

CLOCK

Clock is an application of circular Race b/w hour hand and minute hand.

Min. hand

60 min $\rightarrow$ 1 round $\rightarrow 360^\circ$

1 min $\rightarrow \frac{1 \text{ round}}{360} \rightarrow (6^\circ)$

for RA of $(5\frac{1}{2})$ min hand goes (6).

for (RA of (1) min hand $\rightarrow (\frac{12}{11})^\circ$)

Hr. hand

12 hrs $\rightarrow 360^\circ$

(60 min) $\approx$ 1 hr $\rightarrow 30^\circ$

1 min $\rightarrow (1/2)^\circ$

$5\frac{1}{2} \rightarrow 6$

$\frac{11}{2} \rightarrow 6$

11 $\rightarrow 12$

1 $\rightarrow \frac{12}{11}$

Relative (RA) = $(5\frac{1}{2})^\circ$

gain which
the min.
hand over
hr. hand

Q 1st variety $\rightarrow$ 12 hrs

(1) coincide $\rightarrow$ 11	} 24 hrs	22	] day
(2) right angle $\rightarrow$ 22		44	
(1) opposite $\rightarrow$ 11		22	

FORMULAS

(x) & (x+1) 0' clock

$5x \times \frac{12}{11}$ $\leftarrow$ coincidence

$(5x \pm 15) \frac{12}{11}$ $\leftarrow$ opposite $\rightarrow$ Rt. angle

$(5x \pm 30) \frac{12}{11}$ $\leftarrow$ ~~stand~~ opposite

$x > 6$ (-)

$x < 6$ (+)

$20 \times \frac{12}{11} = \frac{240}{11} = 21 \frac{9}{11} \rightarrow 4:21 \frac{9}{11}$ (winning chance).

$5x$ $\swarrow$
 $\begin{array}{c} 12 \\ \uparrow \text{mm} \\ \text{---} \\ \downarrow \text{mm} \\ 5 \end{array}$ $\searrow$
 $5x \frac{12}{11}$ $\rightarrow$ $\frac{60}{11} = 5 \frac{5}{11}$
 $(5x + \frac{30}{2})$ $\searrow$
 $(20 + 15)$ $\searrow$
 $\frac{12}{11}$ $\rightarrow$ $\frac{420}{11} = 38 \frac{2}{11}$



$$(20 + 30) \times \frac{12}{11} = \frac{600}{11} = 54 \frac{6}{11} \Rightarrow \boxed{4 : 54 \frac{6}{11} \leftarrow \text{opposite}}$$

Q. if b/w 7 and 8

$(5 \times 7 - 30)$

$35 - 30$

$5 \times \frac{12}{11} = \frac{60}{11} = 5 \frac{5}{11} \checkmark$

$7 \div 5 \frac{5}{11}$

* $6^0 \rightarrow 1 \text{ min}$
 $1^0 \rightarrow \left(\frac{1}{6}\right)^m$

$$\begin{aligned} & \left[5\pi + \left(\frac{0^\circ}{6} \right)_m \right] \frac{12}{11} \quad \leftarrow \text{Col'n } 0^\circ \\ & \left[5\pi \pm \left(\frac{90^\circ}{6} \right)_m \right] \frac{12}{11} \quad \leftarrow \text{L } 90^\circ \\ & \left[5\pi \pm \left(\frac{180^\circ}{6} \right)_m \right] \frac{12}{11} \quad \leftarrow \begin{array}{l} \text{opp} \\ n \geq 6(-) \\ n \leq 6(+) \end{array} 180^\circ \end{aligned}$$

*

$$\left[5x \pm \left(\frac{D^\circ}{6} \right) \right] \times \frac{12}{11}$$

Pg 56
Q6

~~40°~~

~~5x~~

~~$$\left[5x - \frac{D^\circ}{6} \right] \times \frac{12}{11}$$~~

~~$$\left[5x2 - \frac{40}{6} \right]$$~~

$$\left[5x + \frac{D^\circ}{6} \right] \times \frac{12}{11}$$

$$\left[5 \times 2 - \frac{40}{6} \right] \times \frac{12}{11} = \frac{40}{11} = 3 \frac{7}{11}$$

2 : 3 $\frac{7}{11}$
or
2 : 18 $\frac{2}{11}$

$$\left[5 \times 2 + \frac{40}{6} \right] \times \frac{12}{11} = \frac{200}{11} = 18 \frac{2}{11}$$

Q What is the angle b/w the minute hand and hour hand at 9:25?

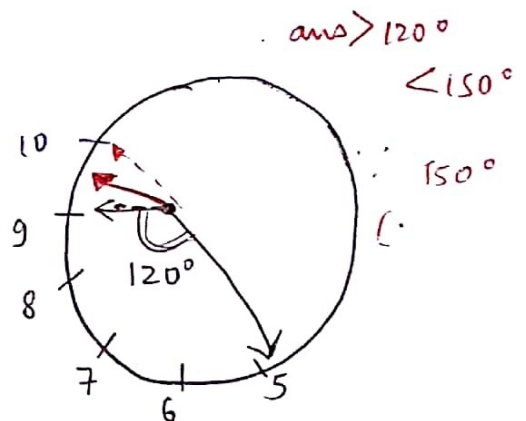
Sol

~~$$\left[5x + \frac{180}{6} \right] \frac{12}{11}$$

$$\left[5x - \frac{180}{6} \right] \frac{12}{11}$$

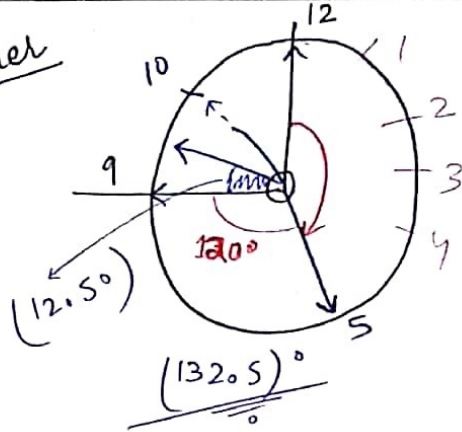
$$(125 - 30) \times \frac{12}{11}$$

$$95 \times \frac{12}{11}$$~~



$$\left[5x + \left(\frac{D^\circ}{6} \right) \right] \times \frac{12}{11} = 25^\circ$$

other

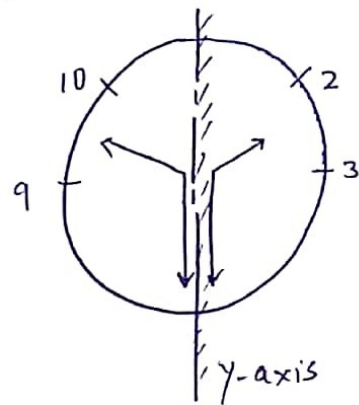


hr hand

$$1 \text{ min} \rightarrow \frac{1}{2}^\circ$$

$$25 \text{ min} \rightarrow 12.5^\circ$$

Mirror image $\rightarrow$ symm. about y axis



Q: How much time / or min hand hr hand kitni del baad mile?

$$60 \times \frac{12}{11} = \frac{720}{11} = \boxed{65 \frac{5}{11}}^{\text{min}} \text{ letter (1 time)}$$

$$\sqrt{12 \text{ hr}} = 12 \times 60 = \frac{720 \text{ hr}}{\frac{720}{11}} = 11 \text{ times}$$