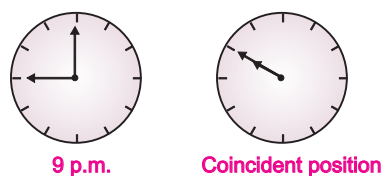


the other. The minute hand describes $360^\circ/60$ min or 6° /min, while the hour hand describes $1/2^\circ$ /min, both moving in the same direction. The minute hand therefore describes $5\frac{1}{2}^\circ$ more per minute than the hour hand.

The number of degrees in the angles described may be conveniently changed into divisions on the circumference, at the rate of 1 division for 60.



Example 1

Between 9 and 10 p.m. at what time are the hands of a clock coincident?

Solution

At 9 p.m. the minutes hand is 270° behind the hour hand. It has to make good the difference at the rate $5\frac{1}{2}^\circ$ /min. It takes $270^\circ/5\frac{1}{2}$ min or $540/11 = 49\frac{1}{11}$ min. The time in the coincident position is $49\frac{1}{11}$ min past 9.00 p.m.

Example 2

A watch which gains uniformly is 5 minutes slow at 8 a.m. and is 5 min. 48 s. fast at 8 p.m. on the following Sunday. When did it show correct time?

Solution

From 8 a.m. on Sunday to 8 p.m. on the following Sunday is 7 days and 12 hours = 180 hours.

In 180 h the watch has gained $(5 + (5\frac{4}{5}))$ min or $10\frac{4}{5}$ min. To show the correct time from first Sunday morning 8 a.m., it must gain 5 min.

To gain $10\frac{4}{5}$ min it takes 180 h.

To gain 5 min it takes $180/(10\frac{4}{5}) \times 5 = 250/3 = 83\frac{1}{3}$ h. = 3 days $11\frac{1}{3}$ h. It was on Wednesday 7.20 p.m.

The Calendar

The time that the earth takes to revolve round the sun once in 365 days 5 hours 48 minutes 45 seconds, that is, 365.24 2 days nearly. But we take only 365 days as a year. To make up for the hours and minutes we take an additional day every four years, and call it a LEAP YEAR. But this correction is found too much. So the first year of every century year is considered a leap year. For example, 1100, 1300, 1400, 1500, 1700, 1800, 1900 are not leap years.

But 1200, 1600, 2000 are leap years. Leap years have 366 days each, the month of February being allotted 29 days instead of 28. Every ordinary year has 365 days, that is, 52 weeks + 1 day. A leap year has 366 days, that is, 52 weeks + 2 days.

An ordinary year has 1 odd day and a leap year has 2 odd days. 100 years have 76 ordinary years and 24 leap year, that is (76×52) weeks + 76 days + (24×52) weeks + 48 days.

i.e. (100×52) weeks + 124 days.

i.e. 124 odd days

i.e. 17 weeks and 5 days or 5 odd days.

200 years contain 10 odd days and 3 odd days.

300 years contain 15 and therefore 1 odd day. 400 years contain $(20 + 1)$ and therefore 0 odd day. We fix the day according to the number of odd days. Sunday for 0 odd day.

Monday for 1 odd day

Tuesday for 2 odd days, and so on.

Example

Find the day of the week on 14th January 1979.

Solution

1600 years have 0 odd day.

300 years have 1 odd day.

78 years have 19 leap years and 59 ordinary years.

= $38 + 59$ odd days

= 97 odd days.

13 weeks + 6 odd days.

= 6 odd days.

14 days of January have 0 odd day.

Total number of odd days = $0 + 1 + 6 + 0$

7 odd days.

= 0 odd days.

The day is a Sunday.

Geometry and Trigonometry

Fundamental Concepts

Points are denoted by capital letters A, B, C and straight lines by lower case letters $a, b, c \dots$. The distance from a point A another point B is denoted by the symbol $|AB|$.

1. Three distinct points not lying in a line determine a plane.
2. Two intersecting lines determine a plane.
3. A line and a point not on it determine a plane.
4. Two parallel lines determine a plane.
5. If the lines lie on two different planes and if they do not intersect, they are called SKEW LINES.