

Clock

Minute Spaces

The face / dial of watch are a circle whose circumference is divided into 60 equal parts called minute spaces.

Hour Hand and Minute Hand

Any clock has 2 hands; the smaller one is called the hour hand / short hand while the larger one is called minute / long hand.

1. In 60 minutes, the minute hand gains 55 minutes on the hour on the hour hand.
2. In every hour, both the hands coincide once.
3. The hands are in the same straight line when they are coincident or opposite to each other.
4. When the two hands are at right angles, they are 15 minute spaces apart.
5. When the hands are in opposite directions, they are 30 minute spaces apart.
6. Angle traced by hour hand in 12 hrs = 360°
7. Angle traced by minute hand in 60 min. = 360° .
8. If a watch or a clock indicates 8.15, when the correct time is 8, it 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.

Problems with solutions

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

Solution

$$\text{Angle traced by hour hand in } \frac{125}{12} \text{ hrs} = \left(\frac{360}{12} \times \frac{125}{12} \right)^\circ = 312\frac{1}{2}.$$

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

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

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

Solution

$$\text{Angle traced by hour hand in 12 hrs} = 360^\circ.$$

$$\text{Angle traced by hour hand in 5 hrs 10 min. i.e., } \frac{31}{6} \text{ hrs} = \left(\frac{360}{12} \times \frac{31}{6} \right)^\circ = 155^\circ.$$

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

Solution

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

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

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

4. How many times are the hands of a clock at right angle in a day?

Solution

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

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

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

Solution

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.