Clocks

Modal 1:
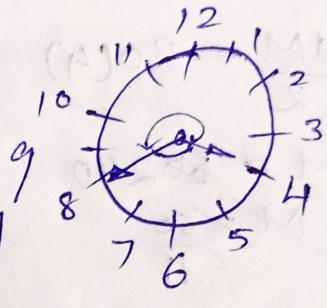
Q1] Find the angle, reflexe angle between hours hand and minute hand when the time is at 4hrs 40min.

Soln:
$$\theta = \left| \frac{11M - 30H}{2} \right|$$

$$\theta = \left| \frac{11(\overset{20}{\cancel{40}}) - 30(4)}{\cancel{2}1} \right|$$

$$\theta = |220 - 120| = 100°$$

reflexive angle = 360 - 100 = 260°

Position name	Angle difference	Number of times occurs		
		1hr	12hr	24hr
1. Coincide or together	0°	1	11	22
2. Right angles	90°	2	22	44
3. Opposite (or) Straight line but not together	180°	1	11	22

Modal 2

Q2] At what time between 4 and 5 both
hands are coinciding?

Ans $\theta = \left| \dfrac{11M}{2} - 30H \right|$ 1 hr gap.

$0 = \dfrac{11M}{2} - 30(4)$

$11M = 80\ 240$ $M = \dfrac{240}{11} min$

$\dfrac{M}{60} = \dfrac{}{11}$ $M = 21\dfrac{9}{11} min$ past 4

$\begin{array}{r} 21 \\ 21 \times \\ \hline 231 \end{array}$

Modal 3

Q3] 4 and 5 ; right angles

$\theta = \left| \dfrac{11M}{2} - 30H \right|$ 7 hr

$90 = \dfrac{11M}{2} - 120$

$\dfrac{11M}{2} = 210$

$M = \dfrac{420}{11}$

$M_1 = 38\dfrac{2}{11}$ min past 4

$\begin{array}{r} 38 \\ 11\overline{)428} \\ -33\downarrow \\ \hline 890 \\ -88 \\ \hline 2 \end{array}$

$\begin{array}{r} 43 \\ 11\overline{)480} \\ -44\downarrow \\ \hline 40 \\ -33 \\ \hline \end{array}$

$90 = \dfrac{HM}{2} - 150$ $\Rightarrow$ $\dfrac{11M}{2} = 240$

$$\theta = |30H - 11\tfrac{M}{2}|$$

$$90 = 120 - \frac{11M}{2}$$

$$\frac{11M}{2} = 30$$

$$M = \frac{60}{11} = 5\frac{5}{11} \text{ min past 4.}$$

$$11 \overline{)\begin{array}{c} 5 \\ 60 \\ 55 \\ \hline 5 \end{array}}$$

Modal 4.

Q4.] 4 & 5 opposite.

only for opposite

$$\theta = \left| \frac{11M}{2} - 30H \right| \longleftarrow \text{if } H < 6 \text{ then}$$

if $H > 6$ then

$$\theta = |30H - \frac{11M}{2}|$$

$$\cancel{180} =$$

$$180 = \frac{11}{2}M - 120$$

$$\frac{11M}{2} = 300$$

$$M = \frac{600}{11}$$

$$11 \overline{)\begin{array}{c} 54 \\ 600 \\ -55\downarrow \\ \hline 50 \\ -44 \\ \hline 6 \end{array}}$$

$$M = 54\frac{6}{11} \text{ min past 4}$$

Modal 5

05) At what time between 4 and 5 will both hands be 18 min apart.

Soln:

$$\theta = 18 \times \frac{360}{60} = 108°$$

$$108 = \frac{11M}{2} - 120$$

$$\frac{11M}{2} = 228$$

$$M = \frac{456}{11}$$

$$M = 41\frac{5}{11} \text{ min past } 4.$$

$$
\begin{array}{r}
41 \\
11{\overline{\smash{\big)}\,456}} \\
-44 \\
\hline
16 \\
-11 \\
\hline
5
\end{array}
$$