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Aptitude Made Simple

Clocks

Various competitive examinations ask questions regularly based on Clocks. Clock is one of the most integral part of our day to day life.

Assume you have any exam or you are going to watch movie or cricket match every thing happens and depends on Clock.

If you don't follow it, you will miss your bus, train or flight or probably an academic year to if you don't reach on time.

Why Clocks problems are different?

We every time look at clock to see what time it is, how much time we have before we leave home etc. However we never come across problems in real life where someone ask us what is current angle in minute hand and hand hour hand? What will happen if your clock loses 5 minutes every hour.

Therefore, the way of us looking normally at Clock is way different than what is asked in exam.

Let us try to understand which things we should know before we actually solve problems on clocks.

Important formulae:

1) To find angle between minute and hour hand at any time (hh:mm)

30h – 5.5 m

h- hour in timing

m –minute s in timing

Post calculation ignore minus sign if it comes

2) Remember fraction **12/11**

Types of Problems:

Type	To find	Things to remember
Type 1	What will be angle between minute hand and hour hand at **hh:mm**	**Angle = 30h - 5.5m** h – hour, m – minutes Ignore sign after solving
Type 2	Between 2 and 3 at what time minute hand and hour hand will **coincide**	0 degree angle
Type 3	Between 3 and 4 at what time minute hand and hour hand will be **opposite to each other.**	180 degree angle
Type 4	Between 5 and 6 at what time minute hand and hour hand will be **Right angle**	90 degree angle
Type 5	Static questions	

Angle Measurement in Clock

Have look at clock and try to remember minutes along with actual digits (1 to 12). When you see circle you can easily remember it as 360 degrees.

We have total 12 numbers and it is equally spaced. (360/12 = 30 degrees)

Angle between each consecutive digit on clock is 30 degrees.

We have 5 lines between 2 consecutive numbers and so 30/5=6

Angle between each consecutive minute line is 6 degrees.

Look at below 3 tables for reference and once you see you really don't need to refer it later and will be able to solve problems easily.

Angle between	Angle in degrees	Angle between	Angle in degrees
12 and 1	30*1 = 30	6 and 7	30*1 = 30
1 and 2	30*1 = 30	7 and 8	30*1 = 30
2 and 3	30*1 = 30	8 and 9	30*1 = 30
3 and 4	30*1 = 30	9 and 10	30*1 = 30
4 and 5	30*1 = 30	10 and 11	30*1 = 30
5 and 6	30*1 = 30	11 and 12	30*1 = 30

Right Angle: (90 degrees)

Angle between	Angle in degrees	Angle between	Angle in degrees
12 and 3	30*3 = 90	6 and 9	30*3 = 90
1 and 4	30*3 = 90	7 and 10	30*3 = 90
2 and 5	30*3 = 90	8 and 11	30*3 = 90
3 and 6	30*3 = 90	9 and 12	30*3 = 90
4 and 7	30*3 = 90	10 and 1	30*3 = 90
5 and 8	30*3 = 90	11 and 2	30*3 = 90

Opposite to each other : 180 degress

Angle between	Angle in degrees	Angle between	Angle in degrees
12 and 6	30*6 = 180	6 and 12	30*6 = 180
1 and 7	30*6 = 180	7 and 1	30*6 = 180
2 and 8	30*6 = 180	8 and 2	30*6 = 180
3 and 9	30*6 = 180	9 and 3	30*6 = 180
4 and 10	30*6 = 180	10 and 4	30*6 = 180
5 and 11	30*6 = 180	11 and 5	30*6 = 180

Type1:

Problem 1:

What will be angle between minute and hr hand at 2:30

Solution :

We have to remember simple formula whenever we have to calculate angle between minute n hr hand
For hh:mm = 30h – 5.5m [where h is hours and m is minutes]
= 30h - 5.5m
= 30 * 2 - (5.5*30)
= 60 - 165
= -105 degress

Ignore minus sign

Answer is 105 degrees

Problem 2:

What will be angle between minute and hr hand at 8:20

Solution :

We have to remember simple formula whenever we have to calculate angle between minute n hr hand.
For hh:mm = 30h – 5.5m [where h is hours and m is minutes]

= 30h - 5.5m
= 30 * 8 - (5.5 * 20)
= 240 - 110
= 130 degrees

Answer is 130 degrees

Type2:

Problem 1:

At what time between 4 to 5 minute and hour hand will coincide each other?

Solution :

As we have to find between 4 and 5, imagine it is 4 o'clock time.

Let us make hour hand constant on 4.

In order to make minute and hour hand coincide minute hand has to travel from 12 to 4.
This is nothing but -> 4 * 5 = 20 minutes

Now recall fraction number **12/11** which will help to solve maximum clock problems

= 20* 12/11
= 240/11= 21 9/11

$= \mathbf{21\frac{9}{11}}$

= 4 hr + $\mathbf{21\frac{9}{11}}$ min

Answer is 4 hr $\mathbf{21\frac{9}{11}}$ mins

Problem 2:

At what time between 11 to 12 minute and hour hand will coincide each other?

Solution :

As we have to find between 11 and 12, imagine it is 11 o'clock time.

Let us make hour hand constant on 11.

In order to make minute and hour hand coincide minute hand has to travel from 12 to 11.
This is nothing but -> 11 * 5 = 55 minutes

Now recall fraction number **12/11** which will help to solve maximum clock problems

= 55 * 12/11
= 5 * 12
= 60
= 11 hr + 60 mins
= 12 hr

Answer is 12 o'clock

Type3:

Problem 1:

At what time between 7 to 8 minute and hour hand will be in straight line but in opposite direction of each other?

Solution :

As we have to find between 7 and 8, imagine it is 7 o'clock time.

Let us make hour hand constant on 7.

In order to make minute and hour hand opposite of each other:
As hr hand is on 7 and to make in straight line and opposite we need to cover 180 degrees.
Opposite of 7 is 1 [you can refer table that we created earlier for 18- degrees]

So minute hand has to travel from 12 to 1
This is nothing but -> 5 minutes

Now recall fraction number **12/11** which will help to solve maximum clock problems

= 5 * 12/11
= 60/11
= $\mathbf{5\frac{5}{11}}$

= 7 hr + $\mathbf{5\frac{5}{11}}$ mins

Answer is 7 hr $\mathbf{5\frac{5}{11}}$ mins

Problem 2:

At what time between 8 to 9 , minute and hour hand will be in straight line but in opposite direction of each other?

Solution :

As we have to find between 8 and 9, imagine it is 8 o'clock time.

Let us make hour hand constant on 8.

In order to make minute and hour hand opposite of each other:
As hr hand is on 8 and to make in straight line and opposite we need to cover 180 degrees.
Opposite of 8 is 2 [you can refer table that we created earlier for 180 degrees]

So minute hand has to travel from 12 to 2
This is nothing but -> 2 * 5 = 10 minutes

Now recall fraction number **12/11** which will help to solve maximum clock problems

= 10 * 12/11
= 120/11
= $\mathbf{10\frac{10}{11}}$

= 8 hr + $\mathbf{10\frac{10}{11}}$ mins

Answer is 8 hr $\mathbf{10\frac{10}{11}}$ mins

Type4:

Problem 1:

At what time between 10 to 11, minute and hour hand will be in right angle?

Solution :

As we have to find between 10 and 11, imagine it is 10 o'clock time.

Let us make hour hand constant on 10.

In order to make minute and hour hand at right angle:
As hr hand is on 7 and to make in right angle it need to travel 90 degrees.
TO get 90 degrees to 10 we need to move 3 digits ahead that is 1 [you can refer table that we created earlier for 90 degrees]

So minute hand has to travel from 12 to 1
This is nothing but -> 5 minutes

Now recall fraction number **12/11** which will help to solve maximum clock problems

= 5 * 12/11
= 60/11
= $\mathbf{5\frac{5}{11}}$

= 10 hr + $\mathbf{5\frac{5}{11}}$ mins

Answer is 10 hr $\mathbf{5\frac{5}{11}}$ mins

Problem 2:

At what time between 2 to 3 , minute and hour hand will be in straight line but in opposite direction of each other?

Solution :

As we have to find between 2 and 3, imagine it is 2 o'clock time.

Let us make hour hand constant on 2.

In order to make minute and hour hand at right angle:
As hr hand is on 7 and to make in right angle it need to travel 90 degrees.
To get 90 degrees to 2 we need to move 3 digits ahead that is 5 [you can refer table that we created earlier for 90 degrees]

So minute hand has to travel from 12 to 5
This is nothing but -> 5 * 5 = 25 minutes

Now recall fraction number **12/11** which will help to solve maximum clock problems

= 25 * 12/11
= 300/11
= $\mathbf{27\frac{3}{11}}$

= 2 hr + $\mathbf{27\frac{3}{11}}$ mins

Answer is 2 hr $\mathbf{27\frac{3}{11}}$ mins

Type5:

Problem 1:

How many times do hands (hour and minutes hand) of clock coincide in a day?

Solution:

In 12 hrs

Timings	Number of coincide	Timings	Number of coincide
11 to 1	Only 1 time	5 to 6	1
		6 to 7	1
1 to 2	1	7 to 8	1
2 to 3	1	8 to 9	1
3 to 4	1	9 to 10	1
4 to 5	1	10 to 11	1

In 12 hrs: 11 times

In entire day 24 hrs : 22 times

Answer is 22 Times in a day hands of clock coincide

Problem 2:

How many times do hands (hour and minutes hand) of clock are straight?

Solution:

Hands of clock coincides 22 times in day

[Note: Coincide 1 time between 11 to 1 and for rest 1 hr 1 time each]

Hands of clock are in opposite direction 22 times

[Note: Oppoite in direction 1 time only between 5 to 7` and for rest 1 hr 1 time each]

Answer is 44 times in day hands of clock are straight

Problem 3:

How many times do hands (hour and minutes hand) of clock are in right angle?

Solution:

[Note: In Right angle 1 time only between 8 to 10` and for rest 1 hr 1 time each]

Answer is 22 Times in a day hands of clock are in right angle

Problem 4:

How many times do hands (hour and minutes hand) of clock are straight line but opposite in direction?

Solution :

[Note: Opposite and straight 1 time only between 5 to 7 and for rest 1 hr 1 time each]

Answer is 22 times in day hands of clock are in straight and opposite direction.