几何

NO.

NF100AK

以纸版印

点在格位置练习

(1) 预备姿势：左手搭右肩，右手搭左肩，两肘同肩一样高。

点(0,0)：读"横空纵空"，姿势同预备姿势。

(2) 点(0,+)：读"横空纵正"，姿势：

两臂向上伸直，两手相合，

(3) 点(0,-)：读"横空纵负"，姿势：

两臂下垂，两手贴大腿.

(4) 点(+,0)：读"横正纵空"，姿势：

右臂右手向右伸直，左臂左手保持预备姿势.

(5) 点(+,+)：读"横正纵正"，姿势：

右臂右手向右上方伸直，左臂左手保持预备姿势.

(6) 点(+,-)：读"横正纵负"，姿势：

右臂右手向右下方伸直，左臂左手保持预备姿势.

(7) 点(-,0)：读"横负纵空"，姿势：

左臂左手向左伸直，右臂右手保持预备姿势.

(8) 点(-,+)：读"横负纵正"，姿势：

左臂左手向左上方伸直，右臂右手保持预备姿势.

(9) 点(-,-)：读"横负纵负"，姿势：

左臂左手向左下方伸直，右臂右手保持预备姿势.

附表

红层 1 $5\times\begin{bmatrix}5\\7\end{bmatrix}=5\times12$ $4\frac{5}{2}$

橙层 2 $3\times\begin{bmatrix}3\\17\end{bmatrix}=3\times20$ $4\frac{5}{2}$

黄层 3 $4\times\begin{bmatrix}4\\23\end{bmatrix}=4\times27$ $4\frac{5}{2}$

绿层 4 $5\times\begin{bmatrix}5\\31\end{bmatrix}=5\times36$ $4\frac{5}{2}$

蓝层 5 $3\times\begin{bmatrix}3\\41\end{bmatrix}=3\times44$ $4\frac{5}{2}$

紫层 6 $1\times\begin{bmatrix}1\\47\end{bmatrix}=1\times48$ $4\frac{5}{2}$

红周层 红周宽 5 cm $\begin{bmatrix}5\\7\\5\end{bmatrix}\begin{bmatrix}5\\7\\5\end{bmatrix}$

橙周层 橙周宽 3 cm $\begin{bmatrix}3\\17\\3\end{bmatrix}\begin{bmatrix}3\\17\\3\end{bmatrix}$

黄周层 黄周宽 4 cm $\begin{bmatrix}4\\23\\4\end{bmatrix}\begin{bmatrix}4\\23\\4\end{bmatrix}$

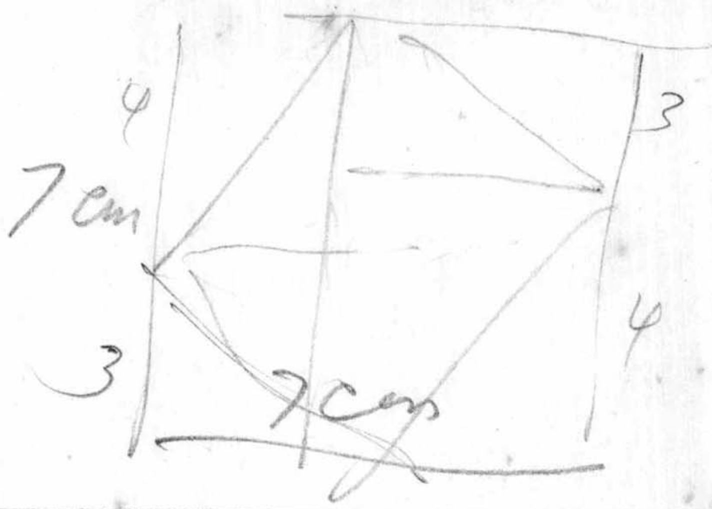
绿周层 绿周宽 5 cm $\begin{bmatrix}5\\31\\5\end{bmatrix}\begin{bmatrix}5\\31\\5\end{bmatrix}$

蓝周层 蓝周宽 3 cm $\begin{bmatrix}3\\41\\3\end{bmatrix}\begin{bmatrix}3\\41\\3\end{bmatrix}$

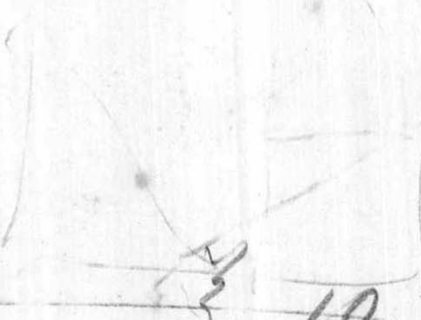
紫周层 紫周宽 1 cm $\begin{bmatrix}1\\47\\1\end{bmatrix}\begin{bmatrix}1\\47\\1\end{bmatrix}$

底层 49 cm × 49 cm

$3 \times 3 = 9$
$4 \times 4 = 16$
$5 \times 5 = 25$

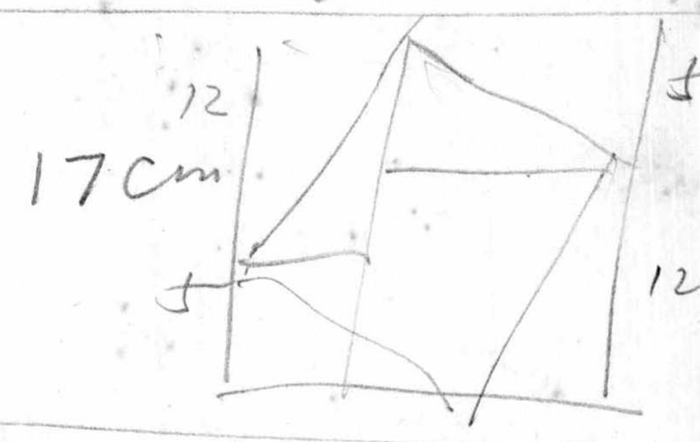


勾股七色



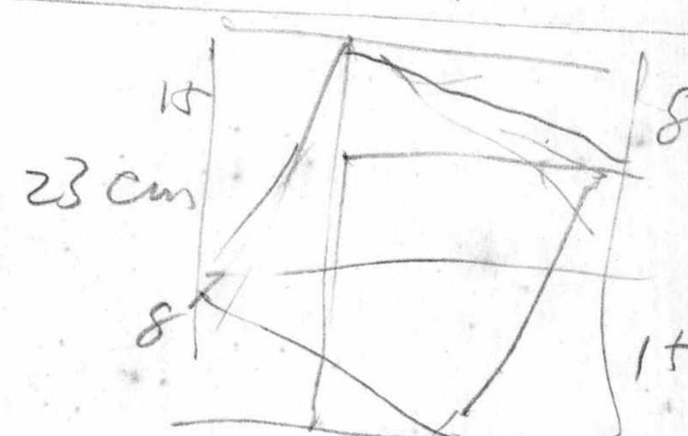
差 10 红

$5 \times 5 = 25$
$12 \times 12 = 144$
$13 \times 13 = 169$



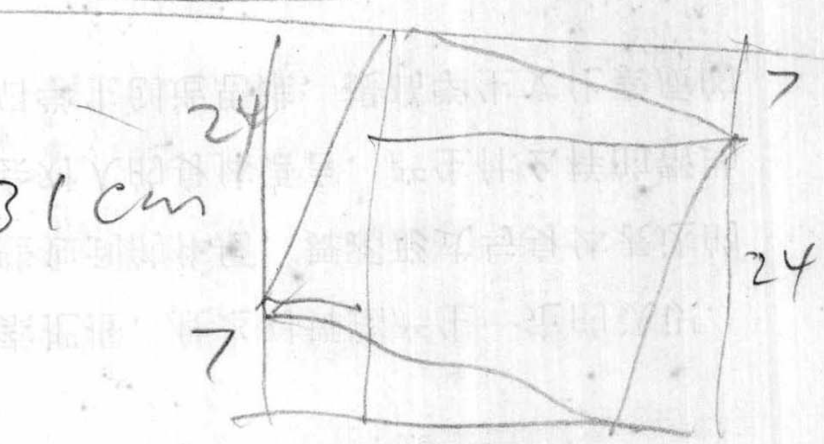
差 6 橙

$8 \times 8 = 64$
$15 \times 15 = 225$
$17 \times 17 = 289$



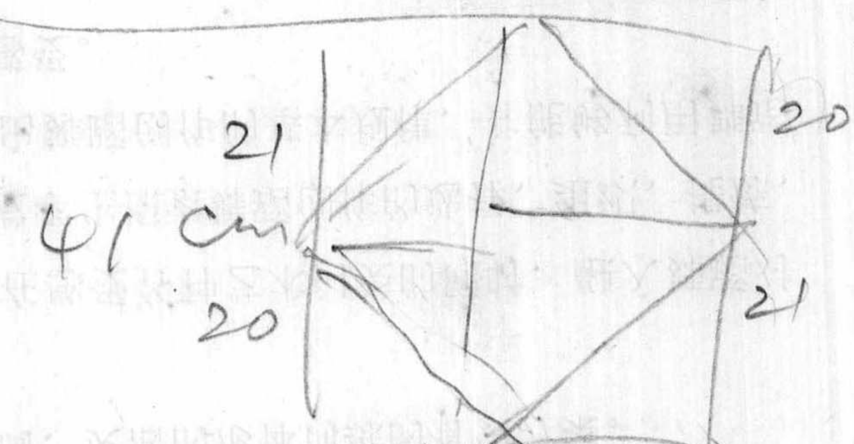
差 8 黄

$7 \times 7 = 49$
$24 \times 24 = 576$
$25 \times 25 = 625$



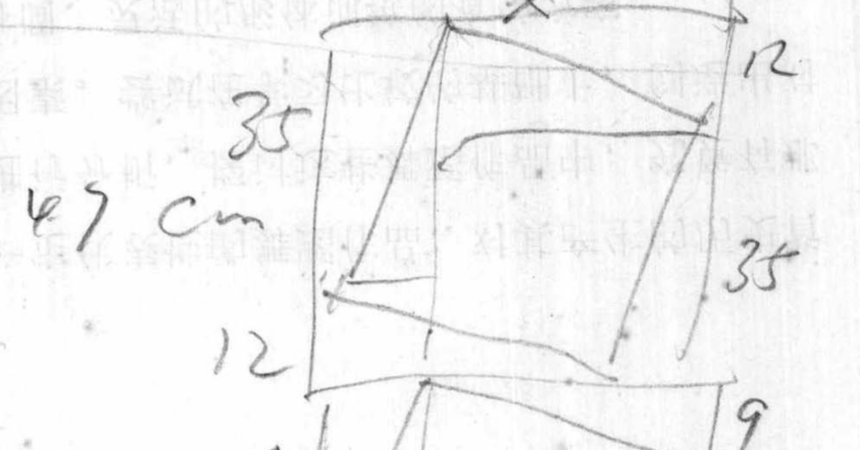
差 10 绿

$20 \times 20 = 400$
$21 \times 21 = 441$
$29 \times 29 = 841$



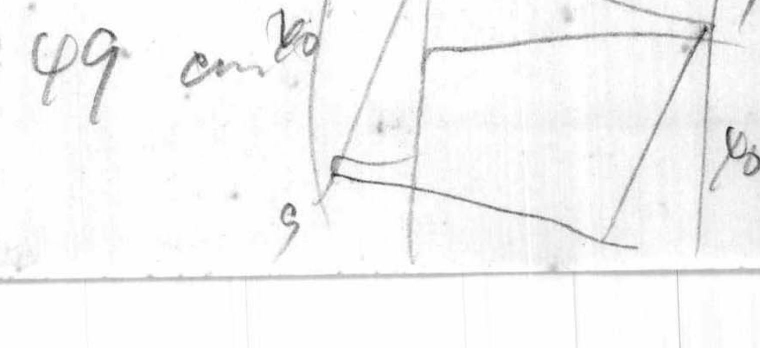
差 6 蓝

$12 \times 12 = 144$
$35 \times 35 = 1225$
$37 \times 37 = 1369$



差 2 紫

$9 \times 9 = 81$
$40 \times 40 = 1600$
$41 \times 41 = 1681$

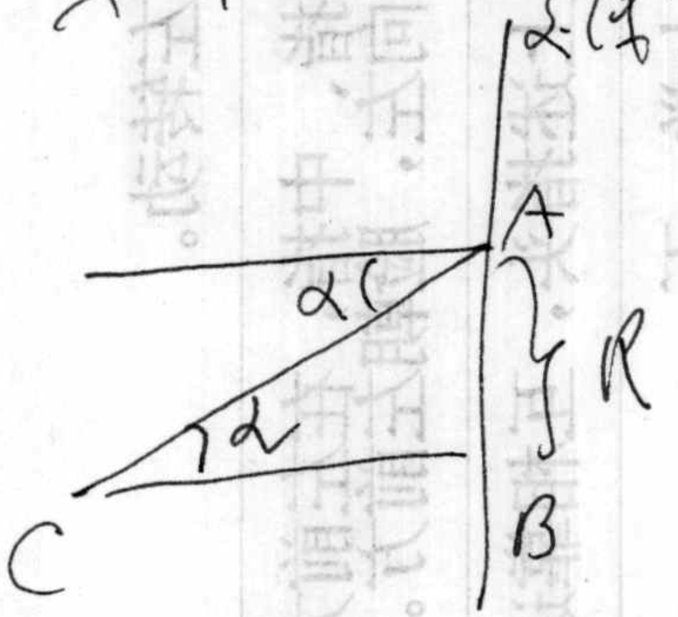


由两平面交线内任意一点出发，

分别在两平面内作垂直交线的直线，以交角计算

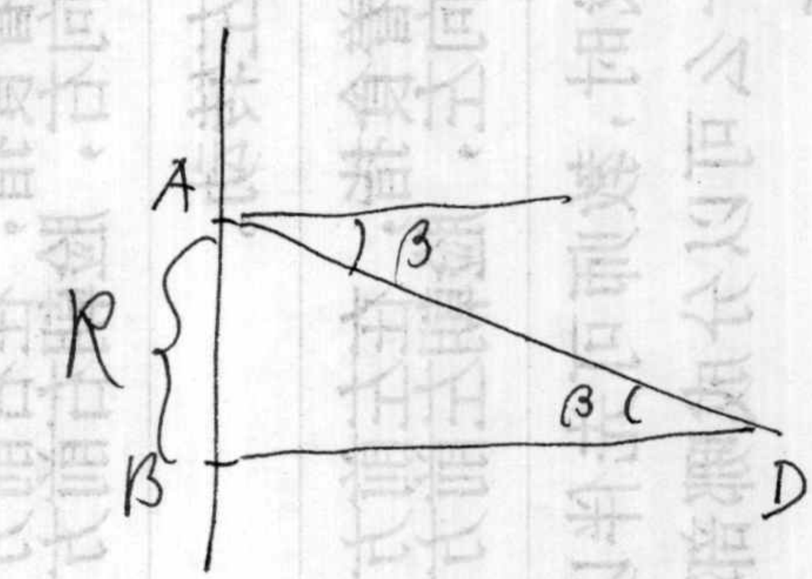
性质一. 同向的高

第一平面 F_1



$\overline{AB}$	R	$\sin\alpha$		1
$\overline{BC}$	$R\,ctg\alpha$	$\cos\alpha$	1	$ctg\alpha$
$\overline{CA}$	$\frac{R}{\sin\alpha}$	1		

第二平面 F_2

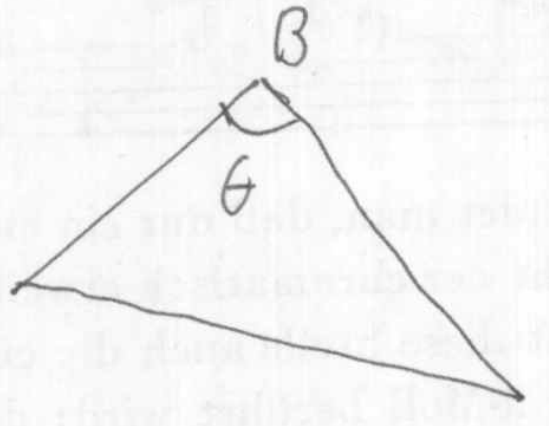


$\overline{AB}$	R	$\sin\beta$		1
$\overline{BD}$	$R\,ctg\beta$	$\cos\beta$	1	$ctg\beta$
$\overline{DA}$	$\frac{R}{\sin\beta}$	1		

第三軍向 F_3

$$F_3 \perp F_1$$

$$F_3 \perp F_2$$

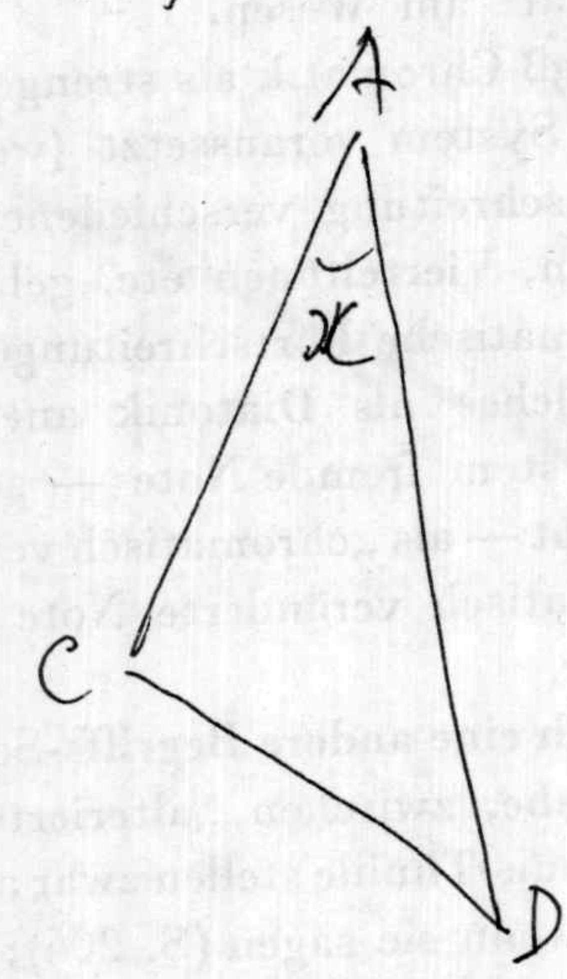


$$\begin{array}{l|l}
-\overline{CD}^2 & \cos\theta \\
\overline{BC}^2 & \\
\overline{BD}^2 & \\
\hline
2\cdot\overline{BC}\cdot\overline{BD} & 1
\end{array}$$

$$0 = \left[\begin{array}{l} -\overline{CD}^2 \\ \overline{BC}^2 \\ \overline{BD}^2 \\ -2\cdot\overline{BC}\cdot\overline{BD}\cdot\cos\theta \end{array}\right] = \left[\begin{array}{l} -\overline{CD}^2 \\ (R\operatorname{ctg}\alpha)^2 \\ (R\operatorname{ctg}\beta)^2 \\ -2\cdot R\operatorname{ctg}\alpha\cdot R\operatorname{ctg}\beta\cdot\cos\theta \end{array}\right]$$

第四章节

要求计算角度的文所在的章节



$$\begin{array}{l} -\overline{CD}^2 \\ \overline{AC}^2 \\ \overline{AD}^2 \\ \hline 2\cdot AC\cdot AD \end{array} \Bigg| \cos x$$

$$0=\left[\begin{array}{l} -\overline{CD}^2 \\ \overline{AC}^2 \\ \overline{AD}^2 \\ -2\overline{AC}\cdot\overline{AD}\cdot\cos x \end{array}\right] = \left[\begin{array}{l} -\overline{CD}^2 \\ \left[\frac{R}{\sin\alpha}\right]^2 \\ -\left[\frac{R}{\sin\beta}\right]^2 \\ -2\cdot\frac{R}{\sin\alpha}\cdot\frac{R}{\sin\beta}\cdot\cos x \end{array}\right]$$

以 0 递等 R4

$$\begin{bmatrix} \cancel{\overline{CD}^2} \\ R^2(\text{ctg}\,\alpha)^2 \\ R^2(\text{ctg}\,\beta)^2 \\ -2R^2\,\text{ctg}\,\alpha\cdot\text{ctg}\,\beta\cos\theta \end{bmatrix} = \begin{bmatrix} \cancel{\overline{CD}^2} \\ R^2\left(\frac{1}{\sin\alpha}\right)^2 \\ R^2\left(\frac{1}{\sin\beta}\right)^2 \\ -2R^2\cdot\frac{1}{\sin\alpha}\cdot\frac{1}{\sin\beta}\cdot\cos x \end{bmatrix}$$

$$\cancel{R^2}\begin{bmatrix} (\text{ctg}\,\alpha)^2 \\ (\text{ctg}\,\beta)^2 \\ -2\,\text{ctg}\,\alpha\cdot\text{ctg}\,\beta\cdot\cos\theta \end{bmatrix} = \cancel{R^2}\begin{bmatrix} \left(\frac{1}{\sin\alpha}\right)^2 \\ \left(\frac{1}{\sin\beta}\right)^2 \\ -2\cdot\frac{1}{\sin\alpha}\cdot\frac{1}{\sin\beta}\cdot\cos x \end{bmatrix}$$

$$0 = \begin{bmatrix} (\text{ctg}\,\alpha)^2 \\ (\text{ctg}\,\beta)^2 \\ -2\,\text{ctg}\,\alpha\cdot\text{ctg}\,\beta\cdot\cos\theta \\ -\left(\frac{1}{\sin\alpha}\right)^2 \\ -\left(\frac{1}{\sin\beta}\right)^2 \\ +2\cdot\frac{1}{\sin\alpha}\cdot\frac{1}{\sin\beta}\cos x \end{bmatrix}$$

P. 5

$$\cos x = \frac{\sin\alpha \cdot \sin\beta}{2}(-)\begin{bmatrix} (\operatorname{ctg}\alpha)^2 \\ (\operatorname{ctg}\beta)^2 \\ -2\operatorname{ctg}\alpha \operatorname{ctg}\beta \cdot \cos\theta \\ -\left(\frac{1}{\sin\alpha}\right)^2 \\ -\left(\frac{1}{\sin\beta}\right)^2 \end{bmatrix}$$

$$= \frac{\sin\alpha \cdot \sin\beta}{2}\begin{bmatrix} \left(\frac{1}{\sin\alpha}\right)^2 \\ -(\operatorname{ctg}\alpha)^2 \\ \left[\left(\frac{1}{\sin\beta}\right)^2 \\ -(\operatorname{ctg}\beta)^2\right] \\ 2\operatorname{ctg}\alpha \cdot \operatorname{ctg}\beta \cdot \cos\theta \end{bmatrix}$$

$$= \frac{\sin\alpha \cdot \sin\beta}{\cancel{2}}\begin{bmatrix} \cancel{2}\cdot 1 \\ \cancel{2}\operatorname{ctg}\alpha \cdot \operatorname{ctg}\beta \cos\theta \end{bmatrix}$$

$$\cos x = \sin\alpha \cdot \sin\beta \begin{bmatrix} 1 \\ \operatorname{ctg}\alpha \cdot \operatorname{ctg}\beta \cdot \cos\theta \end{bmatrix}$$

$$= \begin{bmatrix} \sin\alpha \cdot \sin\beta \\ \sin\alpha \cdot \mathrm{ctg}\,\alpha \cdot \sin\beta \cdot \mathrm{ctg}\,\beta \cdot \cos\theta \end{bmatrix}$$

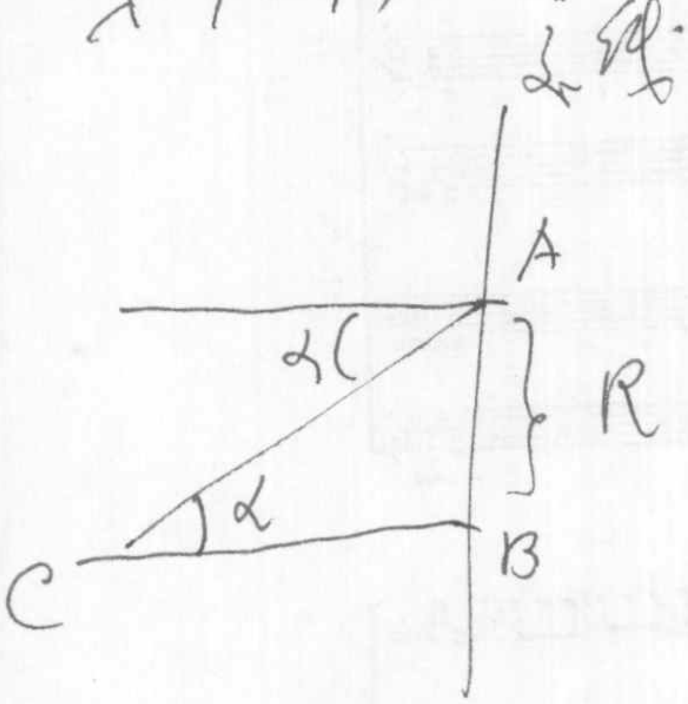
$$\cos x = \begin{bmatrix} \sin\alpha \cdot \sin\beta \\ \cos\alpha \cdot \cos\beta \cdot \cos\theta \end{bmatrix}$$

由两平面交线的任意一点出发

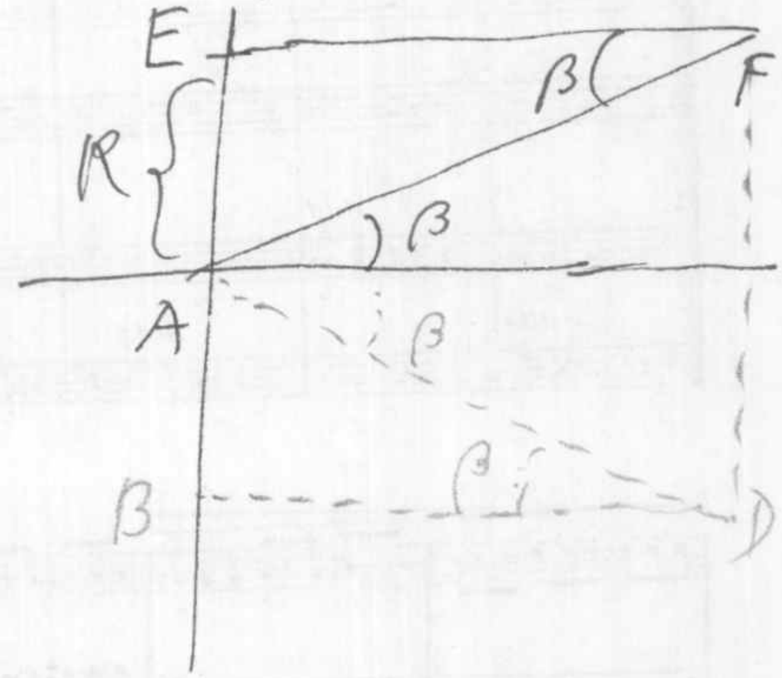
分别在两平面内作任意两直线的交角计算

情况二. 反向偏离

第一平面 F_1



第二平面 F_2



$\overline{AB}$	R	$\sin\alpha$		1
$\overline{BC}$	$R\,ctg\,\alpha$	$\cos\alpha$	1	$ctg\,\alpha$
$\overline{CA}$	$\frac{R}{\sin\alpha}$	1		$\frac{1}{\sin\alpha}$

$\overline{AE}$	R	$\sin\beta$		1
$\overline{EF}$	$R\,ctg\,\beta$	$\cos\beta$	1	$ctg\,\beta$
$\overline{FA}$	$\frac{R}{\sin\beta}$	1		$\frac{1}{\sin\beta}$

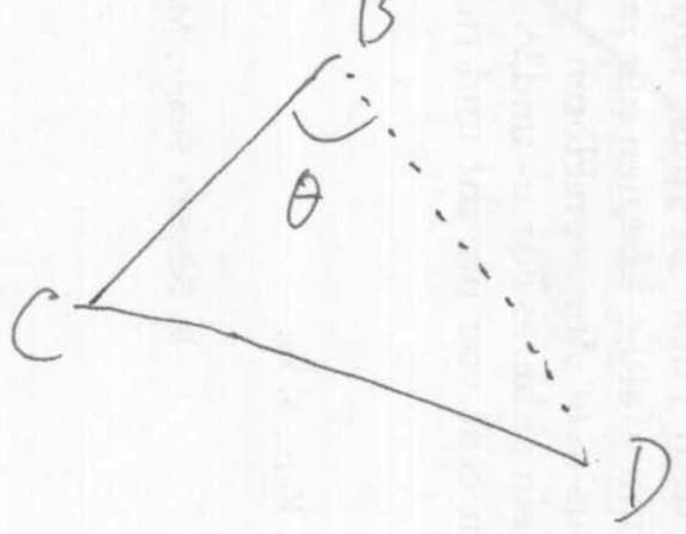
虚线28结果：

$\overline{AB}$	R	$\sin\beta$		1
$\overline{BD}$	$R\,ctg\,\beta$	$\cos\beta$	1	$ctg\,\beta$
$\overline{DA}$	$\frac{R}{\sin\beta}$	1		

第三平面 F_3 BD为虚线对称面的一条直线

$$F_3 \perp F_1$$

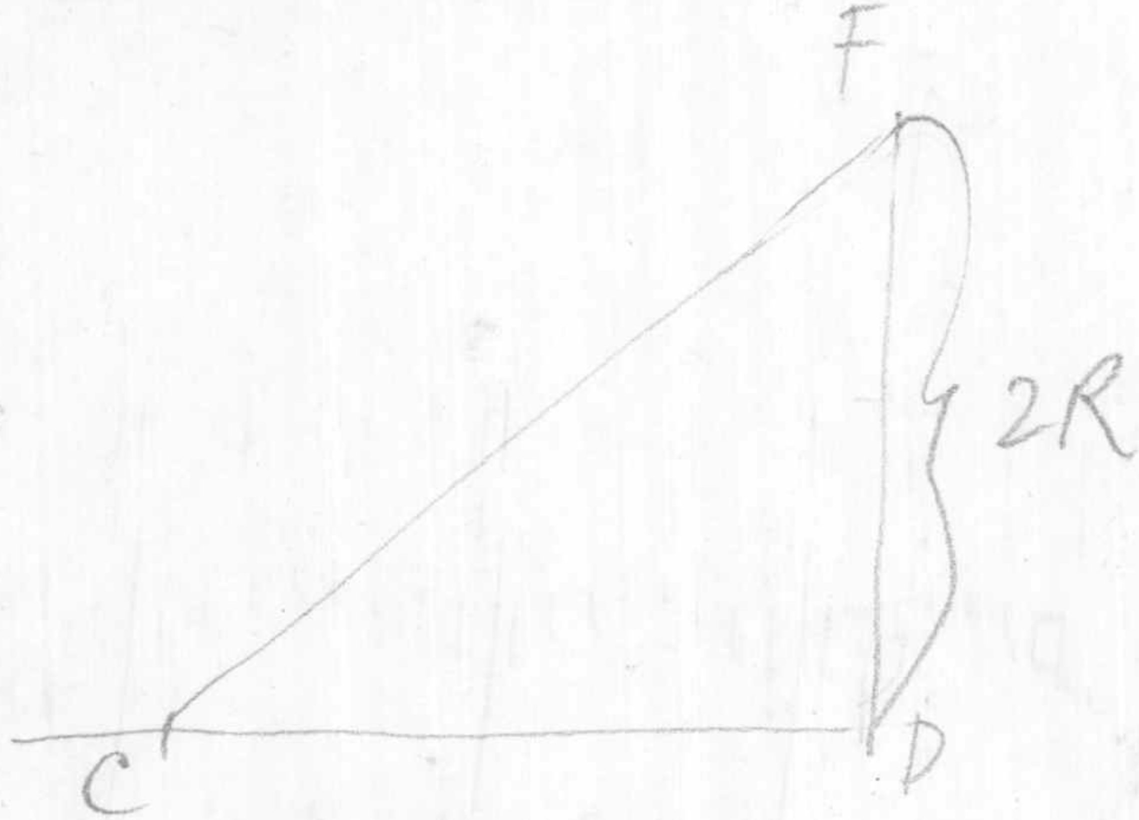
$$F_3 \perp F_2$$



$-\overline{CD}^2$	$\cos\theta$
$\overline{BC}^2$	
$\overline{BD}^2$	
$2\cdot\overline{BC}\cdot\overline{BD}$	1

$$0=\begin{bmatrix} -\overline{CD}^2 \\ \overline{BC}^2 \\ \overline{BD}^2 \\ -2\,\overline{BC}\cdot\overline{BD}\cdot\cos\theta \end{bmatrix}=\begin{bmatrix} -\overline{CD}^2 \\ (R\,\mathrm{ctg}\,\alpha)^2 \\ (R\,\mathrm{ctg}\,\beta)^2 \\ -2\,R\,\mathrm{ctg}\,\alpha\cdot R\,\mathrm{ctg}\,\beta\cdot\cos\theta \end{bmatrix}$$

第四章的F_4

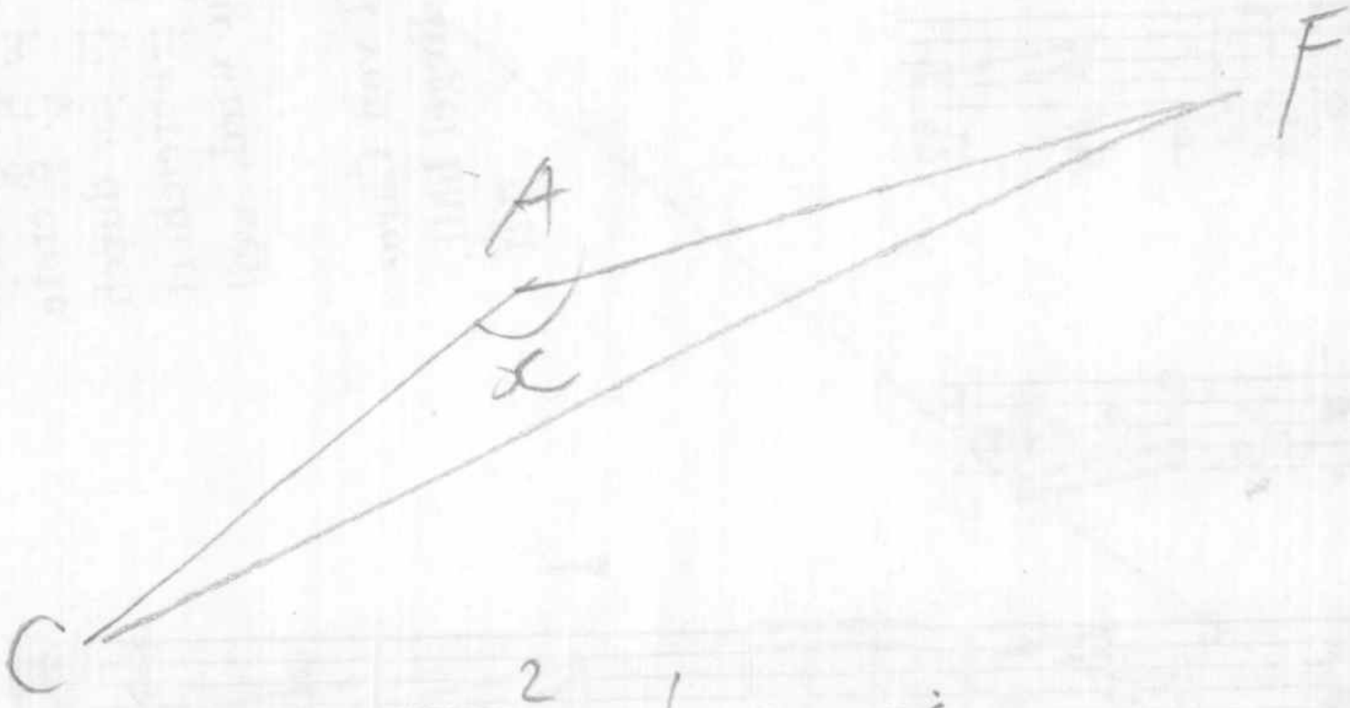


$$\frac{\overline{CF}^2}{\overline{CD}^2} \rightarrow \frac{\overline{CF}^2}{\overline{CD}^2}$$

$$(2R)^2 \qquad 4R^2$$

第五章節 F_5

要求计算角度 $\cos x$ 所在的章節



$$\begin{array}{c|c} -\overline{CF}^2 & \cos x \\ \overline{AC}^2 & \\ \overline{AF}^2 & \\ \hline 2\cdot\overline{AC}^2\,\overline{AF} & 1 \end{array}$$

$$0=\begin{bmatrix} -\overline{CF}^2 \\ \overline{AC}^2 \\ \overline{AF}^2 \\ -2\,\overline{AC}\cdot\overline{AF}\cdot\cos x \end{bmatrix}=\begin{bmatrix} -\overline{CD}^2 \\ -4R^2 \\ \left(\dfrac{R}{\sin\alpha}\right)^2 \\ \left(\dfrac{R}{\sin\beta}\right)^2 \\ -2\dfrac{R}{\sin\alpha}\cdot\dfrac{R}{\sin\beta}\cdot\cos x \end{bmatrix}$$

以O逆算：

$(F_3$ 与 $F_5)$

P.7 　 P.9

$$\left[\begin{array}{l} \cancel{-CD^2} \\ R^2(ctg\,\alpha)^2 \\ R^2(ctg\,\beta)^2 \\ -2R^2 ctg\,\alpha \cdot ctg\,\beta \cos\theta \end{array}\right] = \left[\begin{array}{l} \cancel{-CD^2} \\ -4R^2 \\ R^2\left(\frac{1}{\sin\alpha}\right)^2 \\ R^2\left(\frac{1}{\sin\beta}\right)^2 \\ -2R^2 \frac{1}{\sin\alpha}\cdot\frac{1}{\sin\beta}\cdot\cos x \end{array}\right]$$

$$\cancel{R^2}\left[\begin{array}{l} (ctg\,\alpha)^2 \\ (ctg\,\beta)^2 \\ -2\,ctg\,\alpha \cdot ctg\,\beta \cos\theta \end{array}\right] = \cancel{R^2}\left[\begin{array}{l} -4 \\ \left(\frac{1}{\sin\alpha}\right)^2 \\ \left(\frac{1}{\sin\beta}\right)^2 \\ -2\frac{1}{\sin\alpha}\cdot\frac{1}{\sin\beta}\cdot\cos x \end{array}\right]$$

$$0 = \left[\begin{array}{l} (ctg\,\alpha)^2 \\ (ctg\,\beta)^2 \\ -2\,ctg\,\alpha \cdot ctg\,\beta\cdot\cos\theta \\ +4 \\ -\left(\frac{1}{\sin\alpha}\right)^2 \\ -\left(\frac{1}{\sin\beta}\right)^2 \\ +2\cdot\frac{1}{\sin\alpha}\cdot\frac{1}{\sin\beta}\cdot\cos x \end{array}\right]$$

$$\cos x = \frac{\sin\alpha\cdot\sin\beta}{2}(-)\left[\begin{array}{c}(ctg\,\alpha)^2\\ (ctg\,\beta)^2\\ -2\,ctg\,\alpha\cdot ctg\,\beta\cdot\cos\theta\\ 4\\ -\left(\frac{1}{\sin\alpha}\right)^2\\ -\left(\frac{1}{\sin\beta}\right)^2\end{array}\right]$$

$$= \frac{\sin\alpha\cdot\sin\beta}{2}\cdot\left[\begin{array}{c}\left[\begin{array}{c}\left(\frac{1}{\sin\alpha}\right)^2\\ -(ctg\,\alpha)^2\end{array}\right]\\ \left[\begin{array}{c}\left(\frac{1}{\sin\beta}\right)^2\\ -(ctg\,\beta)^2\end{array}\right]\\ -4\\ 2\,ctg\,\alpha\cdot ctg\,\beta\cdot\cos\theta\end{array}\right]$$

$$= \frac{\sin\alpha\cdot\sin\beta}{2}\left[\begin{array}{c}(-)2\cdot 1\\ 2\,ctg\,\alpha\cdot ctg\,\beta\cdot\cos\theta\end{array}\right]$$

$$= \sin\alpha\cdot\sin\beta\left[\begin{array}{c}-1\\ ctg\,\alpha\cdot ctg\,\beta\cdot\cos\theta\end{array}\right]$$

$$= \begin{bmatrix} -\sin\alpha \cdot \sin\beta \\ \sin\alpha \cdot \operatorname{ctg}\alpha \cdot \sin\beta \cdot \operatorname{ctg}\beta \cdot \cos\theta \end{bmatrix}$$

$$\cos x = \begin{bmatrix} -\sin\alpha \cdot \sin\beta \\ \cos\alpha \cdot \cos\beta \cdot \cos\theta \end{bmatrix}$$