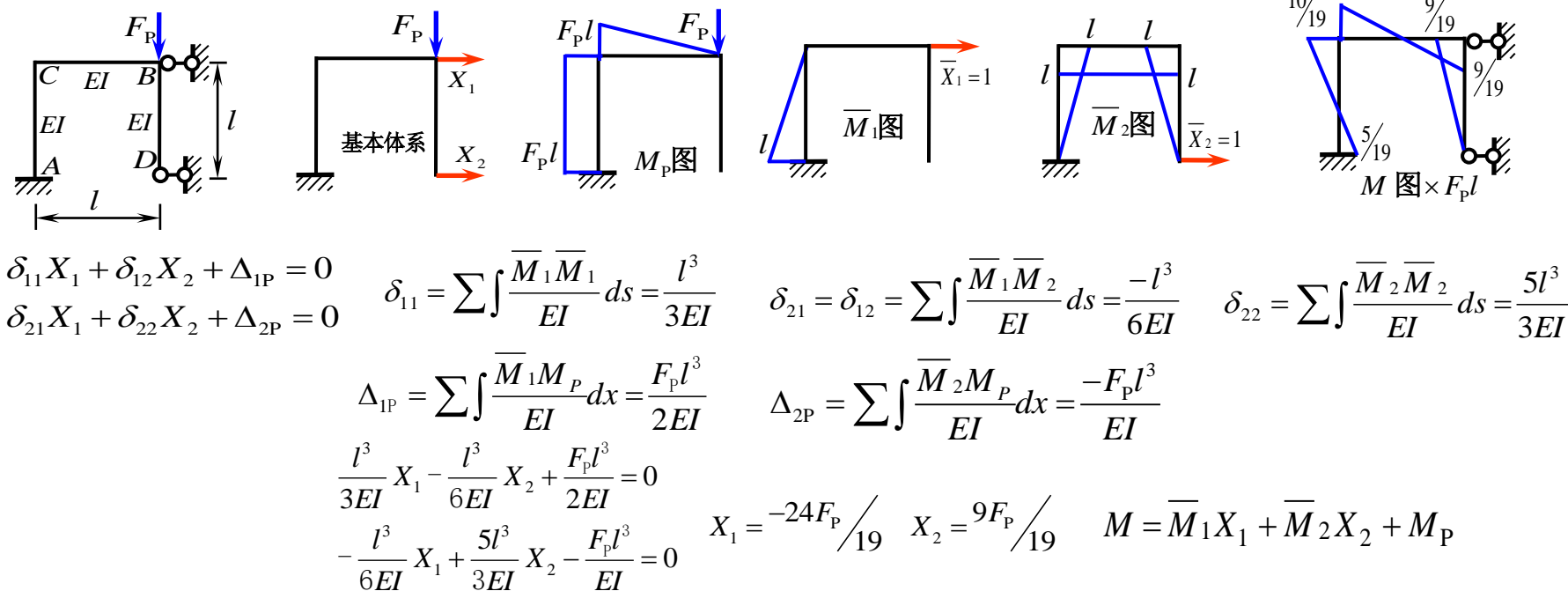
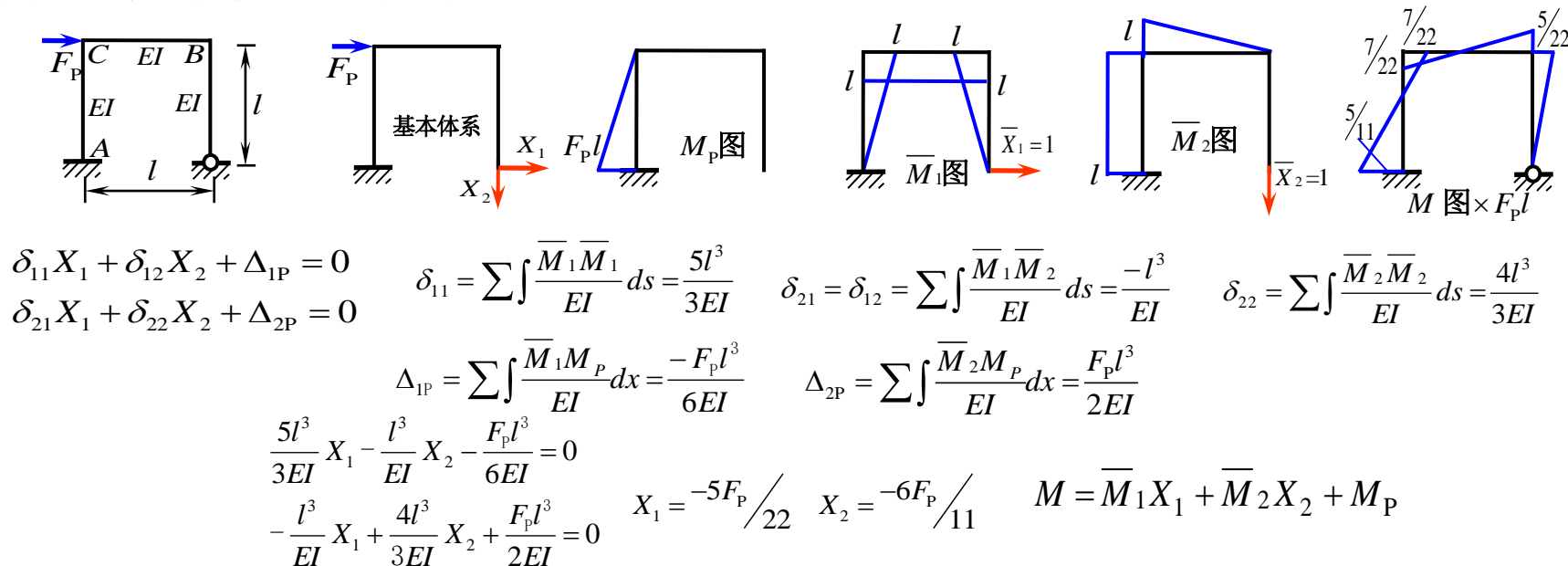


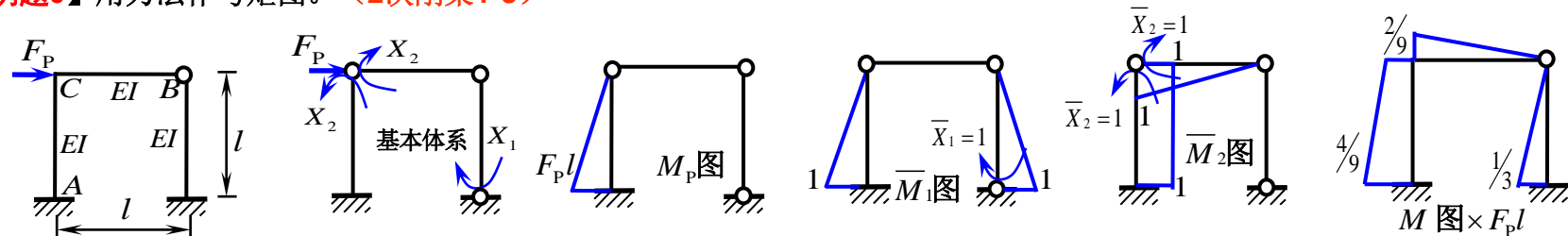
【例题1】用力法作弯矩图。（2次刚架1-1）



【例题2】用力法作弯矩图。（2次刚架1-2）



【例题3】用力法作弯矩图。（2次刚架1-5）



$$\delta_{11}X_1 + \delta_{12}X_2 + \Delta_{1P} = 0$$

$$\delta_{21}X_1 + \delta_{22}X_2 + \Delta_{2P} = 0$$

$$\Delta_{1P} = \sum \int \frac{\bar{M}_1 M_P}{EI} dx = \frac{F_P l^2}{3EI}$$

$$\Delta_{2P} = \sum \int \frac{\bar{M}_2 M_P}{EI} dx = \frac{F_P l^2}{2EI}$$

$$\delta_{11} = \sum \int \frac{\bar{M}_1 \bar{M}_1}{EI} ds = \frac{2l}{3EI}$$

$$\delta_{21} = \delta_{12} = \sum \int \frac{\bar{M}_1 \bar{M}_2}{EI} ds = \frac{l}{2EI}$$

$$\delta_{22} = \sum \int \frac{\bar{M}_2 \bar{M}_2}{EI} ds = \frac{3l}{2EI}$$

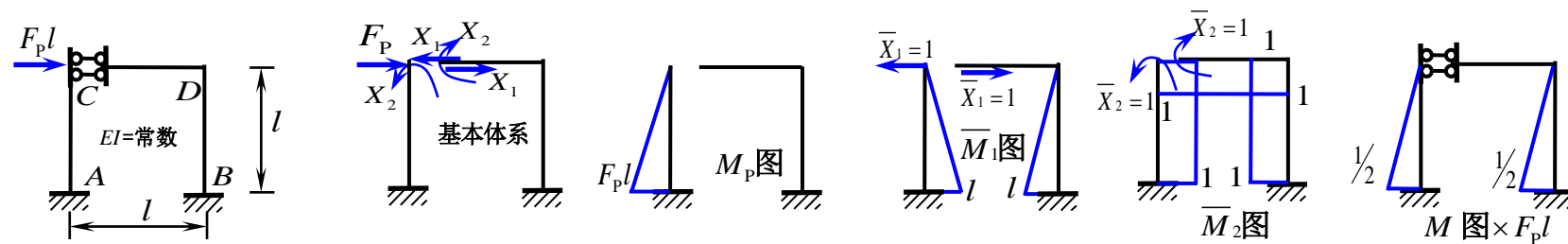
$$\frac{2l}{3EI}X_1 + \frac{l}{2EI}X_2 + \frac{F_P l^2}{3EI} = 0$$

$$\frac{l}{2EI}X_1 + \frac{3l}{2EI}X_2 + \frac{F_P l^2}{2EI} = 0$$

$$X_1 = -\frac{F_P l}{3} \quad X_2 = -\frac{2F_P l}{9}$$

$$M = \bar{M}_1 X_1 + \bar{M}_2 X_2 + M_P$$

【例题4】用力法作弯矩图。（2次刚架1-6）



$$\delta_{11}X_1 + \delta_{12}X_2 + \Delta_{1P} = 0$$

$$\delta_{21}X_1 + \delta_{22}X_2 + \Delta_{2P} = 0$$

$$\Delta_{1P} = \sum \int \frac{\bar{M}_1 M_P}{EI} dx = -\frac{F_P l^3}{3EI}$$

$$\Delta_{2P} = \sum \int \frac{\bar{M}_2 M_P}{EI} dx = -\frac{F_P l^2}{2EI}$$

$$\delta_{11} = \sum \int \frac{\bar{M}_1 \bar{M}_1}{EI} ds = \frac{2l^3}{3EI}$$

$$\delta_{21} = \delta_{12} = \sum \int \frac{\bar{M}_1 \bar{M}_2}{EI} ds = \frac{l^2}{EI}$$

$$\delta_{22} = \sum \int \frac{\bar{M}_2 \bar{M}_2}{EI} ds = \frac{3l}{EI}$$

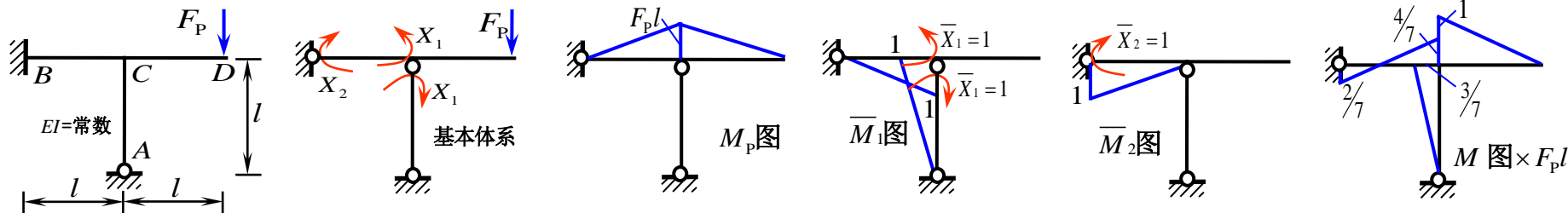
$$\frac{2l^3}{3EI}X_1 + \frac{l^2}{EI}X_2 - \frac{F_P l^3}{3EI} = 0$$

$$\frac{l^2}{EI}X_1 + \frac{3l}{EI}X_2 - \frac{F_P l^2}{2EI} = 0$$

$$X_1 = \frac{F_P}{2} \quad X_2 = 0$$

$$M = \bar{M}_1 X_1 + \bar{M}_2 X_2 + M_P$$

【例题5】用力法作弯矩图。（2次刚架1-7）



$$\delta_{11}X_1 + \delta_{12}X_2 + \Delta_{1P} = 0$$

$$\delta_{21}X_1 + \delta_{22}X_2 + \Delta_{2P} = 0$$

$$\delta_{11} = \sum \int \frac{\bar{M}_1 \bar{M}_1}{EI} ds = \frac{2l}{3EI}$$

$$\delta_{21} = \delta_{12} = \sum \int \frac{\bar{M}_1 \bar{M}_2}{EI} ds = \frac{l}{6EI}$$

$$\delta_{22} = \sum \int \frac{\bar{M}_2 \bar{M}_2}{EI} ds = \frac{l}{3EI}$$

$$\Delta_{1P} = \sum \int \frac{\bar{M}_1 M_P}{EI} dx = -\frac{F_P l^2}{3EI}$$

$$\Delta_{2P} = \sum \int \frac{\bar{M}_2 M_P}{EI} dx = -\frac{F_P l^2}{6EI}$$

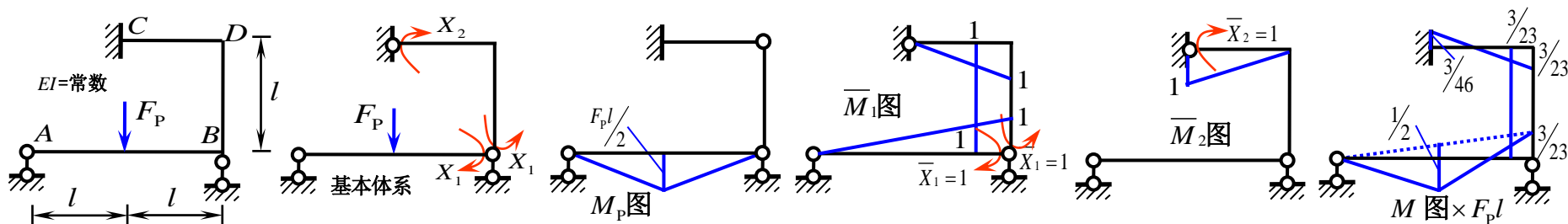
$$\frac{2l^3}{3EI} X_1 + \frac{l}{6EI} X_2 - \frac{F_P l^2}{3EI} = 0$$

$$\frac{l}{6EI} X_1 + \frac{l}{3EI} X_2 - \frac{F_P l^2}{6EI} = 0$$

$$X_1 = 3F_P / 7 \quad X_2 = 2F_P / 7$$

$$M = \bar{M}_1 X_1 + \bar{M}_2 X_2 + M_P$$

【例题6】用力法作弯矩图。（2次刚架1-8）



$$\delta_{11}X_1 + \delta_{12}X_2 + \Delta_{1P} = 0$$

$$\delta_{21}X_1 + \delta_{22}X_2 + \Delta_{2P} = 0$$

$$\delta_{11} = \sum \int \frac{\bar{M}_1 \bar{M}_1}{EI} ds = \frac{2l}{EI}$$

$$\delta_{21} = \delta_{12} = \sum \int \frac{\bar{M}_1 \bar{M}_2}{EI} ds = \frac{l}{6EI}$$

$$\delta_{22} = \sum \int \frac{\bar{M}_2 \bar{M}_2}{EI} ds = \frac{l}{3EI}$$

$$\Delta_{1P} = \sum \int \frac{\bar{M}_1 M_P}{EI} dx = -\frac{F_P l^2}{4EI}$$

$$\Delta_{2P} = \sum \int \frac{\bar{M}_2 M_P}{EI} dx = -\frac{F_P l^2}{4EI}$$

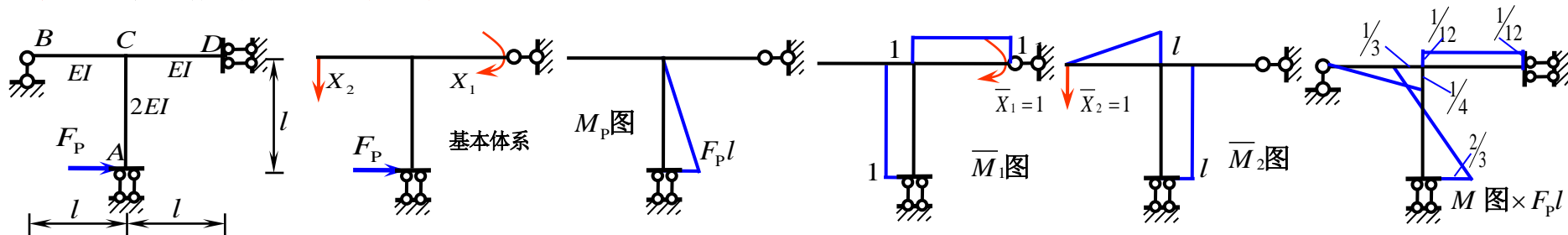
$$\frac{2l}{EI} X_1 + \frac{l}{6EI} X_2 - \frac{F_P l^2}{4EI} = 0$$

$$\frac{l}{6EI} X_1 + \frac{l}{3EI} X_2 = 0$$

$$X_1 = 3F_P l / 23 \quad X_2 = -3F_P l / 46$$

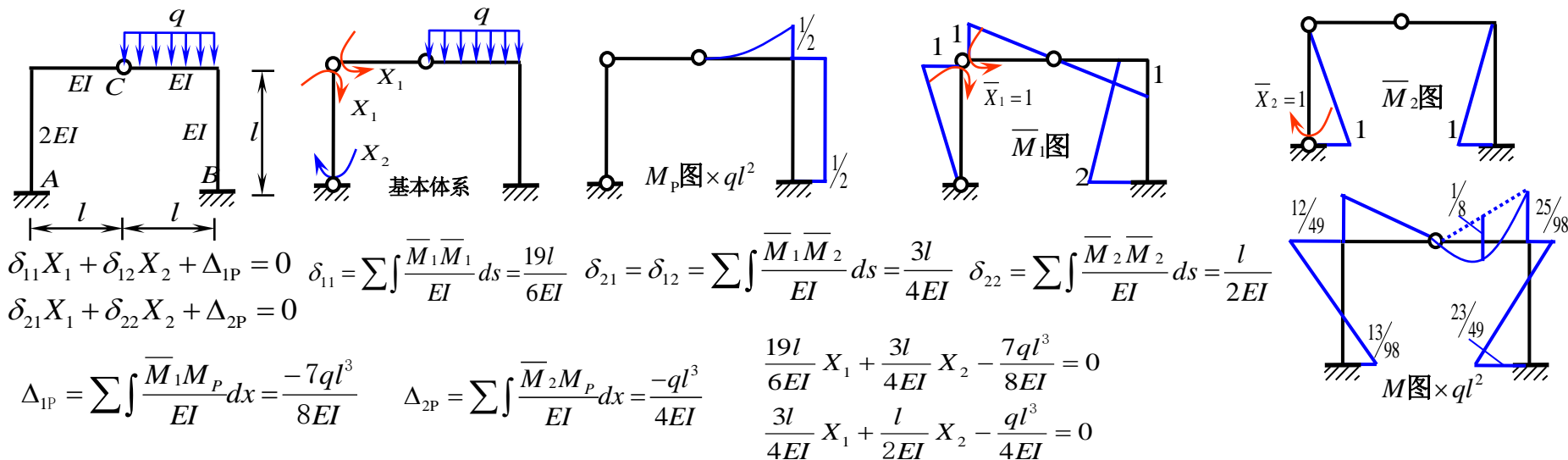
$$M = \bar{M}_1 X_1 + \bar{M}_2 X_2 + M_P$$

【例题7】用力法作弯矩图。（2次刚架1-11）



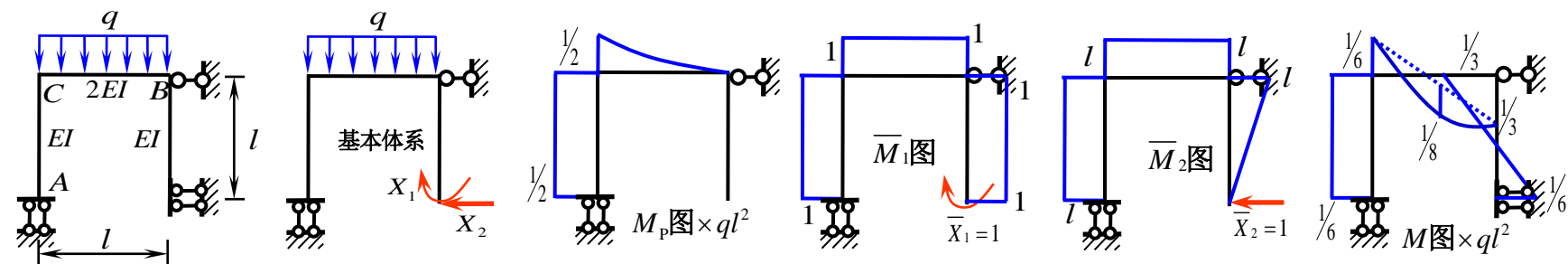
$$\begin{aligned} \delta_{11} X_1 + \delta_{12} X_2 + \Delta_{1P} &= 0 & \delta_{11} &= \sum \int \frac{\bar{M}_1 \bar{M}_1}{EI} ds = \frac{3l}{2EI} & \delta_{21} = \delta_{12} &= \sum \int \frac{\bar{M}_1 \bar{M}_2}{EI} ds = \frac{-l^2}{2EI} & \delta_{22} &= \sum \int \frac{\bar{M}_2 \bar{M}_2}{EI} ds = \frac{5l^3}{6EI} \\ \delta_{21} X_1 + \delta_{22} X_2 + \Delta_{2P} &= 0 \\ \Delta_{1P} &= \sum \int \frac{\bar{M}_1 M_P}{EI} dx = \frac{-F_P l^2}{4EI} & \Delta_{2P} &= \sum \int \frac{\bar{M}_2 M_P}{EI} dx = \frac{F_P l^3}{4EI} & \frac{3l}{2EI} X_1 - \frac{l^2}{2EI} X_2 - \frac{F_P l^2}{4EI} &= 0 & X_1 &= \frac{F_P l}{12} & X_2 &= \frac{-F_P}{4} \\ & & & & \frac{-l^2}{2EI} X_1 + \frac{5l^3}{6EI} X_2 + \frac{F_P l^3}{4EI} &= 0 & M &= \bar{M}_1 X_1 + \bar{M}_2 X_2 + M_P \end{aligned}$$

【例题8】用力法作弯矩图。（2次刚架1-12）



$$X_1 = 12ql^2/49 \quad X_2 = 13ql^2/98 \quad M = \overline{M}_1 X_1 + \overline{M}_2 X_2 + M_P$$

【例题9】用力法作弯矩图。（2次刚架1-15）



$$\delta_{11}X_1 + \delta_{12}X_2 + \Delta_{1P} = 0$$

$$\delta_{21}X_1 + \delta_{22}X_2 + \Delta_{2P} = 0$$

$$\Delta_{1P} = \sum \int \frac{\bar{M}_1 M_P}{EI} dx = \frac{7ql^3}{12EI}$$

$$\delta_{11} = \sum \int \frac{\bar{M}_1 \bar{M}_1}{EI} ds = \frac{5l}{2EI}$$

$$\Delta_{2P} = \sum \int \frac{\bar{M}_2 M_P}{EI} dx = \frac{7ql^4}{12EI}$$

$$\delta_{21} = \delta_{12} = \sum \int \frac{\bar{M}_1 \bar{M}_2}{EI} ds = \frac{2l^2}{EI}$$

$$\frac{5l}{2EI}X_1 + \frac{2l^2}{EI}X_2 + \frac{7ql^3}{12EI} = 0$$

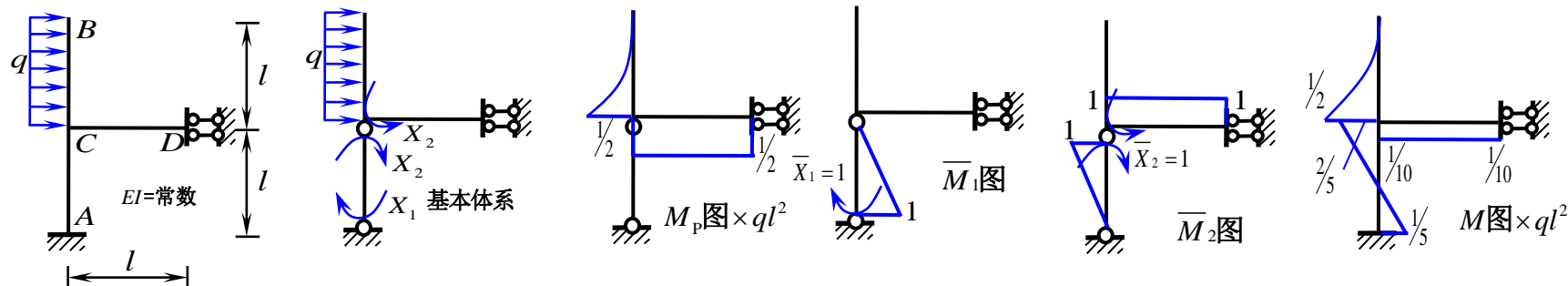
$$\frac{2l^2}{EI}X_1 + \frac{11l^3}{6EI}X_2 + \frac{7ql^4}{12EI} = 0$$

$$\delta_{22} = \sum \int \frac{\bar{M}_2 \bar{M}_2}{EI} ds = \frac{11l^3}{6EI}$$

$$X_1 = ql^2/6 \quad X_2 = -ql/2$$

$$M = \bar{M}_1 X_1 + \bar{M}_2 X_2 + M_P$$

【例题10】用力法作弯矩图。（2次刚架1-16）



$$\delta_{11}X_1 + \delta_{12}X_2 + \Delta_{1P} = 0$$

$$\delta_{21}X_1 + \delta_{22}X_2 + \Delta_{2P} = 0$$

$$\Delta_{1P} = \sum \int \frac{\bar{M}_1 M_P}{EI} dx = 0$$

$$\Delta_{2P} = \sum \int \frac{\bar{M}_2 M_P}{EI} dx = \frac{-ql^3}{2EI}$$

$$\delta_{11} = \sum \int \frac{\bar{M}_1 \bar{M}_1}{EI} ds = \frac{l}{3EI}$$

$$\delta_{21} = \delta_{12} = \sum \int \frac{\bar{M}_1 \bar{M}_2}{EI} ds = \frac{-l}{6EI}$$

$$\delta_{22} = \sum \int \frac{\bar{M}_2 \bar{M}_2}{EI} ds = \frac{4l}{3EI}$$

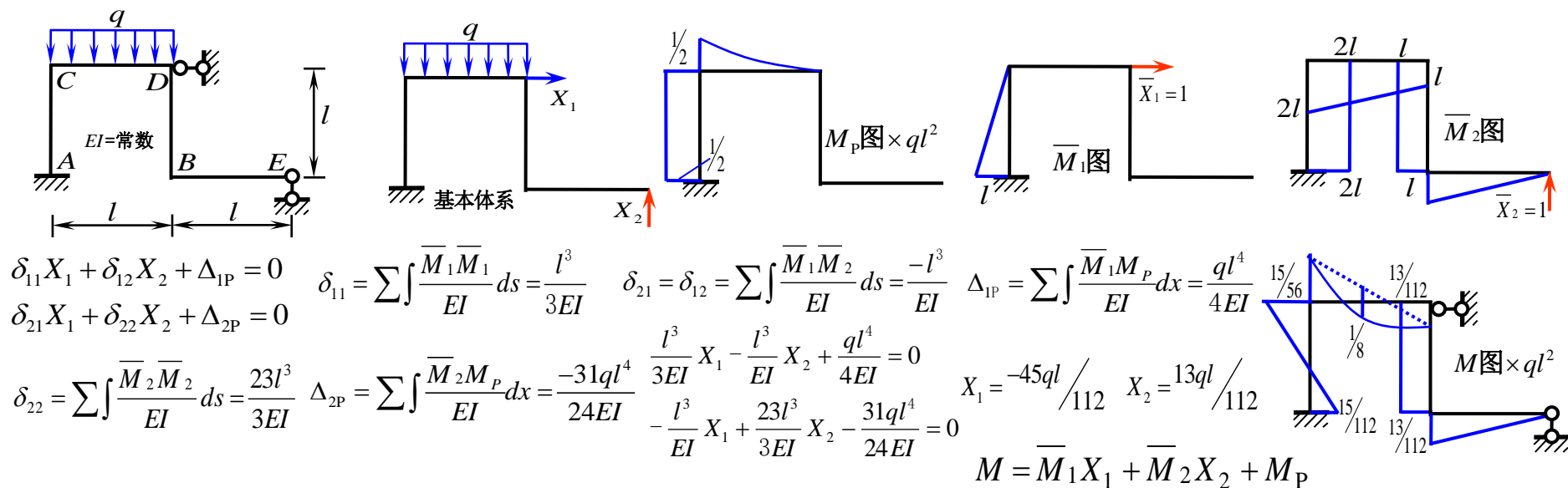
$$\frac{l}{3EI}X_1 - \frac{l}{6EI}X_2 = 0$$

$$-\frac{l}{6EI}X_1 + \frac{4l}{3EI}X_2 - \frac{ql^3}{2EI} = 0$$

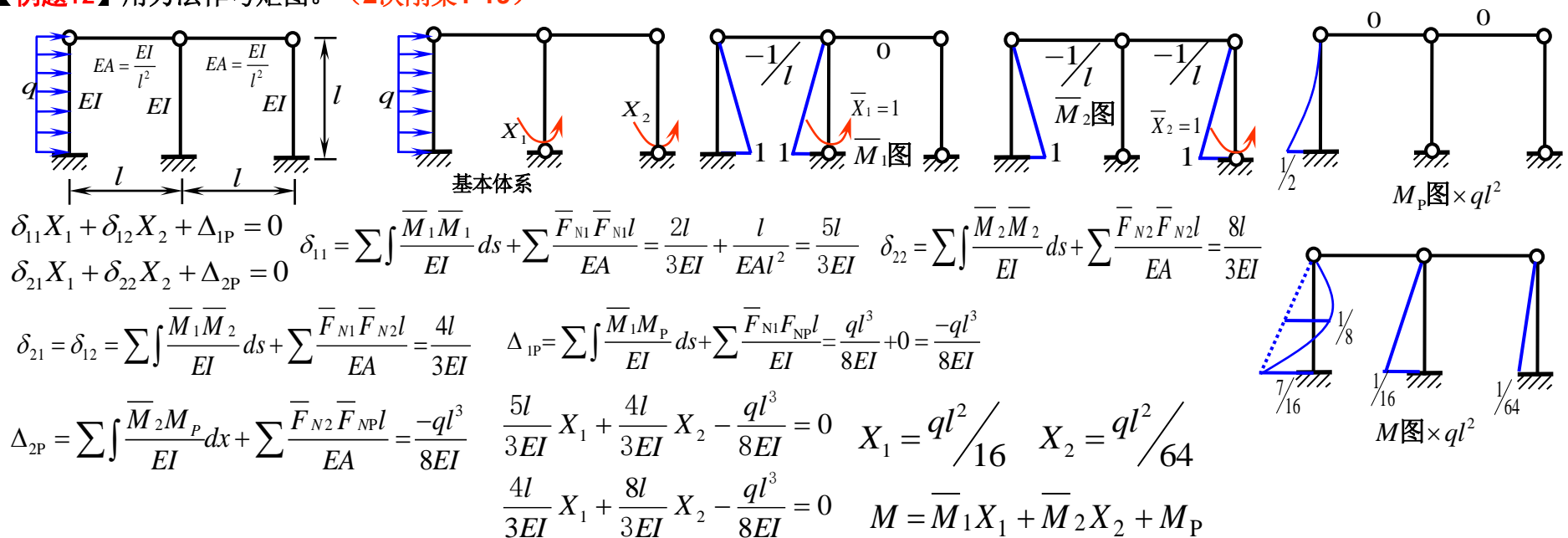
$$X_1 = ql^2/5 \quad X_2 = 2ql^2/5$$

$$M = \bar{M}_1 X_1 + \bar{M}_2 X_2 + M_P$$

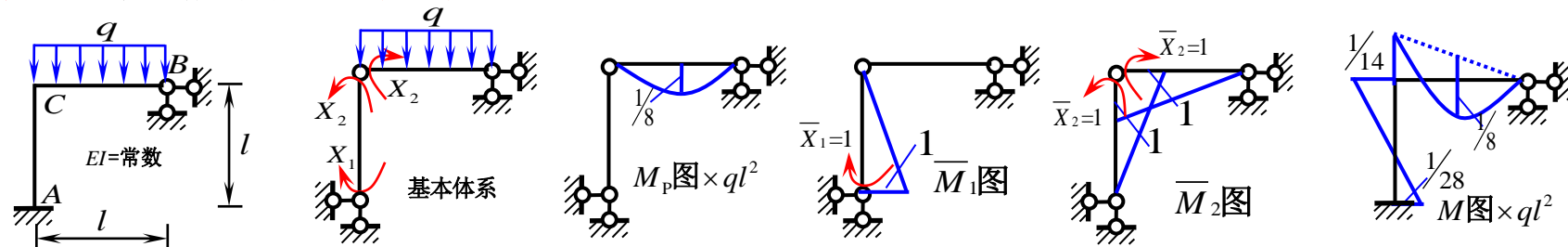
【例题11】用力法作弯矩图。（2次刚架1-17）



【例题12】用力法作弯矩图。（2次刚架1-19）



【例题13】用力法作弯矩图。（2次刚架3-2）



$$\begin{aligned} \delta_{11}X_1 + \delta_{12}X_2 + \Delta_{1P} &= 0 \\ \delta_{21}X_1 + \delta_{22}X_2 + \Delta_{2P} &= 0 \end{aligned}$$

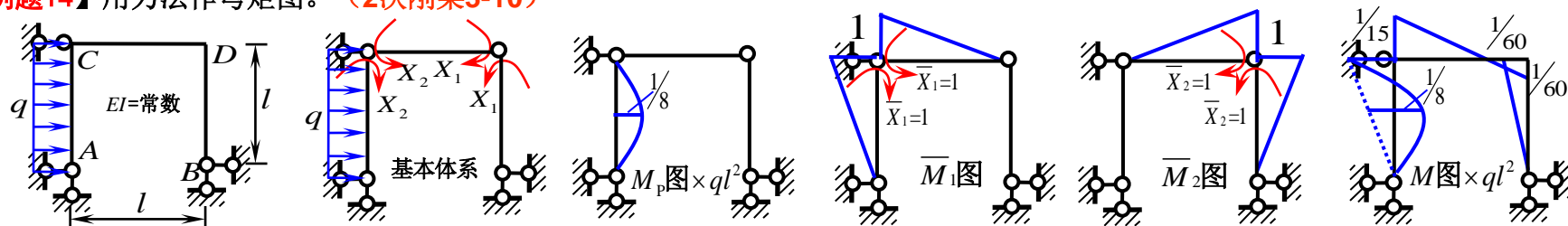
$$\delta_{11} = \sum \int \frac{\bar{M}_1 \bar{M}_1}{EI} ds = \frac{l}{3EI} \quad \delta_{12} = \delta_{21} = \sum \int \frac{\bar{M}_1 \bar{M}_2}{EI} ds = \frac{l}{6EI} \quad \delta_{22} = \sum \int \frac{\bar{M}_2 \bar{M}_2}{EI} ds = \frac{2l}{3EI}$$

$$\Delta_{1P} = \sum \int \frac{\bar{M}_1 M_p}{EI} ds = 0 \quad \Delta_{2P} = \sum \int \frac{\bar{M}_2 M_p}{EI} ds = \frac{ql^3}{24EI}$$

$$\frac{l}{3EI}X_1 + \frac{l}{6EI}X_2 = 0 \quad X_1 = -\frac{ql^2}{28} \quad X_2 = \frac{ql^2}{14}$$

$$\frac{l}{6EI}X_1 + \frac{2l}{3EI}X_2 + \frac{ql^3}{24EI} = 0 \quad M = \bar{M}_1X_1 + \bar{M}_2X_2 + M_p$$

【例题14】用力法作弯矩图。（2次刚架3-10）



$$\begin{aligned} \delta_{11}X_1 + \delta_{12}X_2 + \Delta_{1P} &= 0 \\ \delta_{21}X_1 + \delta_{22}X_2 + \Delta_{2P} &= 0 \end{aligned}$$

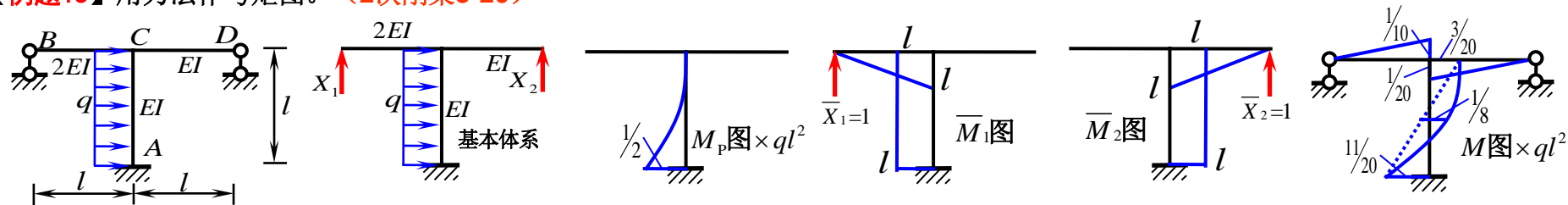
$$\delta_{11} = \sum \int \frac{\bar{M}_1 \bar{M}_1}{EI} ds = \frac{2l}{3EI} \quad \delta_{12} = \delta_{21} = \sum \int \frac{\bar{M}_1 \bar{M}_2}{EI} ds = \frac{l}{6EI} \quad \delta_{22} = \sum \int \frac{\bar{M}_2 \bar{M}_2}{EI} ds = \frac{2l}{3EI}$$

$$\Delta_{1P} = \sum \int \frac{\bar{M}_1 M_p}{EI} ds = -\frac{ql^3}{24EI} \quad \Delta_{2P} = \sum \int \frac{\bar{M}_2 M_p}{EI} ds = 0$$

$$\frac{2l}{3EI}X_1 + \frac{l}{6EI}X_2 - \frac{ql^3}{24EI} = 0 \quad X_1 = \frac{ql^2}{15} \quad X_2 = -\frac{ql^2}{60}$$

$$\frac{l}{6EI}X_1 + \frac{2l}{3EI}X_2 = 0 \quad M = \bar{M}_1X_1 + \bar{M}_2X_2 + M_p$$

【例题15】用力法作弯矩图。（2次刚架3-20）



$$\begin{aligned} \delta_{11}X_1 + \delta_{12}X_2 + \Delta_{1P} &= 0 \\ \delta_{21}X_1 + \delta_{22}X_2 + \Delta_{2P} &= 0 \end{aligned}$$

$$\Delta_{1P} = \sum \int \frac{\bar{M}_1 M_P}{EI} ds = \frac{ql^4}{6EI} \quad \Delta_{2P} = \sum \int \frac{\bar{M}_2 M_P}{EI} ds = \frac{-ql^4}{6EI}$$

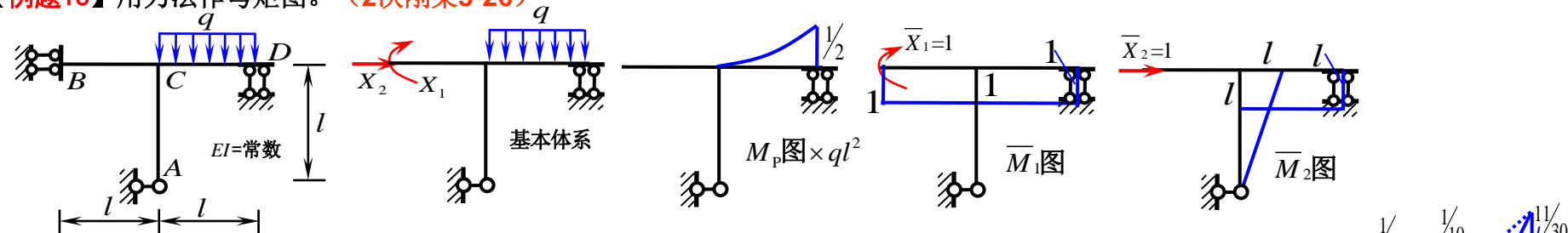
$$\delta_{11} = \sum \int \frac{\bar{M}_1 \bar{M}_1}{EI} ds = \frac{7l^3}{6EI} \quad \delta_{21} = \delta_{12} = \sum \int \frac{\bar{M}_1 \bar{M}_2}{EI} ds = \frac{-l^3}{EI} \quad \delta_{22} = \sum \int \frac{\bar{M}_2 \bar{M}_2}{EI} ds = \frac{4l^3}{3EI}$$

$$\begin{aligned} \frac{7l^3}{6EI} X_1 - \frac{l^3}{EI} X_2 + \frac{ql^4}{6EI} &= 0 \\ -\frac{l^3}{EI} X_1 + \frac{4l^3}{3EI} X_2 - \frac{ql^4}{6EI} &= 0 \end{aligned}$$

$$X_1 = -ql/10 \quad X_2 = ql/20$$

$$M = \bar{M}_1 X_1 + \bar{M}_2 X_2 + M_P$$

【例题16】用力法作弯矩图。（2次刚架3-26）



$$\begin{aligned} \delta_{11}X_1 + \delta_{12}X_2 + \Delta_{1P} &= 0 \\ \delta_{21}X_1 + \delta_{22}X_2 + \Delta_{2P} &= 0 \end{aligned}$$

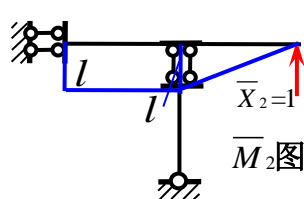
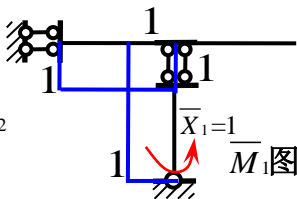
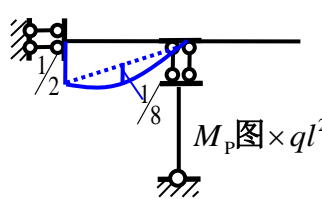
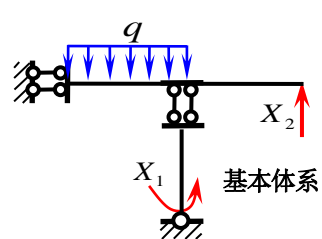
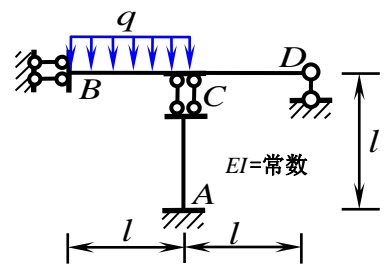
$$\Delta_{1P} = \sum \int \frac{\bar{M}_1 M_P}{EI} ds = \frac{-ql^3}{6EI} \quad \Delta_{2P} = \sum \int \frac{\bar{M}_2 M_P}{EI} ds = \frac{-ql^4}{6EI}$$

$$\delta_{11} = \sum \int \frac{\bar{M}_1 \bar{M}_1}{EI} ds = \frac{2l}{EI} \quad \delta_{21} = \delta_{12} = \sum \int \frac{\bar{M}_1 \bar{M}_2}{EI} ds = \frac{l^2}{EI} \quad \delta_{22} = \sum \int \frac{\bar{M}_2 \bar{M}_2}{EI} ds = \frac{4l^3}{3EI}$$

$$\begin{aligned} \frac{2l}{EI} X_1 + \frac{l^2}{EI} X_2 - \frac{ql^3}{6EI} &= 0 \\ \frac{l^2}{EI} X_1 + \frac{4l^3}{3EI} X_2 - \frac{ql^4}{6EI} &= 0 \end{aligned}$$

$$X_1 = ql^2/30 \quad X_2 = ql/10 \quad M = \bar{M}_1 X_1 + \bar{M}_2 X_2 + M_P$$

【例题17】用力法作弯矩图。（2次刚架3-27）



$$\begin{aligned}\delta_{11}X_1 + \delta_{12}X_2 + \Delta_{1P} &= 0 \\ \delta_{21}X_1 + \delta_{22}X_2 + \Delta_{2P} &= 0\end{aligned}$$

$$\delta_{11} = \sum \int \frac{\bar{M}_1 \bar{M}_1}{EI} ds = \frac{2l}{EI} \quad \delta_{21} = \delta_{12} = \sum \int \frac{\bar{M}_1 \bar{M}_2}{EI} ds = \frac{l^2}{EI}$$

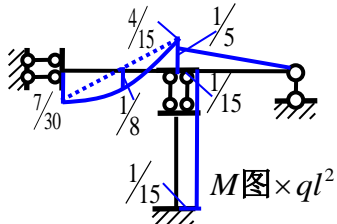
$$\delta_{22} = \sum \int \frac{\bar{M}_2 \bar{M}_2}{EI} ds = \frac{4l^3}{3EI}$$

$$\Delta_{1P} = \sum \int \frac{\bar{M}_1 M_P}{EI} ds = \frac{ql^3}{3EI} \quad \Delta_{2P} = \sum \int \frac{\bar{M}_2 M_P}{EI} ds = \frac{ql^4}{3EI}$$

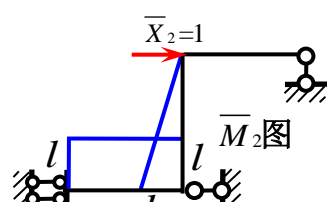
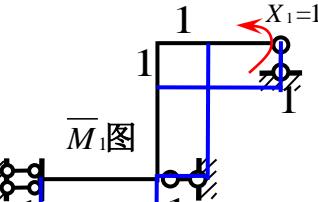
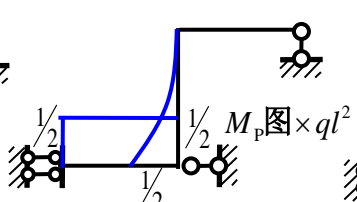
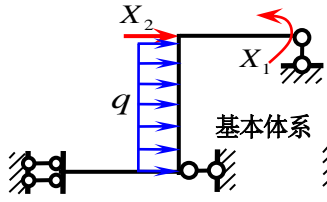
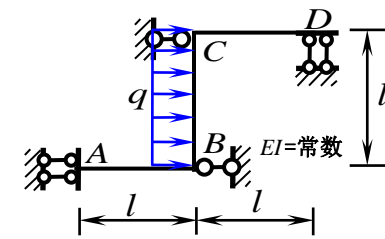
$$\begin{aligned}\frac{2l}{EI}X_1 + \frac{l^2}{EI}X_2 + \frac{ql^3}{3EI} &= 0 \\ \frac{l^2}{EI}X_1 + \frac{4l^3}{3EI}X_2 + \frac{ql^4}{3EI} &= 0\end{aligned}$$

$$X_1 = -\frac{ql^2}{15} \quad X_2 = -\frac{ql}{5}$$

$$M = \bar{M}_1 X_1 + \bar{M}_2 X_2 + M_P$$



【例题18】用力法作弯矩图。（2次刚架3-31）



$$\begin{aligned}\delta_{11}X_1 + \delta_{12}X_2 + \Delta_{1P} &= 0 \\ \delta_{21}X_1 + \delta_{22}X_2 + \Delta_{2P} &= 0\end{aligned}$$

$$\delta_{11} = \sum \int \frac{\bar{M}_1 \bar{M}_1}{EI} ds = \frac{3l}{EI} \quad \delta_{21} = \delta_{12} = \sum \int \frac{\bar{M}_1 \bar{M}_2}{EI} ds = \frac{-3l^2}{2EI}$$

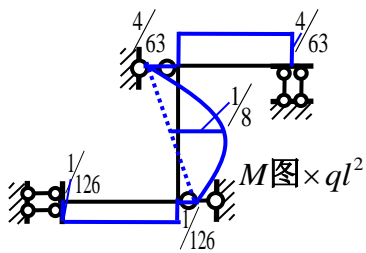
$$\delta_{22} = \sum \int \frac{\bar{M}_2 \bar{M}_2}{EI} ds = \frac{4l^3}{3EI}$$

$$\Delta_{1P} = \sum \int \frac{\bar{M}_1 M_P}{EI} ds = \frac{-2ql^3}{3EI} \quad \Delta_{2P} = \sum \int \frac{\bar{M}_2 M_P}{EI} ds = \frac{2ql^4}{3EI}$$

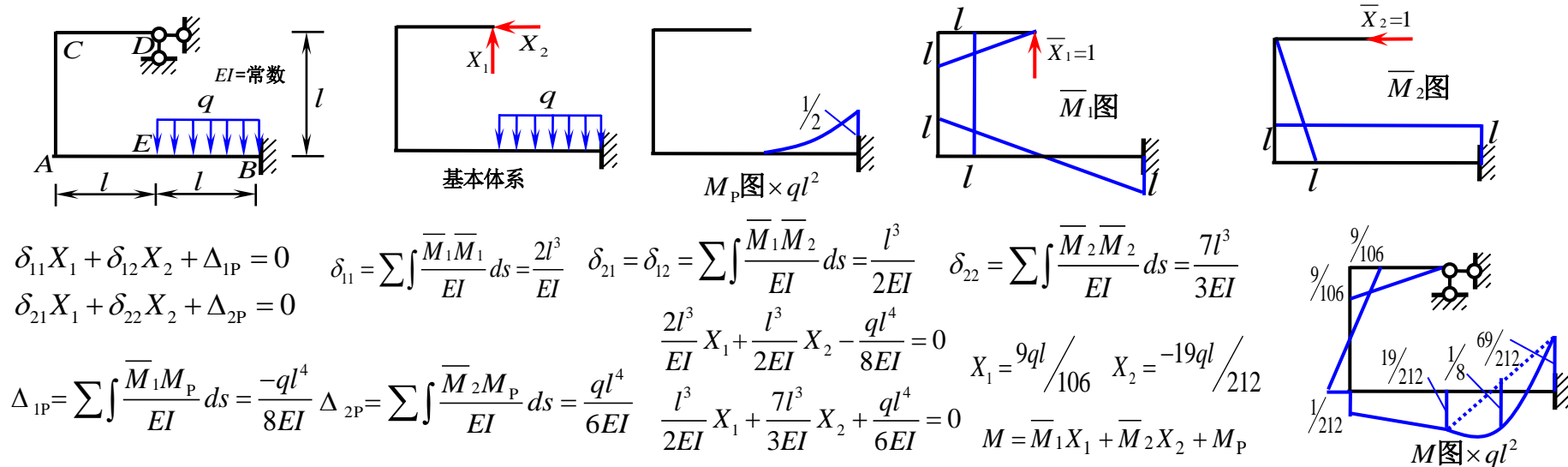
$$\begin{aligned}\frac{3l}{EI}X_1 - \frac{3l^2}{2EI}X_2 - \frac{2ql^3}{3EI} &= 0 \\ \frac{-3l^2}{2EI}X_1 + \frac{4l^3}{3EI}X_2 + \frac{2ql^4}{3EI} &= 0\end{aligned}$$

$$X_1 = -\frac{4ql^2}{63} \quad X_2 = -\frac{4ql}{7}$$

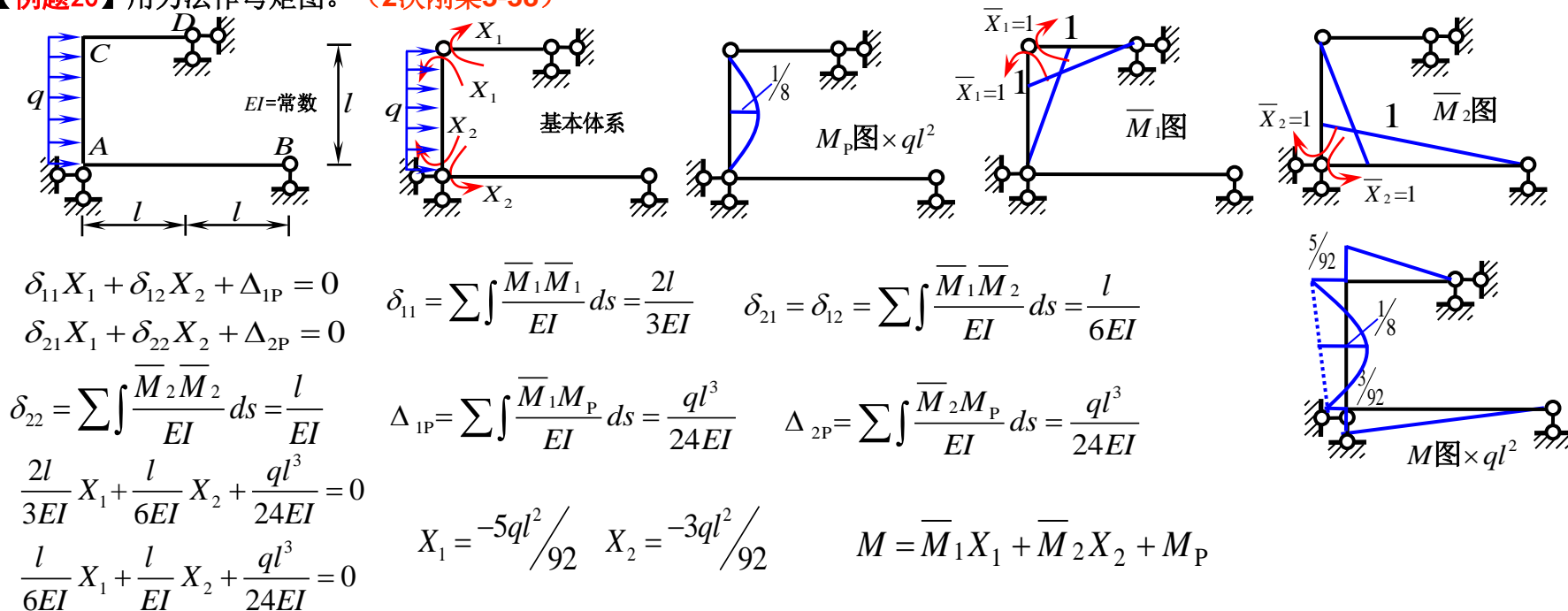
$$M = \bar{M}_1 X_1 + \bar{M}_2 X_2 + M_P$$



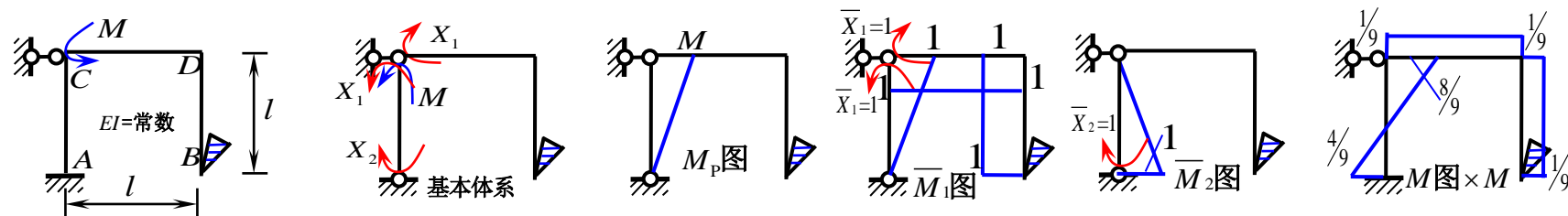
【例题19】用力法作弯矩图。（2次刚架3-37）



【例题20】用力法作弯矩图。（2次刚架3-38）



【例题21】用力法作弯矩图。（2次刚架4-9）



$$\begin{aligned} \delta_{11}X_1 + \delta_{12}X_2 + \Delta_{1P} &= 0 \\ \delta_{21}X_1 + \delta_{22}X_2 + \Delta_{2P} &= 0 \end{aligned}$$

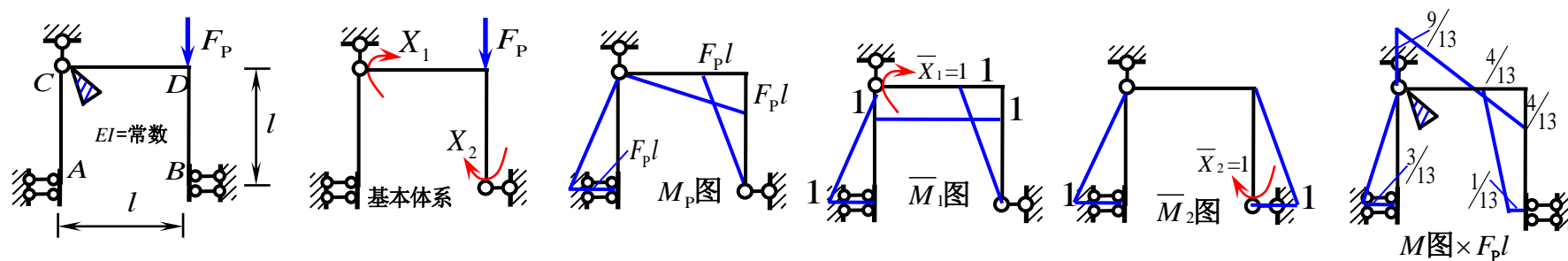
$$\delta_{11} = \sum \int \frac{\bar{M}_1 \bar{M}_1}{EI} ds = \frac{7l}{3EI} \quad \delta_{21} = \delta_{12} = \sum \int \frac{\bar{M}_1 \bar{M}_2}{EI} ds = \frac{l}{6EI} \quad \delta_{22} = \sum \int \frac{\bar{M}_2 \bar{M}_2}{EI} ds = \frac{l}{3EI}$$

$$\Delta_{1P} = \sum \int \frac{\bar{M}_1 M_p}{EI} dx = \frac{Ml}{3EI} \quad \Delta_{2P} = \sum \int \frac{\bar{M}_2 M_p}{EI} dx = \frac{Ml}{6EI}$$

$$\begin{aligned} \frac{7l}{3EI}X_1 + \frac{l}{6EI}X_2 + \frac{Ml}{3EI} &= 0 \\ \frac{l}{6EI}X_1 + \frac{l}{3EI}X_2 + \frac{Ml}{6EI} &= 0 \end{aligned}$$

$$\begin{aligned} X_1 &= -M/9 \quad X_2 = -4M/9 \\ M &= \bar{M}_1 X_1 + \bar{M}_2 X_2 + M_p \end{aligned}$$

【例题22】用力法作弯矩图。（2次刚架4-16）



$$\begin{aligned} \delta_{11}X_1 + \delta_{12}X_2 + \Delta_{1P} &= 0 \\ \delta_{21}X_1 + \delta_{22}X_2 + \Delta_{2P} &= 0 \end{aligned}$$

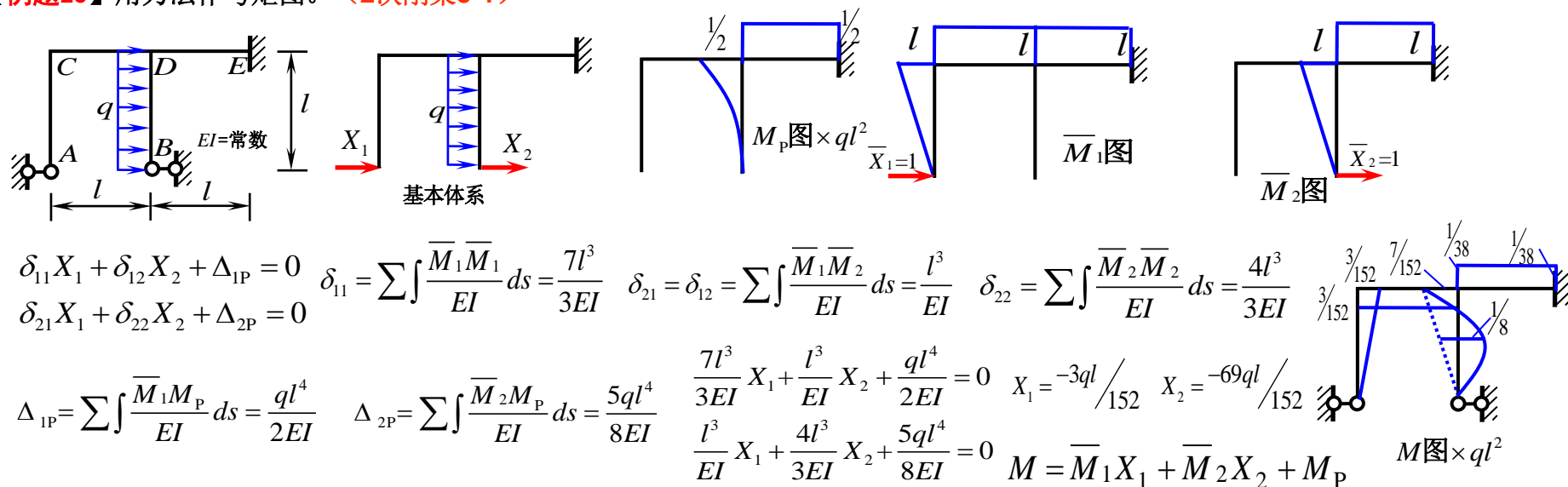
$$\delta_{11} = \sum \int \frac{\bar{M}_1 \bar{M}_1}{EI} ds = \frac{5l}{3EI} \quad \delta_{21} = \delta_{12} = \sum \int \frac{\bar{M}_1 \bar{M}_2}{EI} ds = \frac{l}{6EI} \quad \delta_{22} = \sum \int \frac{\bar{M}_2 \bar{M}_2}{EI} ds = \frac{2l}{3EI}$$

$$\Delta_{1P} = \sum \int \frac{\bar{M}_1 M_p}{EI} dx = \frac{7F_p l^2}{6EI} \quad \Delta_{2P} = \sum \int \frac{\bar{M}_2 M_p}{EI} dx = \frac{F_p l^2}{6EI}$$

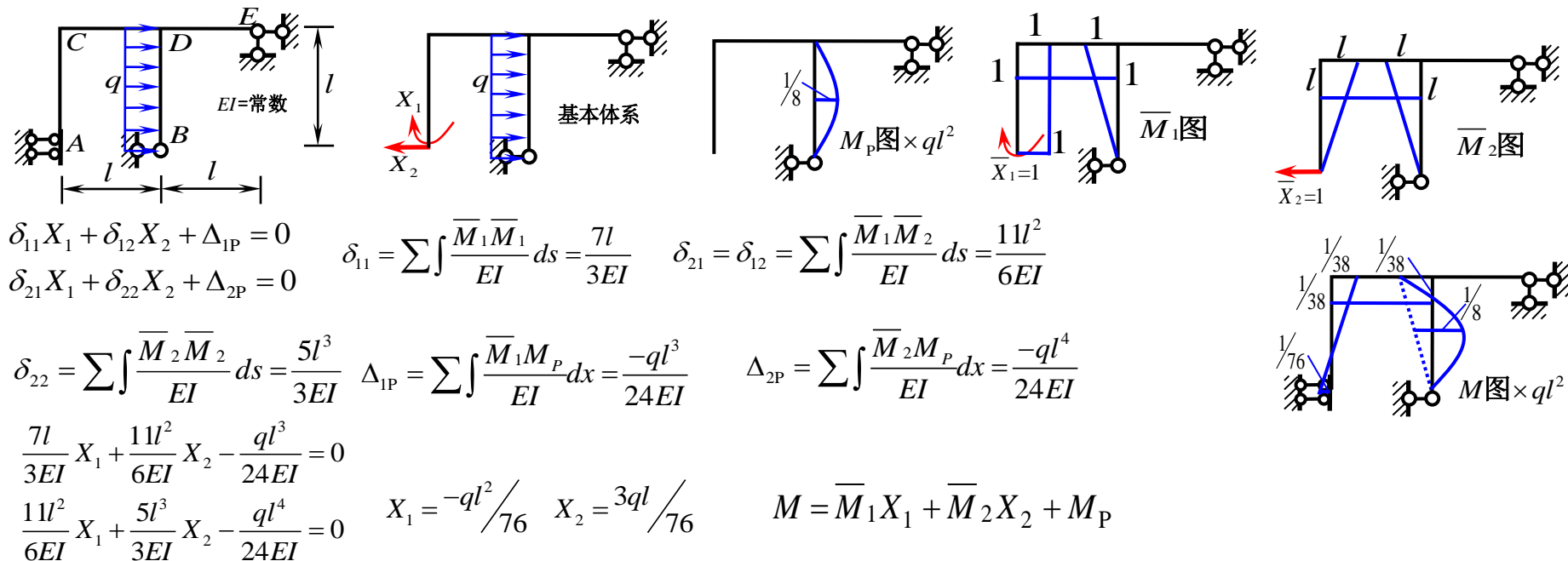
$$\begin{aligned} \frac{5l}{3EI}X_1 + \frac{l}{6EI}X_2 + \frac{7F_p l^2}{6EI} &= 0 \\ \frac{l}{6EI}X_1 + \frac{2l}{3EI}X_2 + \frac{F_p l^2}{6EI} &= 0 \end{aligned}$$

$$\begin{aligned} X_1 &= -9F_p l / 13 \quad X_2 = -F_p l / 13 \\ M &= \bar{M}_1 X_1 + \bar{M}_2 X_2 + M_p \end{aligned}$$

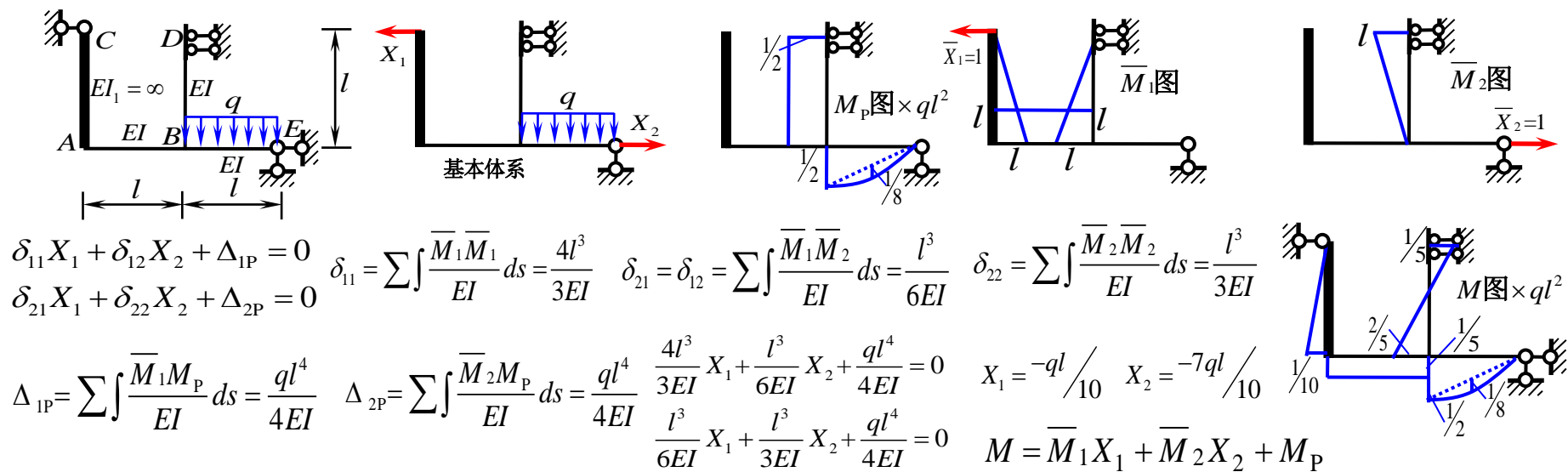
【例题23】用力法作弯矩图。（2次刚架5-1）



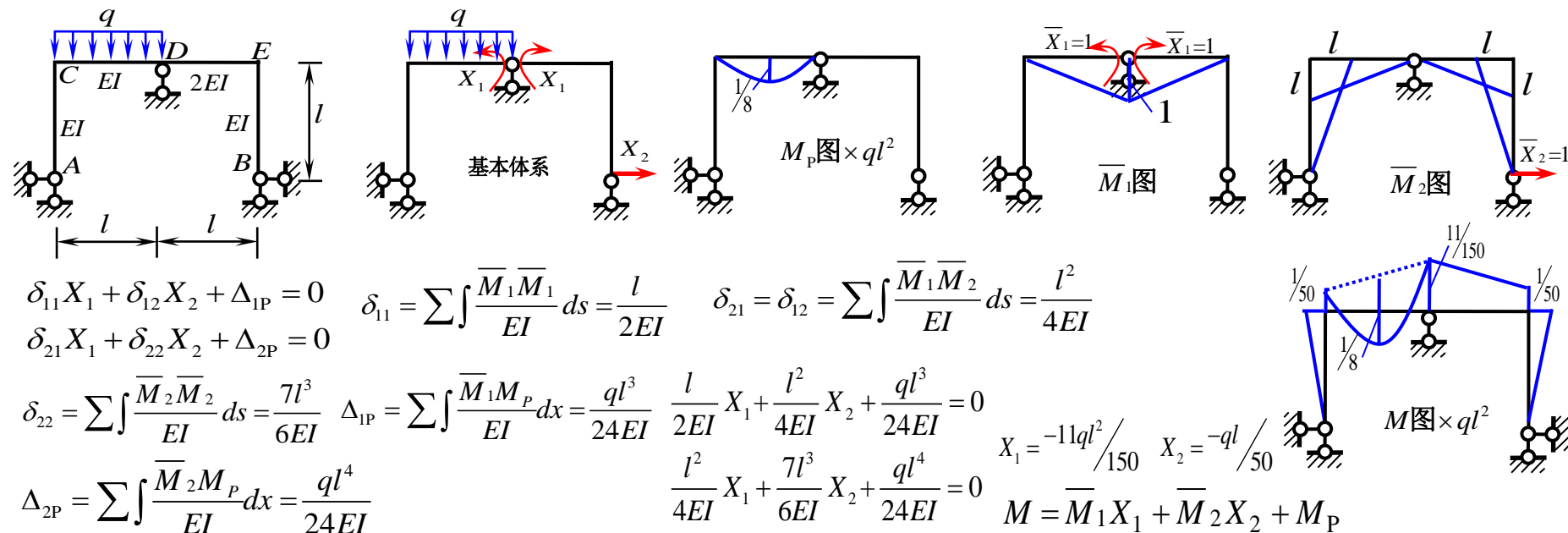
【例题24】用力法作弯矩图。（2次刚架5-3）



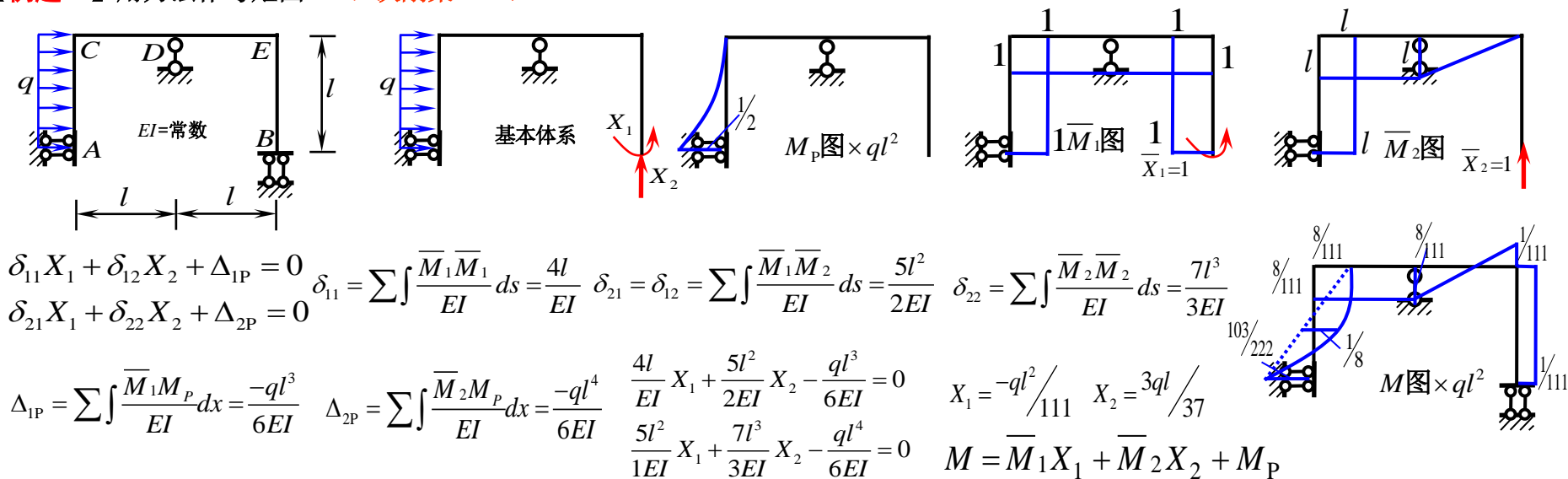
【例题25】用力法作弯矩图。（2次刚架5-9）



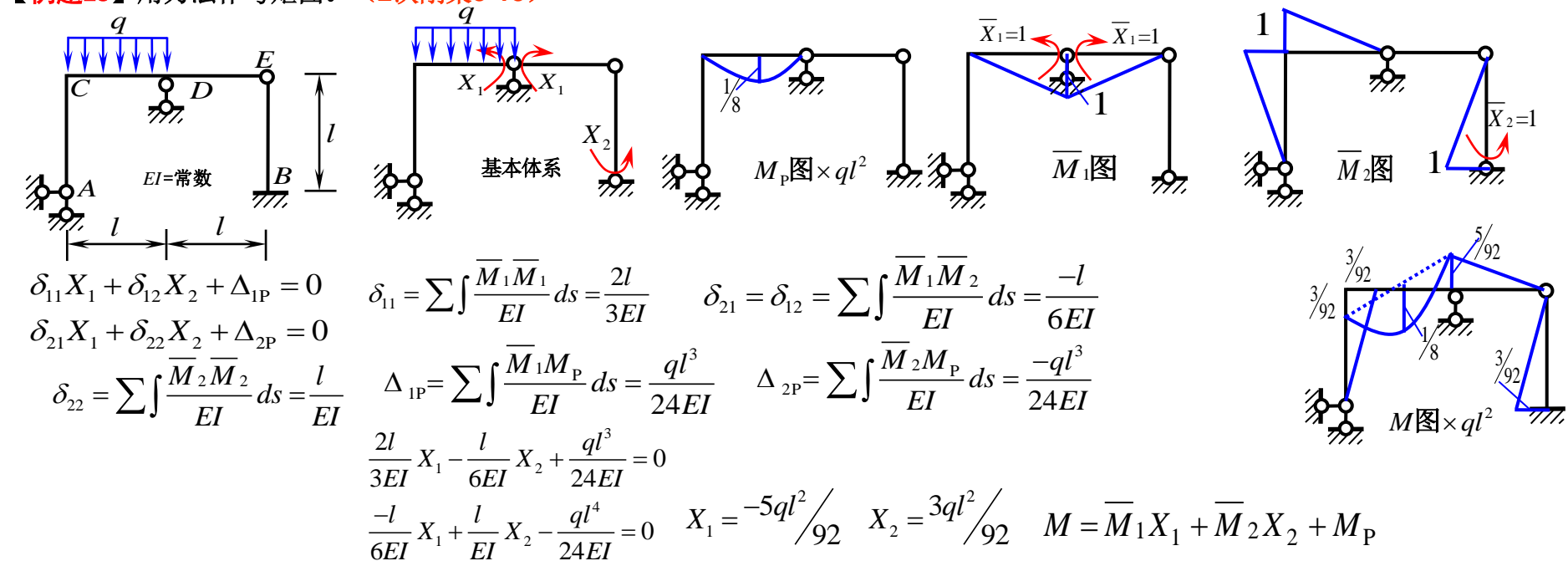
【例题26】用力法作弯矩图。（2次刚架5-11）



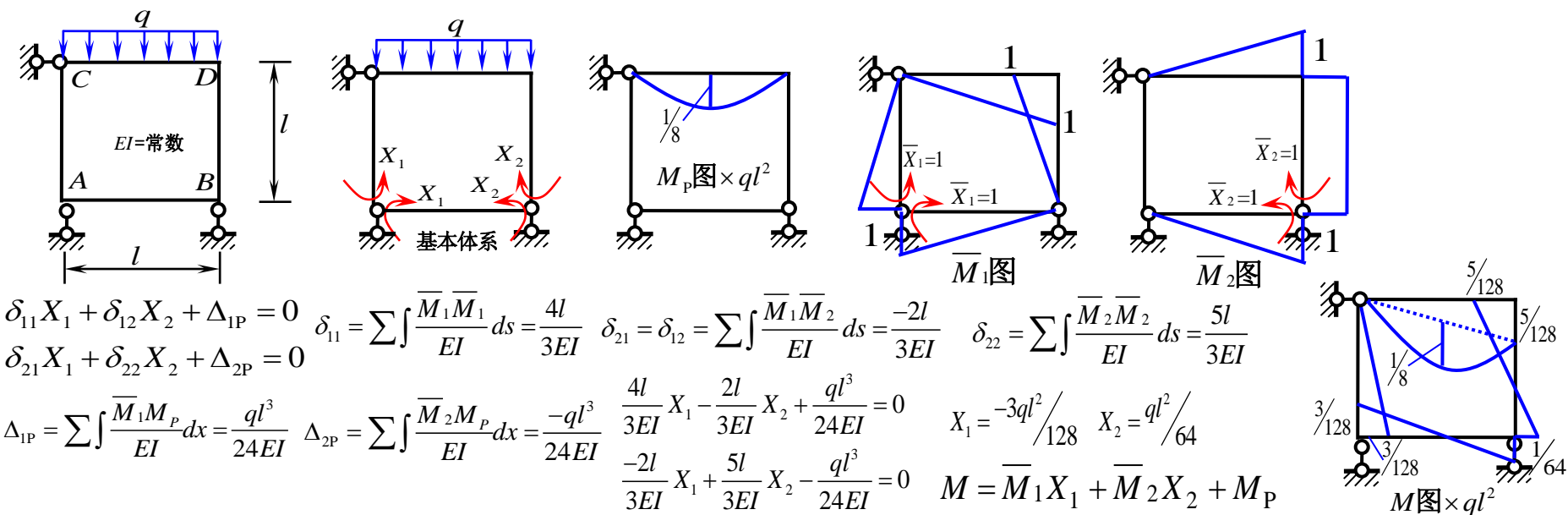
【例题27】用力法作弯矩图。（2次刚架5-13）



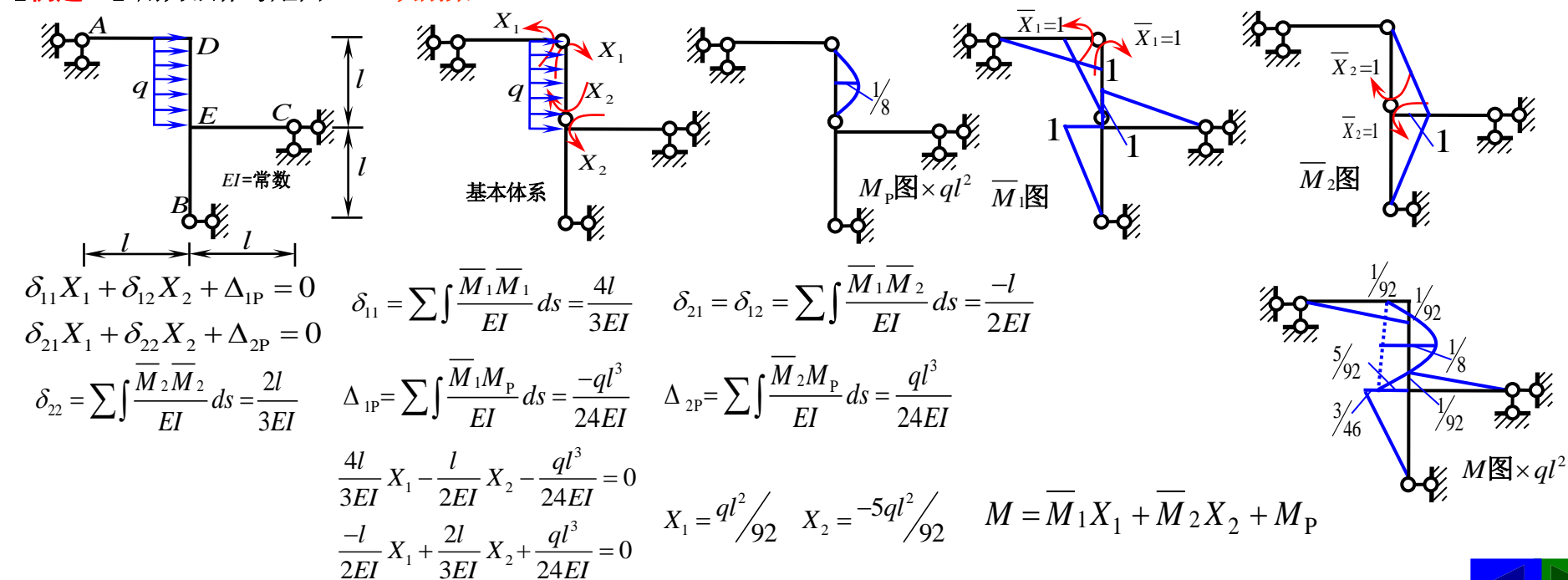
【例题28】用力法作弯矩图。（2次刚架5-15）



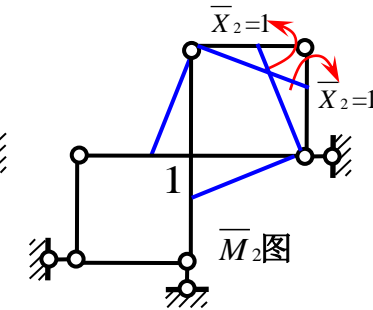
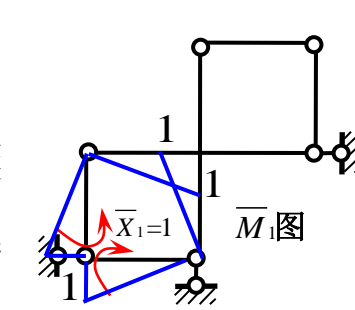
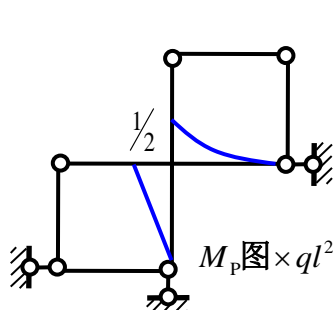
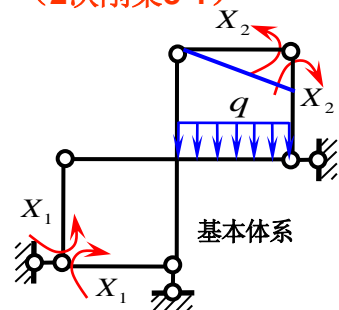
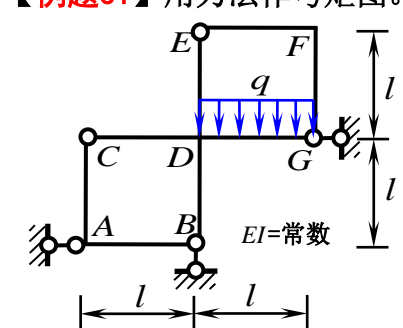
【例题29】用力法作弯矩图。（2次刚架5-19）



【例题30】用力法作弯矩图。（2次刚架5-33）



【例题31】用力法作弯矩图。（2次刚架8-1）



$$\begin{aligned}\delta_{11}X_1 + \delta_{12}X_2 + \Delta_{1P} &= 0 \\ \delta_{21}X_1 + \delta_{22}X_2 + \Delta_{2P} &= 0\end{aligned}$$

$$\delta_{11} = \sum \int \frac{\bar{M}_1 \bar{M}_1}{EI} ds = \frac{4l}{3EI}$$

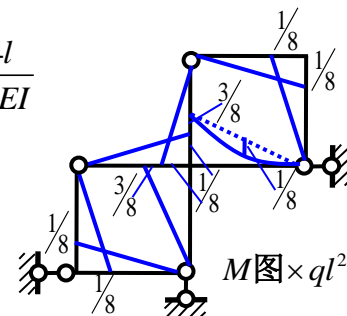
$$\delta_{21} = \delta_{12} = \sum \int \frac{\bar{M}_1 \bar{M}_2}{EI} ds = 0$$

$$\delta_{22} = \sum \int \frac{\bar{M}_2 \bar{M}_2}{EI} ds = \frac{4l}{3EI}$$

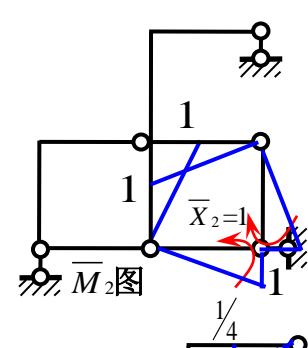
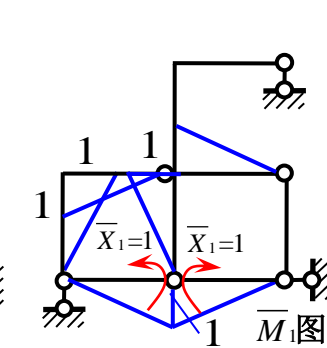
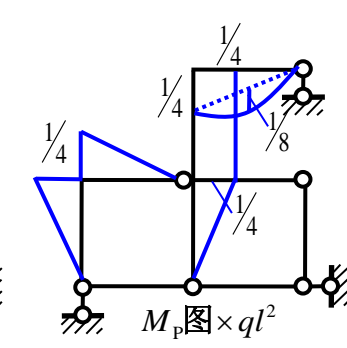
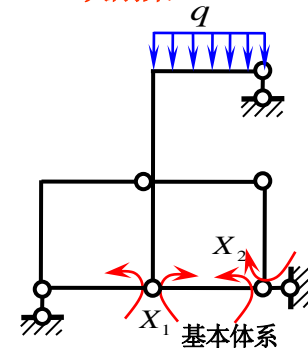
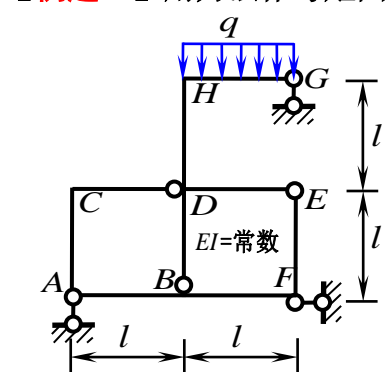
$$\Delta_{1P} = \sum \int \frac{\bar{M}_1 M_P}{EI} ds = \frac{ql^3}{6EI}$$

$$\Delta_{2P} = \sum \int \frac{\bar{M}_2 M_P}{EI} ds = \frac{-ql^3}{6EI}$$

$$\begin{aligned}\frac{4l}{3EI}X_1 + \frac{ql^3}{6EI} &= 0 & X_1 &= -ql^2/8 & X_2 &= ql^2/8 \\ \frac{4l}{3EI}X_2 - \frac{ql^3}{6EI} &= 0 & M &= \bar{M}_1 X_1 + \bar{M}_2 X_2 + M_P\end{aligned}$$



【例题32】用力法作弯矩图。（2次刚架8-2）



$$\begin{aligned}\delta_{11}X_1 + \delta_{12}X_2 + \Delta_{1P} &= 0 \\ \delta_{21}X_1 + \delta_{22}X_2 + \Delta_{2P} &= 0\end{aligned}$$

$$\delta_{11} = \sum \int \frac{\bar{M}_1 \bar{M}_1}{EI} ds = \frac{2l}{EI}$$

$$\delta_{21} = \delta_{12} = \sum \int \frac{\bar{M}_1 \bar{M}_2}{EI} ds = \frac{-l}{2EI}$$

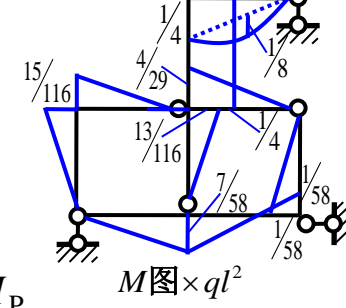
$$\delta_{22} = \sum \int \frac{\bar{M}_2 \bar{M}_2}{EI} ds = \frac{4l}{3EI}$$

$$\Delta_{1P} = \sum \int \frac{\bar{M}_1 M_P}{EI} ds = \frac{-ql^3}{4EI}$$

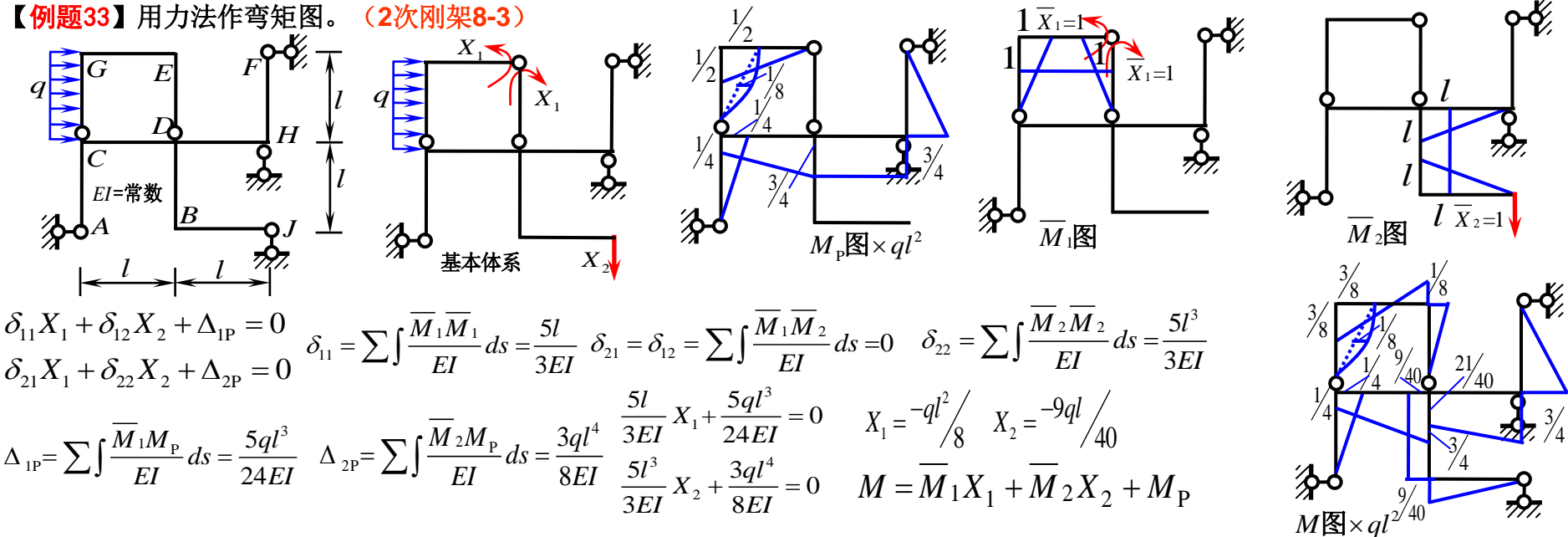
$$\Delta_{2P} = \sum \int \frac{\bar{M}_2 M_P}{EI} ds = \frac{ql^3}{12EI}$$

$$\begin{aligned}\frac{2l}{EI}X_1 - \frac{l}{2EI}X_2 - \frac{ql^3}{4EI} &= 0 \\ -\frac{l}{2EI}X_1 + \frac{4l}{3EI}X_2 + \frac{ql^3}{12EI} &= 0\end{aligned}$$

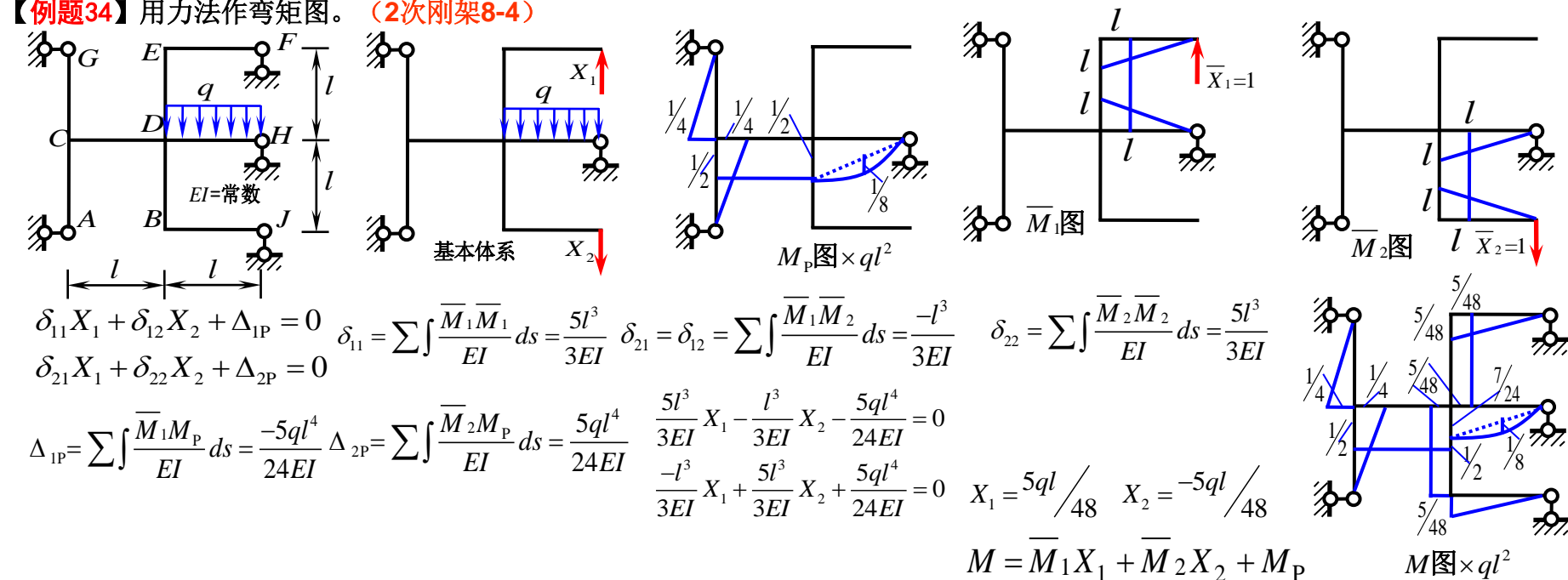
$$\begin{aligned}X_1 &= 7ql^2/58 & X_2 &= -ql^2/58 \\ M &= \bar{M}_1 X_1 + \bar{M}_2 X_2 + M_P\end{aligned}$$



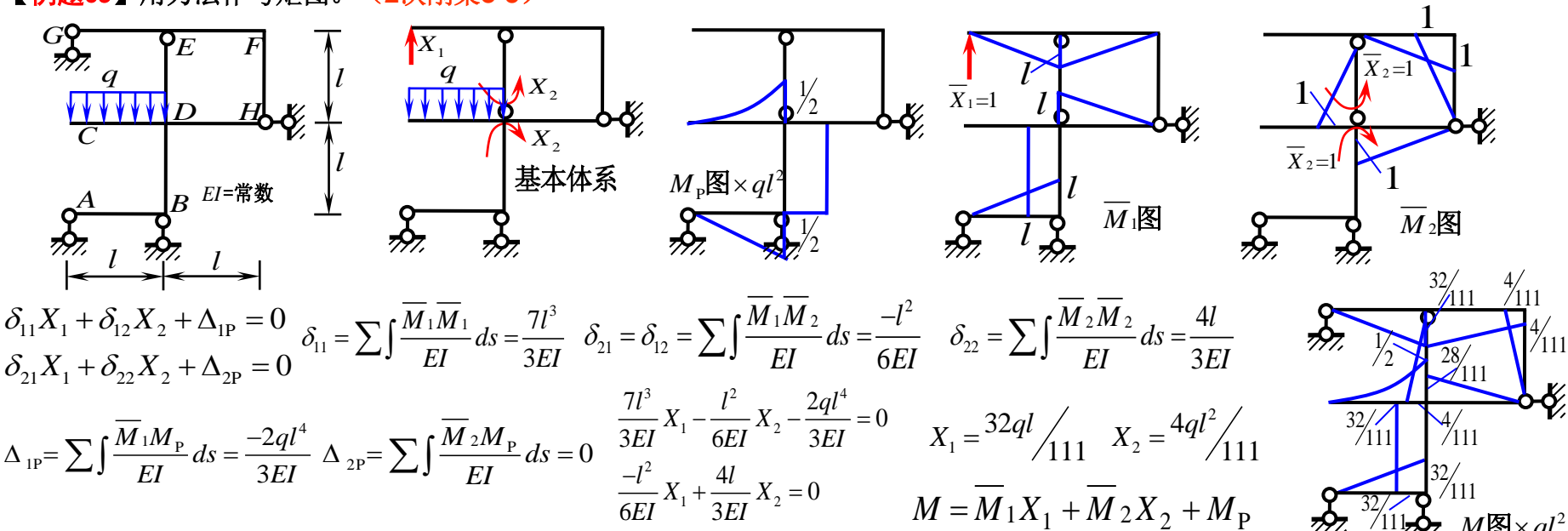
【例题33】用力法作弯矩图。（2次刚架8-3）



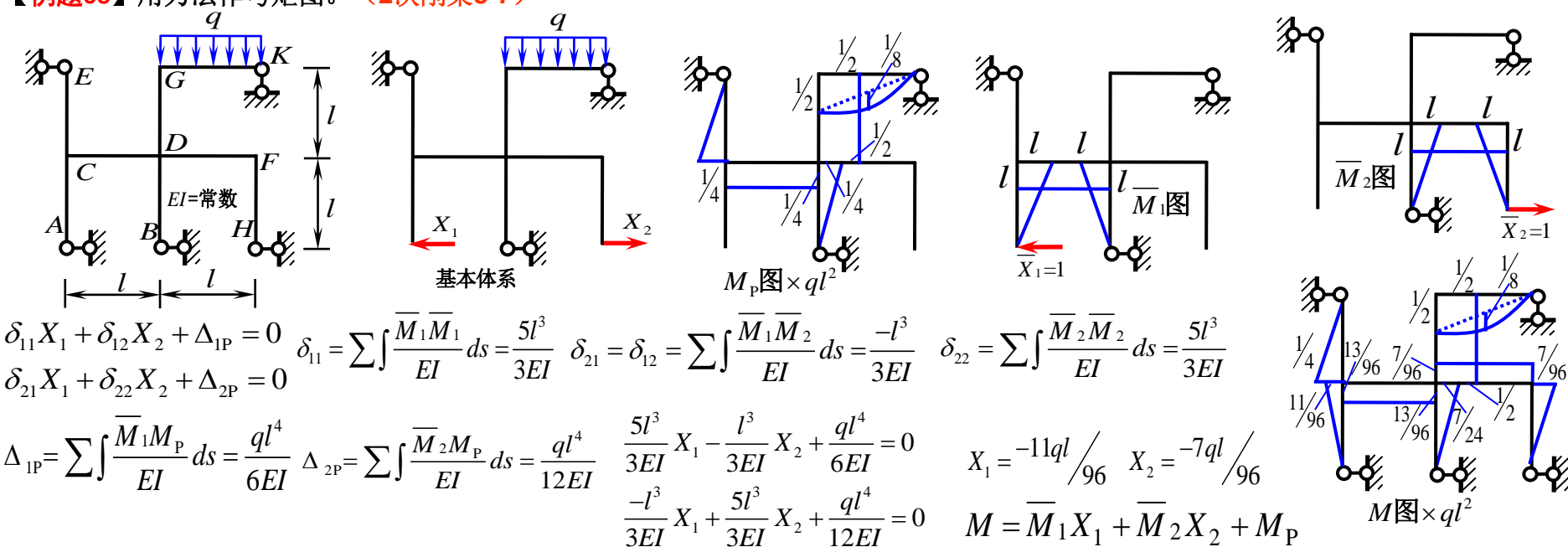
【例题34】用力法作弯矩图。（2次刚架8-4）



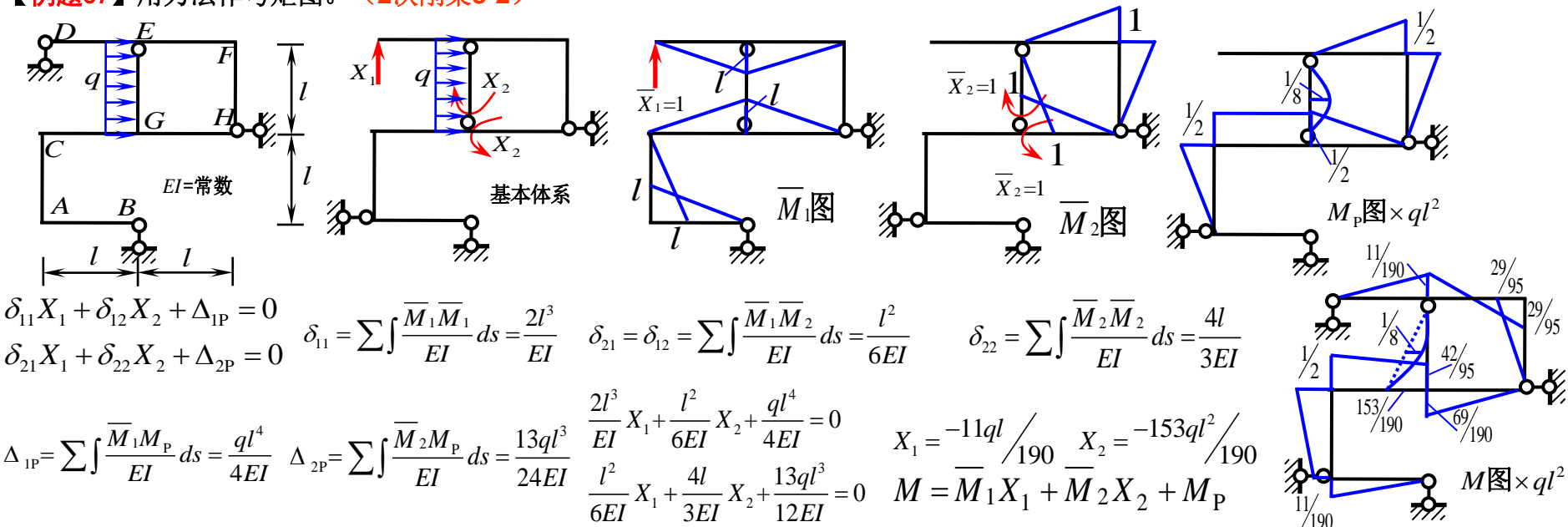
【例题35】用力法作弯矩图。（2次刚架8-5）



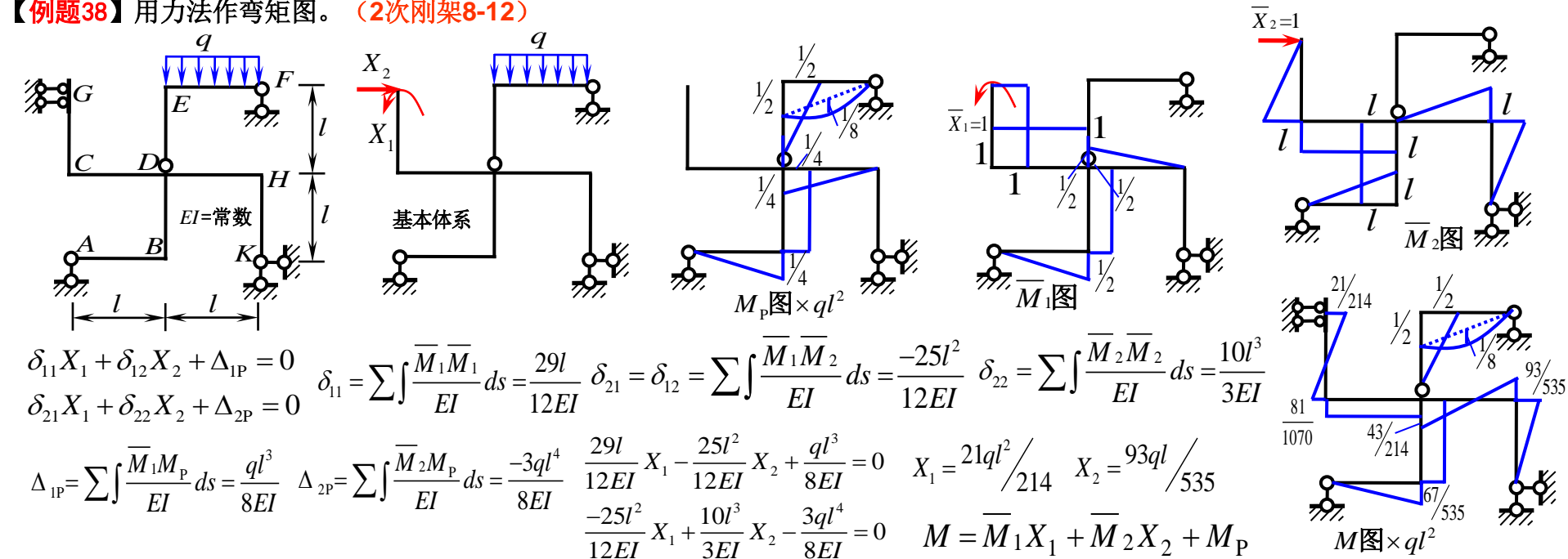
【例题36】用力法作弯矩图。（2次刚架8-7）



【例题37】用力法作弯矩图。（2次刚架8-2）



【例题38】用力法作弯矩图。（2次刚架8-12）



【例题39】用力法作弯矩图。（2次刚架1-2）

【例题40】用力法作弯矩图。（2次刚架1-2）

$$M = \overline{M}_1 X_1 + \overline{M}_2 X_2 + M_P$$

$$\delta_{11} X_1 + \delta_{12} X_2 + \Delta_{1P} = 0$$

$$\delta_{21} X_1 + \delta_{22} X_2 + \Delta_{2P} = 0$$



【例题41】用力法作弯矩图。（2次刚架1-2）

【例题42】用力法作弯矩图。（2次刚架1-2）

$$M = \overline{M}_1 X_1 + \overline{M}_2 X_2 + M_P$$

$$\delta_{11} X_1 + \delta_{12} X_2 + \Delta_{1P} = 0$$

$$\delta_{21} X_1 + \delta_{22} X_2 + \Delta_{2P} = 0$$

