January 1, 2008 is Tuesday. What day of the week lies on Jan 1, 2009?

[A.](#) Monday

[B.](#) Wednesday

[C.](#) Thursday

[D.](#) Sunday

[INFOSYS-2002]

Answer: Option C

Solution:

The year 2008 is a leap year. So, it has 2 odd days.

1st day of the year 2008 is Tuesday (Given)

So, 1st day of the year 2009 is 2 days beyond Tuesday.

Hence, it will be Thursday.

7. January 1, 2007 was Monday. What day of the week lies on Jan. 1, 2008?

[A.](#) Monday

[B.](#) Tuesday

[C.](#) Wednesday

[D.](#) Sunday

Answer: Option B

Solution: The year 2007 is an ordinary year. So, it has 1 odd day.

1st day of the year 2007 was Monday.

1st day of the year 2008 will be 1 day beyond Monday.

Hence, it will be Tuesday.

8. What was the day of the week on, 16th July, 1776?

[A.](#) Sunday

[B.](#) Thursday

[C.](#) Tuesday

[D.](#) Friday

[I-CET 2005]

Answer: Option C

Solution: 16th July, 1776 = (1775 years + Period from 1st Jan., 1776 to 16th July, 1776)

Counting of odd days : 1600 years have 0 odd day. 100 years have 5 odd days.

75 years = (18 leap years + 57 ordinary years)

= [(18 x 2) + (57 x 1)] odd days = 93 odd days

= (13 weeks + 2 days) = 2 odd days.

∴ 1775 years have $(0 + 5 + 2)$ odd days = 7 odd days = 0 odd day.

Jan. Feb. March April May June July

$31 + 29 + 31 + 30 + 31 + 30 + 16 = 198$ days = (28 weeks + 2 days) = 2da

∴ Total number of odd days = $(0 + 2) = 2$. Required day was 'Tuesday'.

9. What was the day of the week on 16th August, 1947?

[A.](#) Sunday

[B.](#) Saturday

[C.](#) Tuesday

[D.](#) Friday

Answer: Option D

Solution: 15th August, 1947 = (1946 years + Period from 1st Jan., 1947 to 15th

Counting of odd days:

1600 years have 0 odd day. 300 years have 1 odd day.

47 years = (11 leap years + 36 ordinary years)

= $[(11 \times 2) + (36 \times 1)]$ odd days = 58 odd days = 2 odd days.

Jan. Feb. March April May June July Aug.

$31 + 28 + 31 + 30 + 31 + 30 + 31 + 15$

= 227 days = (32 weeks + 3 days) = 3,

Total number of odd days = $(0 + 1 + 2 + 3)$ odd days = 6 odd days.

Hence, the required day was 'Saturday'.

10. What was the day of the week on 16th April, 2000 ?

[A.](#) Sunday

[B.](#) Thursday

[CTS 2003]

[C.](#) Tuesday

[D.](#) Friday

Answer: Option A

Solution: 16th April, 2000 = (1999 years + Period from 1st Jan., 2000 to 16thA'

Counting of odd days:

1600 years have 0 odd day. 300 years have 1 odd day.

99 years = (24 leap years + 75 ordinary years)

= $[(24 \times 2) + (75 \times 1)]$ odd days = 123 odd days

= (17 weeks + 4 days) = 4 odd days.

Jan. Feb. March April

$31 + 29 + 31 + 16 = 107$ days = (15 weeks + 2 days) = 2 odd,

Total number of odd days = $(0 + 1 + 4 + 2)$ odd days = 7 odd days = 0 odd day.

Hence, the required day was 'Sunday'.

11. On what dates of Jull.2004 did Monday fall?

[A.](#) 1st, 8th, 15th, 22nd, 29th

[B.](#) 5th, 12th, 19th, 26th

[C.](#) 4th, 11th, 18th, 25th

[D.](#) 6th, 13th, 20th, 27th

Answer: Option B

Solution: Let us find the day on 1st July, 2004.

2000 years have 0 odd day. 3 ordinary years have 3 odd days.

Jan. Feb. March April May June July

$31 + 29 + 31 + 30 + 31 + 30 + 1$

$= 183 \text{ days} = (26 \text{ weeks} + 1 \text{ day}) = 1 \text{ t.}$

Total number of odd days $= (0 + 3 + 1) \text{ odd days} = 4 \text{ odd days.}$

\therefore 1st July 2004 was 'Thursday', -,-

Thus, 1st Monday in July 2004 _as on 5th July.

Hence, during July 2004, Monday fell on 5th, 12th, 19th and 26th. .

12. Prove that the calendar for the year 2008 will serve for the year 2011

[A.](#)2010

[B.](#)2011

[C.](#)2014

[D.](#)2015

[RRB 2002]

Answer: Option C

Sol. In order that the calendar for the year 2003 and 2014 be the same, 1st January of both the years must be on the same day of the week.

For this, the number of odd days between 31st Dec., 2002 and 31st Dec., 2013 must be the same.

We know that an ordinary year has 1 odd day and a leap year has 2 odd. During this period, there are 3 leap years, namely 2004, 2008 and 2012 and 8 ordinary years.

Total number of odd days $= (6 + 8) \text{ days} = 0 \text{ odd day.}$

Hence, the calendar for 2003 will serve for the year 2014.

13. Prove that any date in March of a year is the same day of the week corresponding date in November that year.

[A.](#)Same day

[B.](#)Not same day

[C.](#)Next day

[D.](#)Day by day

Answer: Option A

We will show that the number of odd days between last day of February and last day of October is zero.

March April May June July Aug. Sept. Oct.

$31 + 30 + 31 + 30 + 31 + 31 + 30 + 31$

$= 241 \text{ days} = 35 \text{ weeks} = 0 \text{ odd day.}$,Number of

odd days during this period $= 0$.

Thus, 1st March of an year will be the same day as 1st November of that year. Hence, the result follows.

CLOCK:

14) Find the angle between the hour hand and the minute hand of a clock when 3.25.

- A) 32° B) $47 \times 1/2^\circ$ C) $49 \times 1/2^\circ$ D) 37°

Answer:B

Solution: angle traced by the hour hand in 12 hours = 360°

Angle traced by it in three hours 25 min (i.e.) 41/12 hrs = $(360 \times 41/12 \times 12)^\circ = 102 \times 1/2^\circ$

angle traced by minute hand in 60 min. = 360° .

Angle traced by it in 25 min. = $(360 \times 25) / 60 = 150^\circ$

Required angle = $1500 - 102 \times 1/2^\circ = 47 \times 1/2^\circ$

15) At what time between 2 and 3 o'clock will the hands of a clock be together?

- A) 45 min. past 2 B) 40 min. past 2
C) 120*1/11min.past 2 D) 54*6/11 min.past 2 [Sathyam-2000]

Answer:B

Solution: At 2 o'clock, the hour hand is at 2 and the minute hand is at 12, *i.e.* they are 10 min spaces apart.

To be together, the minute hand must gain 10 minutes over the hour hand.

Now, 55 minutes are gained by it in 60 min.

10 minutes will be gained in $(60 \times 10)/55$ min. = $120/11$ min.

The hands will coincide at 120/11 min. past 2.

16) At what time between 4 and 5 o'clock will the hands of a clock be at right angle?

- A) 45 min. past 4
B) 40 min. past 4
C) 40*1/11 min. past 4
D) 54*1/11 min. past 4
- [IAS 2000]

Answer: C

Solution: At 4 o'clock, the minute hand will be 20 min. spaces behind the hour hand, Now, when the two hands are at right angles, they are 15 min. spaces apart. So, they are at right angles in following two cases.

Case I. When minute hand is 15 min. spaces *behind the hour hand*:

In this case min. hand will have to gain $(20 - 15) = 5$ minute spaces. 55 min. spaces are gained by it in 60 min.

5 min spaces will be gained by it in $\frac{60 \times 5}{55}$ min = 60/11 min.

\therefore They are at right angles at 60/11 min. past 4.

Case II. When the minute hand is 15 min. spaces *ahead* of the *hour* hand:

To be in this position, the minute hand will have to gain $(20 + 15) = 35$ minute spa' 55 min. spaces are gained in 60 min.

35 min spaces are gained in $(60 \times 35)/55 \text{ min} = 40/11$

\therefore They are at right angles at 40/11 min. past 4.

17) Find at what time between 8 and 9 o'clock will the hands of a clock being the same straight line but not together.

- A) 45 min B) 40 min
C) $20\frac{6}{11}$ min. past 4 D) $120\frac{1}{11}$ min. past 4

Answer: D

Solution: At 8 o'clock, the hour hand is at 8 and the minute hand is at 12, i.e. the two hands are 20 min. spaces apart.

To be in the same straight line but not together they will be 30 minute spaces apart. So, the minute hand will have to gain $(30 - 20) = 10$ minute spaces over the hour hand. 55 minute spaces are gained. in 60 min.

10 minute spaces will be gained in $(60 \times 10)/55$ min. = $120/11$ min.

∴ The hands will be in the same straight line but not together at $120/11$ min.

18) At what time between 5 and 6 o'clock are the hands of a clock 3 min apart?

- A) 45 min. past 5 B) 140 min. past 5
C) $346\frac{1}{11}$ min. past 4 D) $354\frac{1}{11}$ min. past 4 [LICAAO 2003]

Answer: C

Solution: At 5 o'clock, the minute hand is 25 min. spaces behind the hour hand.

Case I. Minute hand is 3 min. spaces *behind the hour hand*.

In this case, the minute hand has to gain $(25 - 3) = 22$ minute spaces. 55 min. are gained in 60 min.

22 min. are gained in $(60 \times 22)/55$ min. = 24 min.

∴ The hands will be 3 min. apart at 24 min. past 5.

Case II. Minute hand is 3 min. spaces *ahead of the hour hand*.

In this case, the minute hand has to gain $(25 + 3) = 28$ minute spaces. 55 min. are gained in 60 min.

28 min. are gained in $(60 \times 28)/55 = 346/11$

The hands will be 3 min. apart at $346/11$ min. past 5.

19) The minute hand of a clock overtakes the hour hand at intervals of 65 minutes of the correct time. How much a day does the clock gain or lose?

- A) 450 min. B) 470 min
C) $440/43$ min D) 546 min [SCRA 1996]

Answer: C

Solution: In a correct clock, the minute hand gains 55 min. spaces over the hour hand in 60 minutes.

To be together again, the minute hand must gain 60 minutes over the hour hand. 55 min. are gained in 60 min.

60 min are gained in $\frac{60}{55} \times 60 \text{ min} = 720/11 \text{ min.}$

But, they are together after 65 min.

Gain in 65 min $= 720/11 - 65 = 5/11 \text{ min.}$

Gain in 24 hours $= (5/11 * (60*24)/65) \text{ min} = 440/43$

The clock gains $440/43$ minutes in 24 hours.

20) A watch which gains uniformly, is 6 min. slow at 8 o'clock in the morning Sunday and it is 6 min. 48 sec. fast at 8 p.m. on following Sunday. When was it correct?

[A.](#) Sunday

[B.](#) Wednesday

[C.](#) Tuesday

[D.](#) Friday

[RRB 2010]

Answer: Option B

Solution: Time from 8 a.m. on Sunday to 8 p.m. on following Sunday
 $= 7 \text{ days } 12 \text{ hours} = 180 \text{ hours}$

The watch gains $(5 + 29/5) \text{ min.}$ or $54/5 \text{ min.}$ in 180 hrs.

Now $54/5 \text{ min.}$ are gained in 180 hrs.

5 min. are gained in $(180 \times \frac{5}{54} \times 5) \text{ hrs.} = 83 \text{ hrs } 20 \text{ min.} = 3 \text{ days } 11 \text{ hrs } 20 \text{ min.}$

Watch is correct 3 days 11 hrs 20 min. after 8 a.m. of Sunday.

It will be correct at 20 min. past 7 p.m. on Wednesday.

21) A clock is set right at 6 a.m. The clock loses 16 minutes in 24 hours. What will be the true time when the clock indicates 10 p.m. on 4th day?

A) 12 am B) 06 am C) 11 p.m D) 10 p.m

Answer: C

Solution: Time from 5 a.m. on a day to 10 p.m. on 4th day $= 89 \text{ hours.}$

Now 23 hrs 44 min. of this clock $= 24 \text{ hours of correct clock.}$

$356/15 \text{ hrs of this clock} = 24 \text{ hours of correct clock.}$

$89 \text{ hrs of this clock} = (24 \times \frac{31556}{15} \times 89) \text{ hrs of correct clock.}$

$= 90 \text{ hrs of correct clock.}$

So, the correct time is 11 p.m.

22) A clock is set right at 8 a.m. The clock gains 10 minutes in 24 hours will be the true time when the clock indicates 1 p.m. on the following day?

- A) 45 min. past 12 B) 48 min. past 12
C) 40 min. past 12 D) 54 min. past 12

Answer: B

Solution: Time from 8 a.m. on a day 1 p.m. on the following day = 29 hours.

24 hours 10 min. of this clock = 24 hours of the correct clock.

145 / 6 hrs of this clock = 24 hrs of the correct clock

29 hrs of this clock = $(24 \times \frac{6}{145} \times 29)$ hrs of the correct clock

= 28 hrs 48 min. of correct clock

The correct time is 28 hrs 48 min. after 8 a.m.

This is 48 min. past 12.

23) The angle between the minute hand and the hour hand of a clock when the time is 4.20, is:

- A. 0° B. 10°
C. 5° D. 20°

[AAO EXAM 2003]

Answer: Option B

Explanation:

Angle traced by hour hand in $\frac{13}{3}$ hrs = $\left(\frac{360}{12} \times \frac{13}{3} \right)^\circ = 130^\circ$.

Angle traced by min. hand in 20 min. = $\left(\frac{360}{60} \times 20 \right)^\circ = 120^\circ$.

\therefore Required angle = $(130 - 120)^\circ = 10^\circ$.

24) At what angle the hands of a clock are inclined at 15 minutes past 5?

- A. $58\frac{1}{2}^\circ$ B. 64°
C. $67\frac{1}{2}^\circ$ D. $72\frac{1}{2}^\circ$

Answer: Option C

Explanation:

Angle traced by hour hand in $\frac{21}{4}$ hrs = $\left(\frac{360}{12} \times \frac{21}{4} \right)^\circ = 157\frac{1}{2}^\circ$

Angle traced by min. hand in 15 min. = $\left(\frac{360}{60} \times 15\right)^\circ = 90^\circ$.

\therefore Required angle = $\left(157\frac{1}{2}\right)^\circ - 90^\circ = 67\frac{1}{2}^\circ$

25) At 3.40, the hour hand and the minute hand of a clock form an angle of:

[A.](#) 120°

[B.](#) 125°

[C.](#) 130°

[D.](#) 135°

Answer: Option C

Explanation:

Angle traced by hour hand in 12 hrs. = 360°.

Angle traced by it in $11\frac{1}{3}$ hrs = $\left(\frac{360}{12} \times \frac{11}{3}\right)^\circ = 110^\circ$.

Angle traced by minute hand in 60 min. = 360°.

Angle traced by it in 40 min. = $\left(\frac{360}{60} \times 40\right)^\circ = 240^\circ$.

\therefore Required angle $(240 - 110)^\circ = 130^\circ$.

26) How many times are the hands of a clock at right angle in a day?

[A.](#) 22

[B.](#) 24

[C.](#) 44

[D.](#) 48

[TCS-2010]

Answer: Option C

Explanation:

In 12 hours, they are at right angles 22 times.

\therefore In 24 hours, they are at right angles 44 times.

27) The angle between the minute hand and the hour hand of a clock when the time is 8.30, is:

[A.](#) 80°

[B.](#) 75°

[C.](#) 60°

[D.](#) 105°

Answer: Option B

Explanation:

Angle traced by hour hand in $\frac{17}{2}$ hrs = $\left(\frac{360}{12} \times \frac{17}{2} \right)^\circ = 255^\circ$.

Angle traced by min. hand in 30 min. = $\left(\frac{360}{60} \times 30 \right)^\circ = 180^\circ$.

\therefore Required angle = $(255 - 180)^\circ = 75^\circ$.

28) How many times in a day, are the hands of a clock in straight line but opposite in direction?

[A.](#) 20

[B.](#) 22

[C.](#) 24

[D.](#) 48

Answer: Option B

Explanation:

The hands of a clock point in opposite directions (in the same straight line) 11 times in every 12 hours. (Because between 5 and 7 they point in opposite directions at 6 o'clock only).

So, in a day, the hands point in the opposite directions 22 times.

29) At what time between 4 and 5 o'clock will the hands of a watch point in opposite directions?

[A.](#) 45 min. past 4

[B.](#) 40 min. past 4

[C.](#) $50\frac{4}{11}$ min. past 4

[D.](#) $54\frac{6}{11}$ min. past 4

Answer: Option D

Explanation:

At 4 o'clock, the hands of the watch are 20 min. spaces apart.

To be in opposite directions, they must be 30 min. spaces apart.

\therefore Minute hand will have to gain 50 min. spaces.

55 min. spaces are gained in 60 min.

50 min. spaces are gained in $\left(\frac{60}{55} \times 50 \right)$ min. or $54\frac{6}{11}$ min.

\therefore Required time = $54\frac{6}{11}$ min. past 4.

30) At what time between 9 and 10 o'clock will the hands of a watch be together?

A. 45 min. past 9

B. 50 min. past 9

C. $49\frac{1}{11}$ min. past 9

D. $48\frac{2}{11}$ min. past 9

Answer: Option C

Explanation:

To be together between 9 and 10 o'clock, the minute hand has to gain 45 min. spaces.

55 min. spaces gained in 60 min.

45 min. spaces are gained in $\left(\frac{60}{55} \times 45\right)$ min or $49\frac{1}{11}$ min.

\therefore The hands are together at $49\frac{1}{11}$ min. past 9.

31) At what time, in minutes, between 3 o'clock and 4 o'clock, both the needles will coincide each other?

A. $5\frac{1}{11}$ "

B. $12\frac{4}{11}$ "

C. $13\frac{4}{11}$ "

D. $16\frac{4}{11}$ "

Answer: Option D

Explanation:

At 3 o'clock, the minute hand is 15 min. spaces apart from the hour hand.

To be coincident, it must gain 15 min. spaces.

55 min. are gained in 60 min.

15 min. are gained in $\left(\frac{60}{55} \times 15\right)$ min = $16\frac{4}{11}$ min.

\therefore The hands are coincident at $16\frac{4}{11}$ min. past 3.

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

A. 20

B. 21

C. 22

D. 24

Answer: Option C

Explanation:

The hands of a clock coincide 11 times in every 12 hours (Since between 11 and 1, they coincide only once, *i.e.*, at 12 o'clock).

AM

12:00
1:05
2:11
3:16
4:22
5:27
6:33
7:38
8:44
9:49
10:55

PM

12:00
1:05
2:11
3:16
4:22
5:27
6:33
7:38
8:44
9:49
10:55

The hands overlap about every 65 minutes, not every 60 minutes.

∴ The hands coincide 22 times in a day.

33) How many times in a day, the hands of a clock are straight?

[A.](#)22

[B.](#)24

[C.](#)44

[D.](#)48

Answer: Option C

Explanation: In 12 hours, the hands coincide or are in opposite direction 22 times.

∴ In 24 hours, the hands coincide or are in opposite direction 44 times a day.

34) 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

Answer: Option B

Explanation: Time from 12 p.m. on Monday to 2 p.m. on the following Monday = 7 days 2 hours = 170 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.

35) Alpha, Beta, gamma, delta and epsilon are friends and have birthdays on consecutive days though may not be in order. Gamma is as many days old to Alpha as Beta is younger to Epsilon. Delta is two days older than Epsilon. Gamma's Birthday is on Wednesday. Tell whose birthday is when.

Answer:

[infosys, july 2003]

Alpha: Friday

Beta : Saturday

Gamma: Wednesday

Delta: Tuesday

Epsilon: Thursday

36) The quarter of the time from midnight to present time added to the half of the time from the present to midnight gives the present time. What is the present time?

Answer:

9hrs past 36 minutes AM

[infosys, july 2003]

37) A, B, C, D & E are having their birthdays on consecutive days of the week not necessarily in the same order. A's birthday comes before G's as many days as B's birthday comes after E's. D is older than E by 2 days. This time G's birthday came on Wednesday. Then find the day of each of their birthdays?

Answer:**[infosys, july 2003]**

Birthday of D on SUNDAY

Birthday of B on MONDAY

Birthday of E on TUESDAY

Birthday of G on WEDNESDAY

Birthday of A on THURSDAY

38) A clock showing 6 o'clock takes 30 secs to strike 6 times. How long will it take to strike 12 at midnight?
[infosys, 2006]

Answer:

66 Secs

39) Light glows for every 13 seconds . How many times did it between 1:57:58 and 3:20:47 am

Answer:**[infosys, 1997]** $383 + 1 = 384$

40) when the actual time pass 1hr wall clock is 10 min behind it .when 1 hr is shown by wall clock, table clock shows 10 min ahead of it when table clock shows 1 hr the alarm clock goes 5min behind it, when alarm clock goes 1 hr wrist watch is 5 min ahead of it assuming that all clocks are correct with actual time at 12 noon what will be time shown by wrist watch after 6 hr

Answer: 5:47:32.5**[infosys, 1999]** $(n \times 60) 50/60 \times 70/60 \times 55/60 \times 65/60$

41) A man walks from 9.15 to 5.15 from Monday to Friday and 9.00 to 12.00 on Saturday. Each day 0.45 min lunch. How much time he walks in a week.

Answer: 39hrs15min**[Citil]**

42) If a clock takes 7 seconds to strike 7, how long will the same clock take to strike 10?

Answer: The clock strikes for the first time at the start and takes 7 seconds for 6 intervals-thus for one interval time taken = $7/6$.

Therefore, for 10 seconds there are 9 intervals and time taken is $9 \times 7/6 = 10$ and $1/2$ seconds.
[VIT]

43) Given that April 1 is Tuesday. A, B, C are 3 persons told that their farewell party was on A - May 8, Thursday B - May 10, Tuesday C - June 5, Friday. Out of A, B, C only one made a completely true statement concerning date, day and month. Of the rest one told the day right and the other the date right. What are correct date, month, and day?

Answer: B - (May 10) SUNDAY. C - June 6 (Friday). [VIT]

44) Fifty minutes ago if it was four times as many minutes past three o'clock, how many minutes is it to six o'clock?

Answer: 26 minutes. [VIT]

45) A clock strikes '6' in 5 seconds. How long does it take to strike '12'?
11 seconds

[VIT]

Answer: There is an interval of 1 second between each stroke. If the clock strikes 6, there are 5 intervals. If the clock strikes 12 there are 11 intervals.

46) How many birth days does the average man have? [VIT]

Answer: One, he may have many Birthdays, but only one birth day!

Question Bank for Mock Test

1. Monday falls on 4th April 1988. What was the day on 3rd November, 1987?

a) Tuesday b) Monday c) Saturday d) Sunday

2. First January, 1981 was Sunday. What day of the week was 1st Jan 1980?

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

3. On what dates of August 1988 did 'Friday' falls?

a) 6, 13, 20, 27 b) 4, 11, 18, 25 c) 5, 12, 19, 26 d) 3, 10, 17, 25

4. The year next to 1973 having the same calendar as that of 1973 is ____

a) 1976 b) 1977 c) 1978 d) 1979

5. The year next to 1988 having the same calendar as that of 1988 is ____

a) 2016 b) 2010 c) 2004 d) 1999

6. Any day in April is always on the same day of the week as the corresponding day is

- a) May b) March c) June d) July

7. One of the following day which cannot be the last day of the century

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

8. What was the day on 1st January, 1 A.D.?

- a) Sunday b) Monday c) Tuesday d) Wednesday

9. What was the day on 31st December, 1 A.D.?

- a) Sunday b) Monday c) Tuesday d) Wednesday

10. How many days are there from 2nd Jan 1993 to 15th March 1993?

- a) 73 b) 71 c) 37 d) 80

11. Find the number of odd days in 200 days.

- A) 2 B) 4 C) 5 D) 6

12. Find the number of odd days in 425 days.

- A) 3 B) 4 C) 5 D) 6

13. Find the number of odd days in 49 years.

- a) 2 b) 4 c) 5 d) 6

14. What day of the week on 26th Jan 1950?

- a) Monday b) Tuesday c) Wednesday d) Thursday

15. Gandhiji was born on 2nd October, 1869. What day was it of the week?

- a) Thursday b) Friday c) Saturday d) Sunday

16. What day of the week on 2nd June, 1988?

- a) Thursday b) Friday c) Sunday d) Saturday

17. What day of the week on 15th August, 1947?

- a) Thursday b) Friday c) Sunday d) Saturday

18. What day of the week on 31st October, 1984?

- a) Thursday b) Friday c) Sunday d) Saturday

19. What day of the week on 14th March, 1993?

- a) Thursday b) Friday c) Sunday d) Saturday

20. What day of the week on 14th November, 1889?

- a) Monday b) Wednesday c) Thursday d) Saturday

21. It was Sunday on Jan 1, 2004. What was the day of the week Jan 1, 2005?

[A.](#) Sunday

[B.](#) Saturday

[C.](#) Friday

[D.](#) Wednesday

22. On 8th March, 2005 it was Tuesday. What was the day of the week on 8th, 2004?

[A.](#) Tuesday

[B.](#) Monday

[C.](#) Sunday

[D.](#) Wednesday

23. The calendar for the year 2005 will be the same for the year:

[A.](#) 2010

[B.](#) 2011

[C.](#) 2012

[D.](#) 2013

24. On what dates of April, 2001 did Sunday fall?

[A.](#) 1st, 8th, 15th, 22nd, 29th

[B.](#) 2nd, 9th, 16th, 23rd, 30th

[C.](#) 4th, 11th, 18th, 25th

[D.](#) 6th, 13th, 20th, 27th

25. What will be the day of the week 1st January, 2010?

[A.](#) Friday

[B.](#) Saturday

[C.](#) Sunday

[D.](#) Monday

26. What was the day of the week on 17th June, 1998?

[A.](#) Monday

[B.](#) Tuesday

[C.](#) Wednesday

[D.](#) Thursday

27. What was the day of the week on 28th May, 2003?

[A.](#) Thursday

[B.](#) Friday

[C.](#) Saturday

[D.](#) Sunday

28. Today is Friday. After 62 days, it will be:

[A.](#) Wednesday

[B.](#) Saturday

[C.](#) Tuesday

[D.](#) Thursday

29. The first Republic day of India was celebrated on 26th January, 1950. It was:

[A.](#) Tuesday

[B.](#) Wednesday

[C.](#) Thursday

[D.](#) Friday

30) A clock is started at noon. By 10 minutes past 5, the hour hand has turned through:

A) 145 degrees

B) 150 degrees

C) 155 degrees

D) 160 degrees

31) 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 degrees

B) 150 degrees

C) 168 degrees

D) 180 degrees

32) At 3.40, the hour and the minute hand of a clock form an angle of :

A) 120 degrees

B) 125 Degrees

C) 130 degrees

D) 135 Degrees

33) The angle between the hour hand and the minute hand of a clock when the time is 8.30am is:

A) 80 degrees

B) 75 degrees

C) 60 degrees

D) 105 degrees

34) The angle between the hour hand and the minute hand of a clock when the time is 4.20 is:

A) 0 degrees

B) 10 degrees

C) 5 degrees

D) 20 degrees

35) At what angle the hands of a clock are inclined at 15 minutes past 5?

A) $58\frac{1}{2}^\circ$

B) 64°

C) $67\frac{1}{2}^\circ$

D) $72\frac{1}{2}^\circ$

36) The reflex angle between the hands of clock at 10.25 is :

A) 180°

B) $192\frac{1}{2}^\circ$

C) 195°

D) $192\frac{1}{2}^\circ$

37) How many times do the hands of the clock coincide in a day?

A) 20

B) 21

C) 22

D) 24

38) How many times in a day, the hands of the clock are straight?

- A) 22 B) 24 C) 44 D) 48

39) How many times do the hands of the clock are at right angle in a day?

- A) 22 B) 24 C) 44 D) 48

40) How many times in a day do the hands of the clock in straight line but opposite in direction?

- A) 20 B) 22 C) 24 D) 48

41) 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

42) At what time, in minutes, between 3'o clock and 4'o clock, both the needles will coincide with each other

- A) $5\frac{1}{11}$ " B) $12\frac{4}{11}$ " C) $13\frac{4}{11}$ " D) $16\frac{4}{11}$ "

43) At what time, between 9'o clock and 10'o clock will the hands of watch be together

- A) 45 min. past 9 B) 50 min. past 9
C) $49\frac{1}{11}$ min. past 9 D) $48\frac{2}{11}$ min. past 9

44) At what time, between 7'o clock and 8'o clock will the hands of clock be in straight line but, not together

- A) 5 min. past 7 B) $5\frac{2}{11}$ min. past 7
C) $5\frac{3}{11}$ min. past 7 D) $5\frac{5}{11}$ min. past 7

45) At what time, between 4'o clock and 5'o clock will the hands of watch point in opposite directions

- A) 45 min. past 4 B) 40 min. past 4
C) $50\frac{4}{11}$ min. past 4 D) $54\frac{6}{11}$ min. past 4

46) At what time, between 5.30 and 6'o clock will the hands of clocks 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

47) A watch which gains uniformly is 2 minutes low at noon on Monday and is 4 min 48 sec fast at 2pm on the following Monday. when it is correct?

- A) 2 p.m on Tuesday
C) 3 p.m on Thursday

- B) 2 p.m on Wednesday
D) 1 p.m on Friday

48) 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) 59*7/12 min.past 3
C) 58*7/11 min.past 3

- B) 4 p.m
D) 2*3/11 min.past 4

49) At a certain moment a watch shows 2 min lag although it is fast. if it showed a 3 min lag at that moment, but gain $\frac{1}{2}$ min more a day than it does. it would show the true time one day sooner than it usually does. how many mins does the watch gain per day. [IIT Madras, 98]

- a).2 b).5 c).6 d).4 e).75

50) There were two clock one is getting slow by two minutes/hr and another one is gaining 1 minute every hour and exactly after how many hours there two clock has a 1hr difference. [infosys, june 2003]

- a).14 hrs b).12 hrs c).16 hrs d)20hrs

Answers

- | | | | | | |
|------|------|------|------|------|------|
| 1.A | 2.D | 3.C | 4.D | 5.A | 6.D |
| 7.D | 8.B | 9.B | 10.A | 11.B | 12.A |
| 13.C | 14.D | 15.C | 16.A | 17.B | 18.D |
| 19.D | 20.C | 21.B | 22.B | 23.C | 24.A |
| 25.C | 26.C | 27.B | 28.D | 29.C | 30.C |
| 31.D | 32.C | 33.B | 34.B | 35.C | 36.D |
| 37.C | 38.C | 39.C | 40.B | 41.A | 42.D |
| 43.C | 44.D | 45.D | 46.B | 47.B | 48.B |
| 49.E | 50.D | | | | |