

第四章

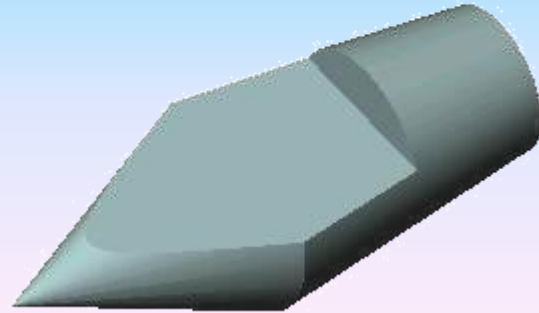
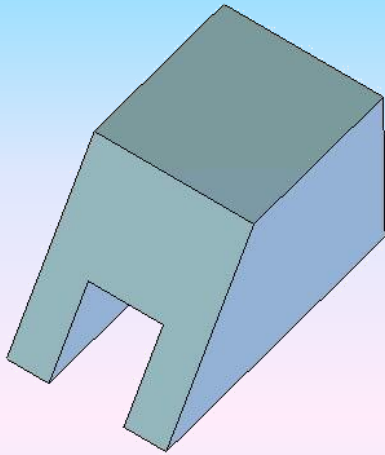
立体的截切

4.1 平面立体的截切

4.2 回转体的截切

截切：

用平面与立体相交，截去立体的一部分。



截平面：用以截切物体的平面。

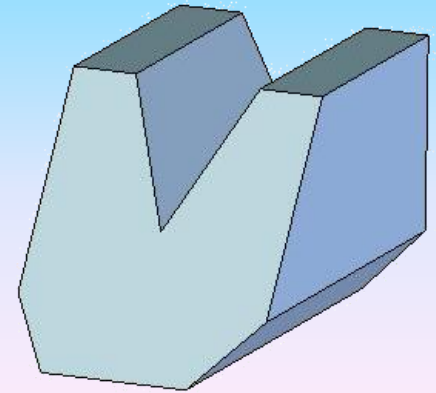
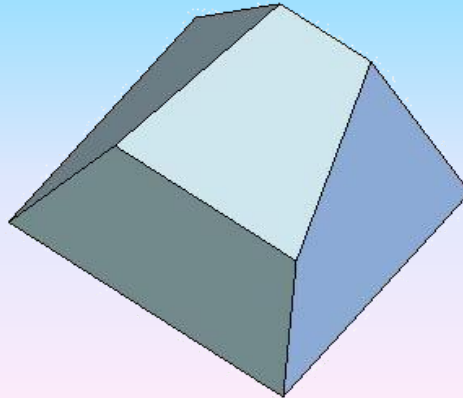
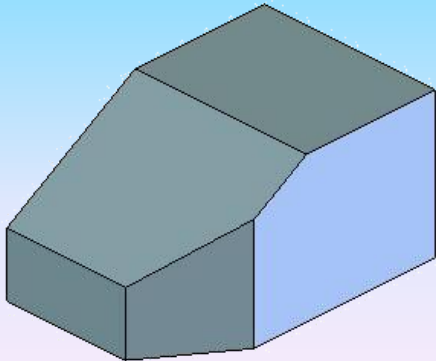
截交线：截平面与物体表面的交线。

截断面：因截平面的截切，在物体上形成的平面。

讨论的问题：截交线的分析和作图。

4.1 平面立体的截切

一、平面立体截切的基本形式



截交线的性质：

- 平面立体的截交线是一个由直线组成的**平面封闭多边形**，其形状取决于平面立体的形状及截平面在平面立体上的截切位置。
- 截交线的每条边都是**截平面与棱面的交线(共有性)**。

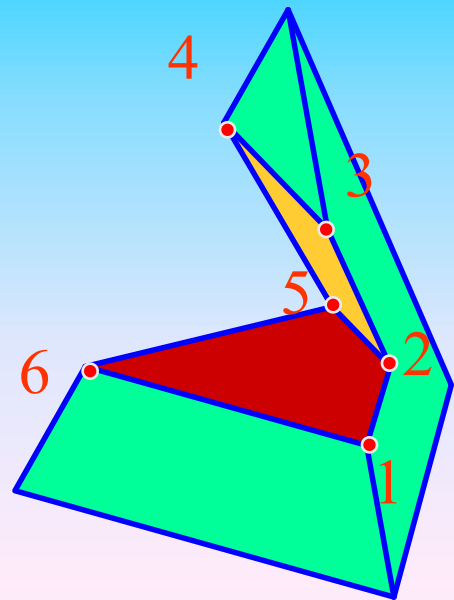
求截交线的实质是求两平面的交线

二、平面立体截交线的画图

1. 求截交线的两种方法:

棱线法:求各棱线与截平面的交点

棱面法:求各棱面与截平面的交线



2. 求截交线的步骤:

1) 空间及投影分析

截平面与立体的相对位置

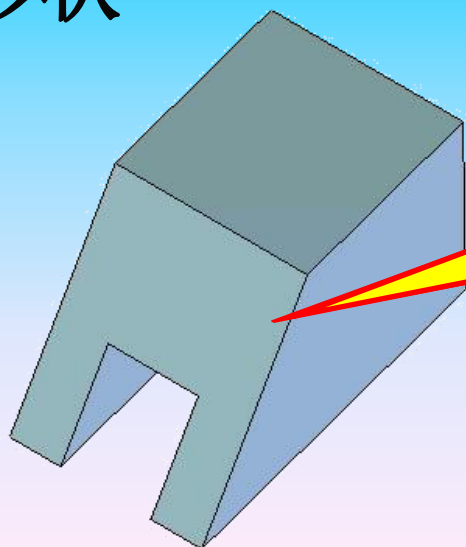
确定截交线的形状

截平面与投影面的相对位置

2) 画出截交线的投影

确定截交线的投影特性

3. 截交线的形状



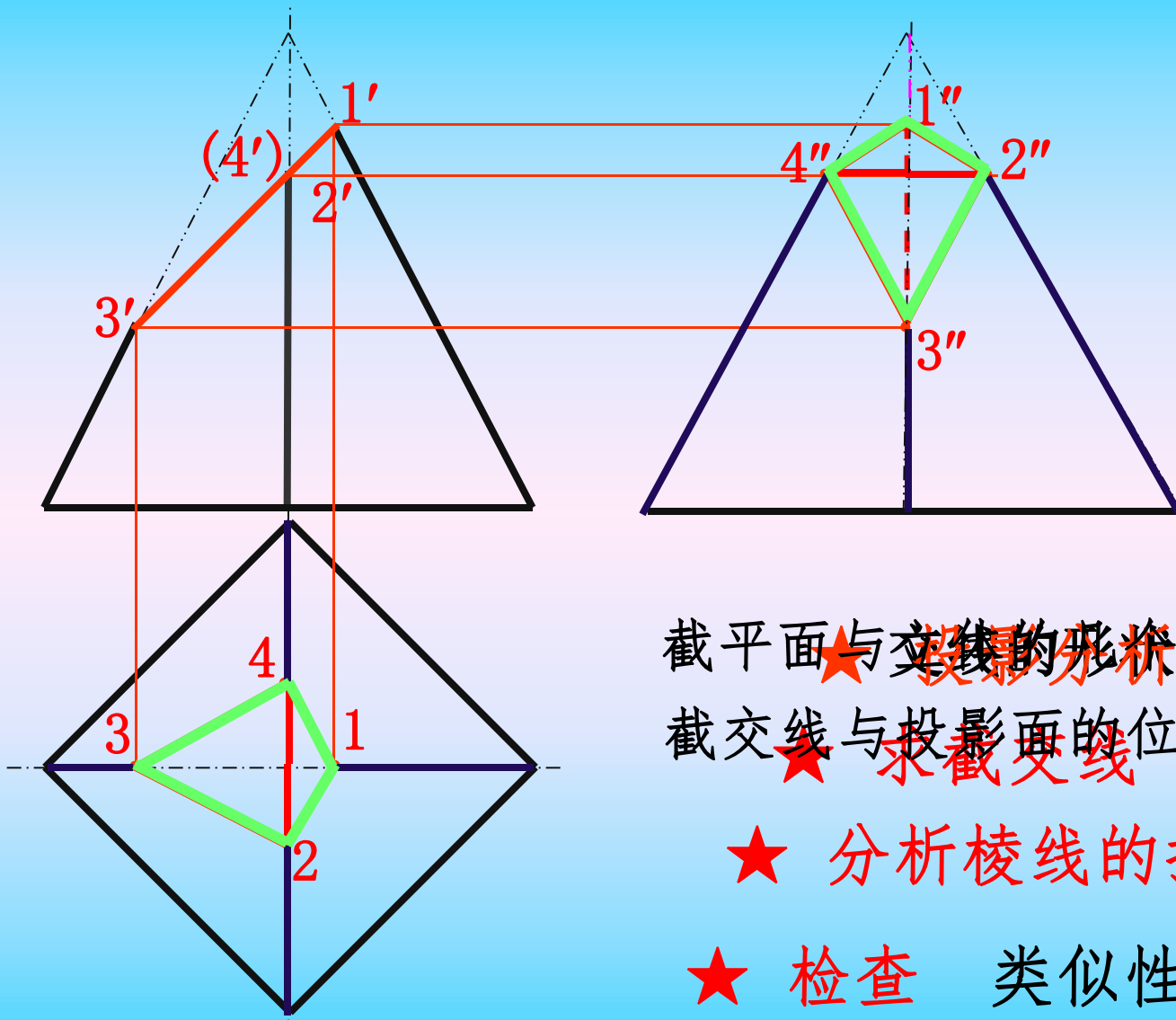
怎样确定截交线的投影形状？

(1) 分析截平面与立体的相对位置以确定截交线形状。

截交线多边形的边数=截平面截到的棱面数

(2) 分析截平面与投影面的相对位置以确定截交线的投影形状。

例1：求四棱锥被截切后的俯视图和左视图。

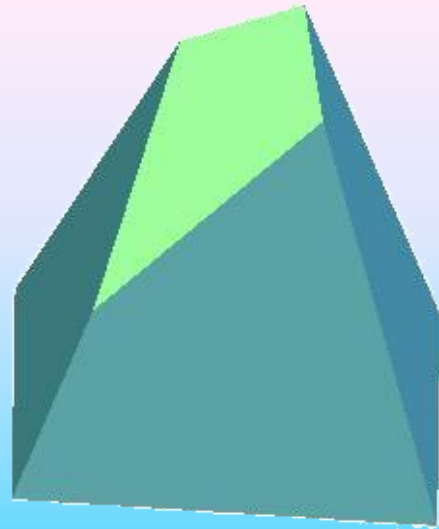
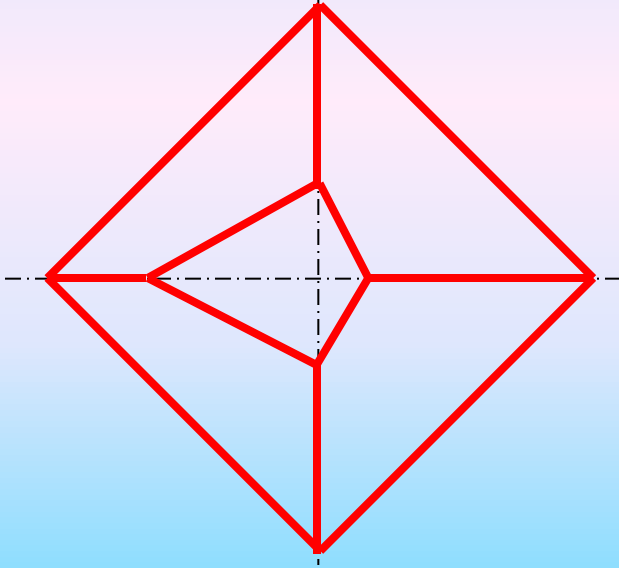
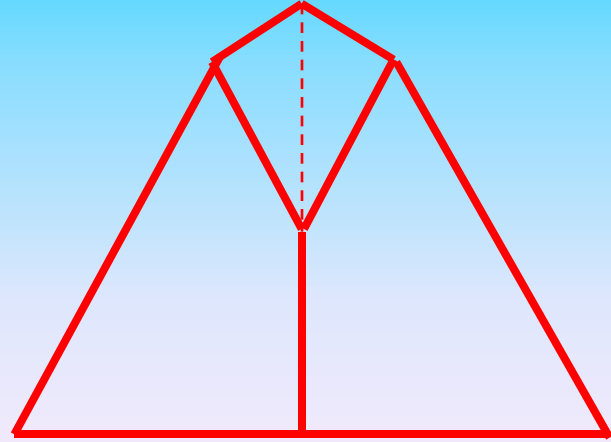
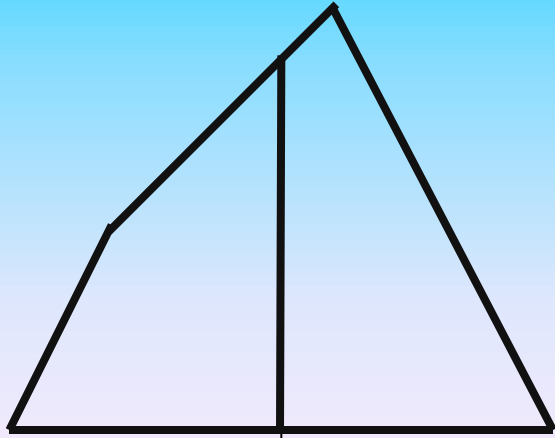


截平面与棱线的形状棱面相交？

截交线与投影面的位置关系？

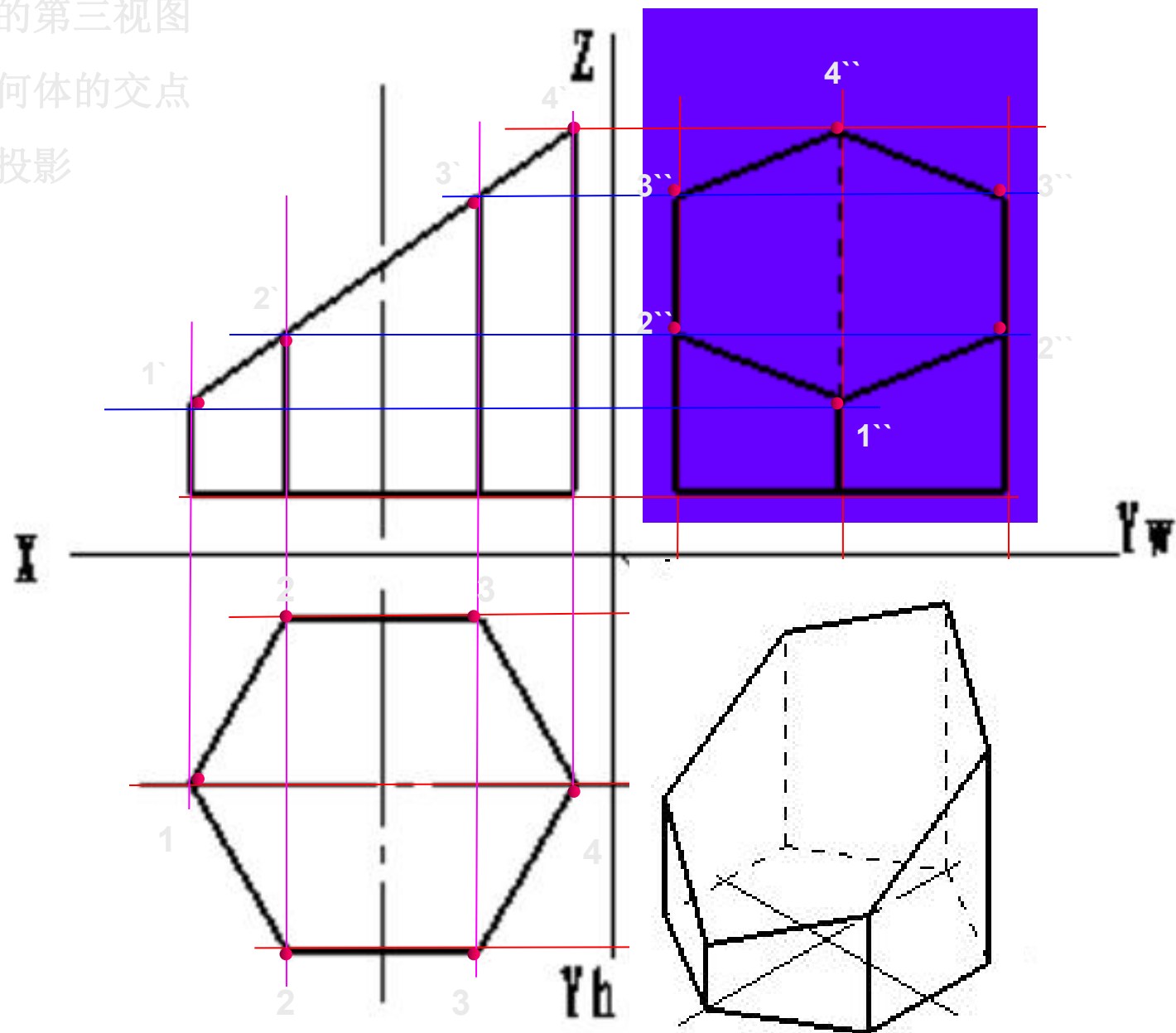
★ 分析棱线的投影

★ 检查 类似性



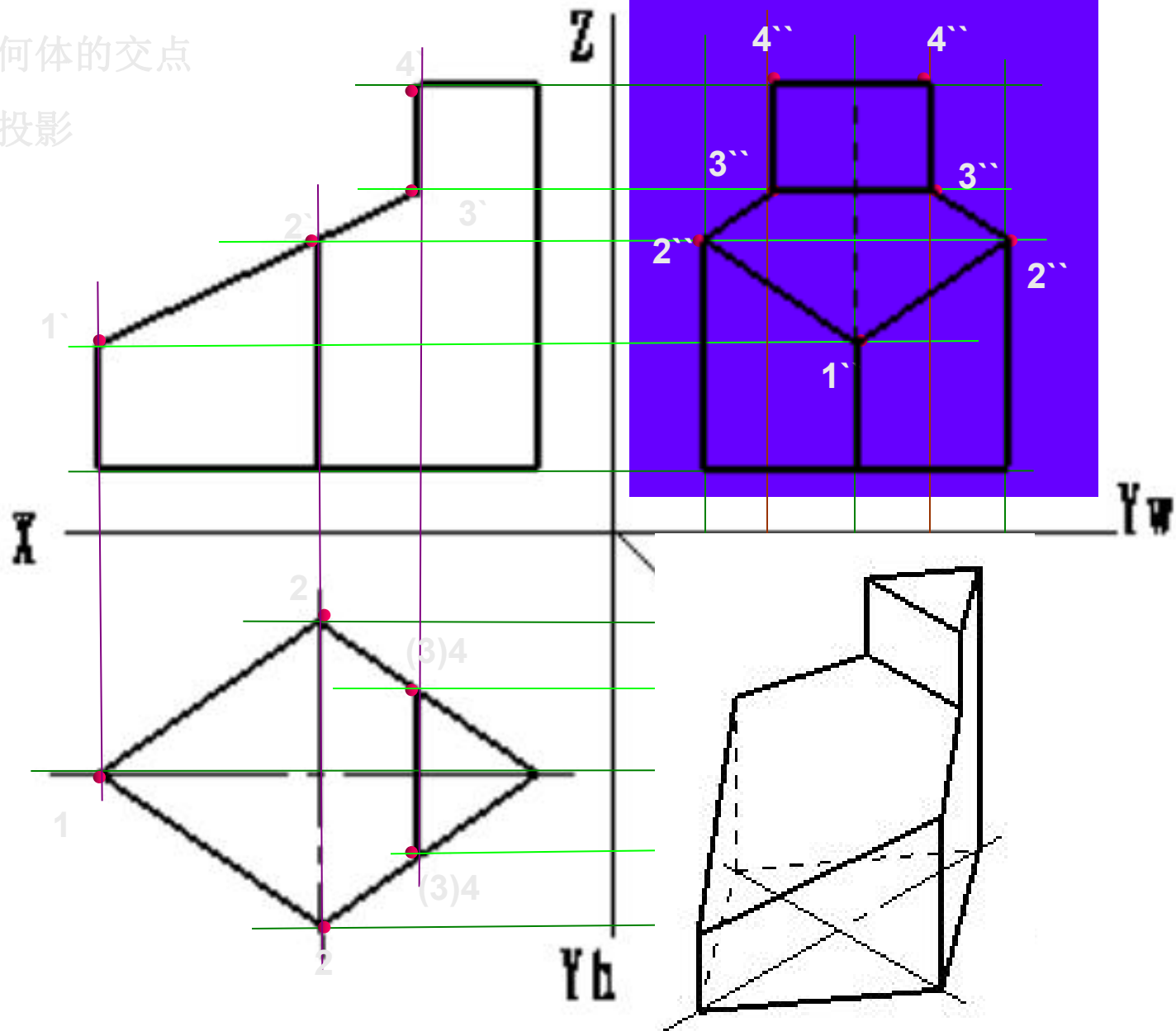
二、求平面几何体的截交线1

- 1、画出完整几何体的第三视图
- 2、找出截平面与几何体的交点
- 3、求这些点的其它投影

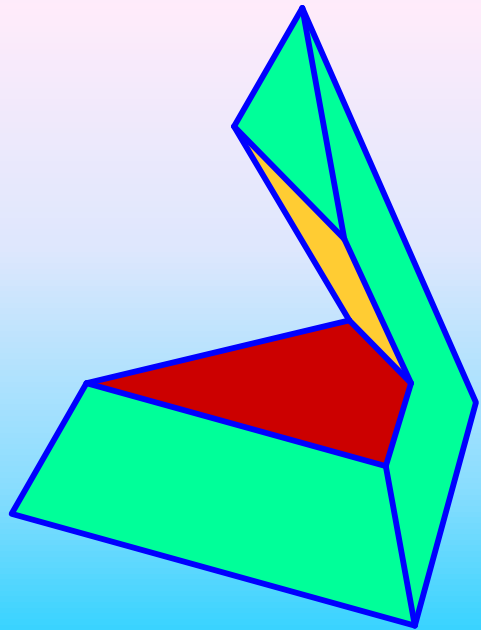
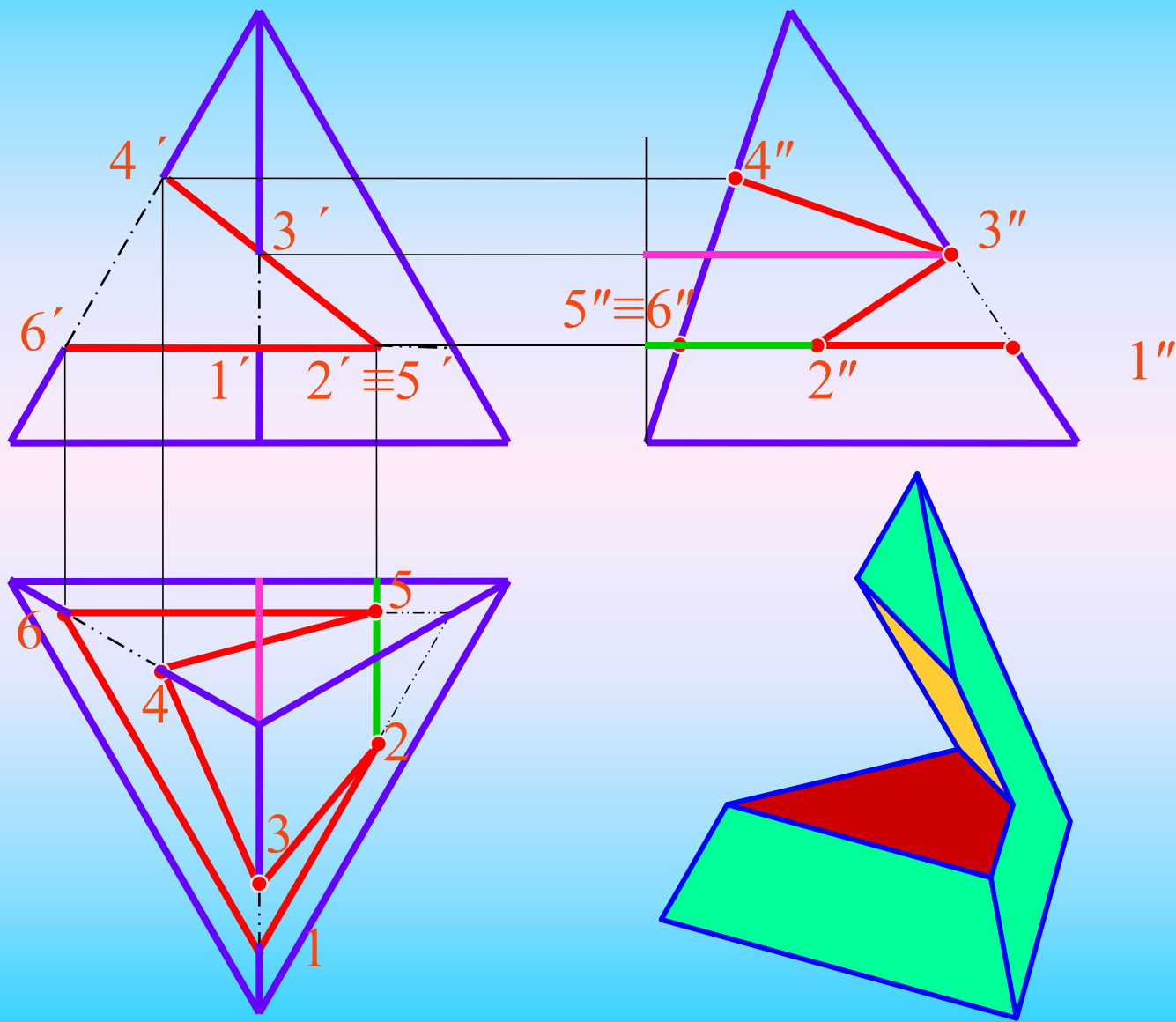


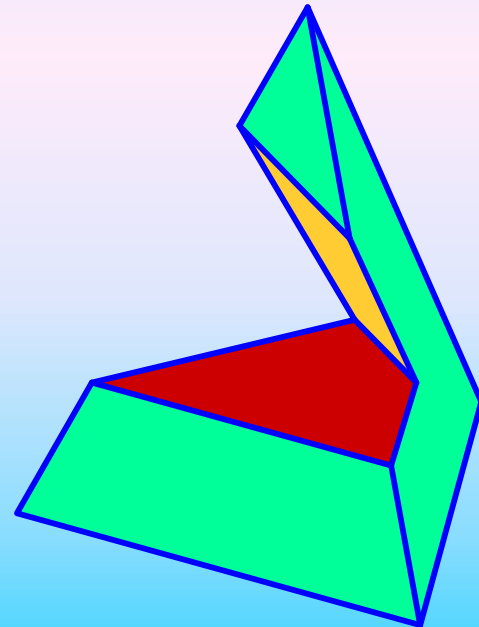
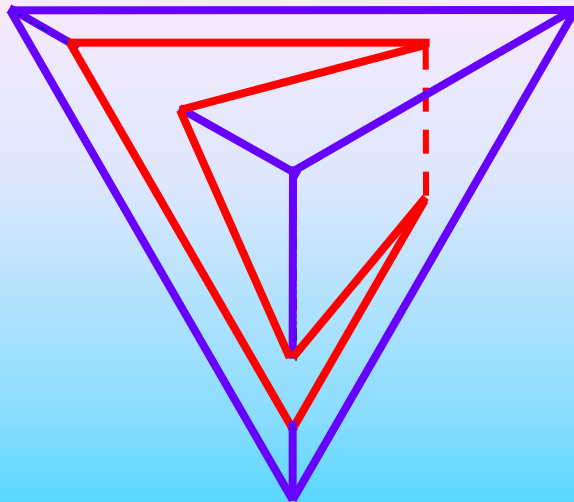
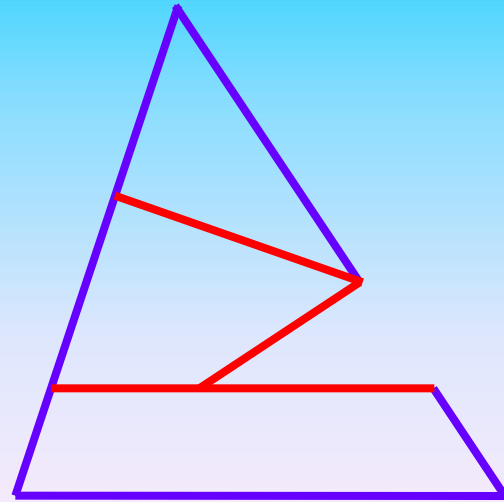
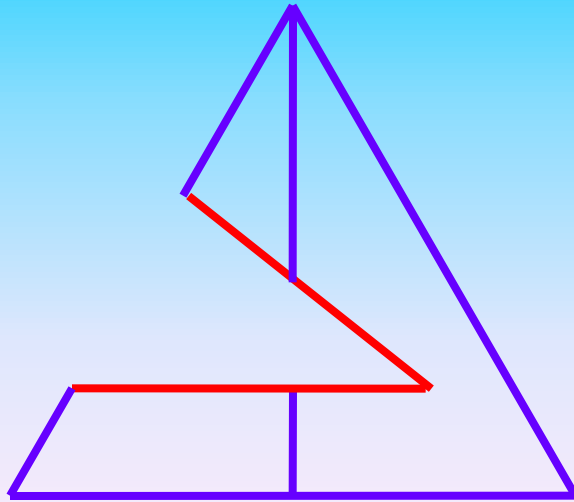
二、求平面几何体的截交线2

- 1、画出完整几何体的第三视图
- 2、找出截平面与几何体的交点
- 3、求这些点的其它投影

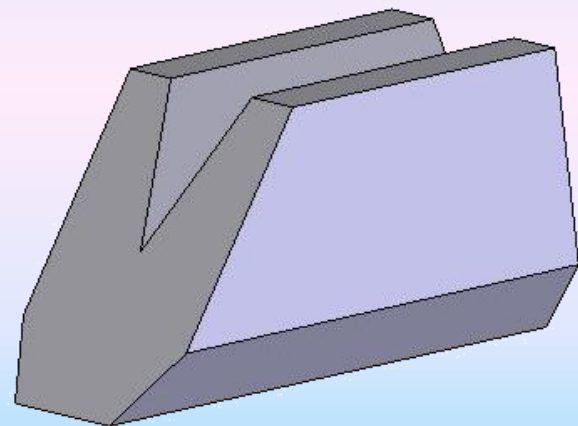
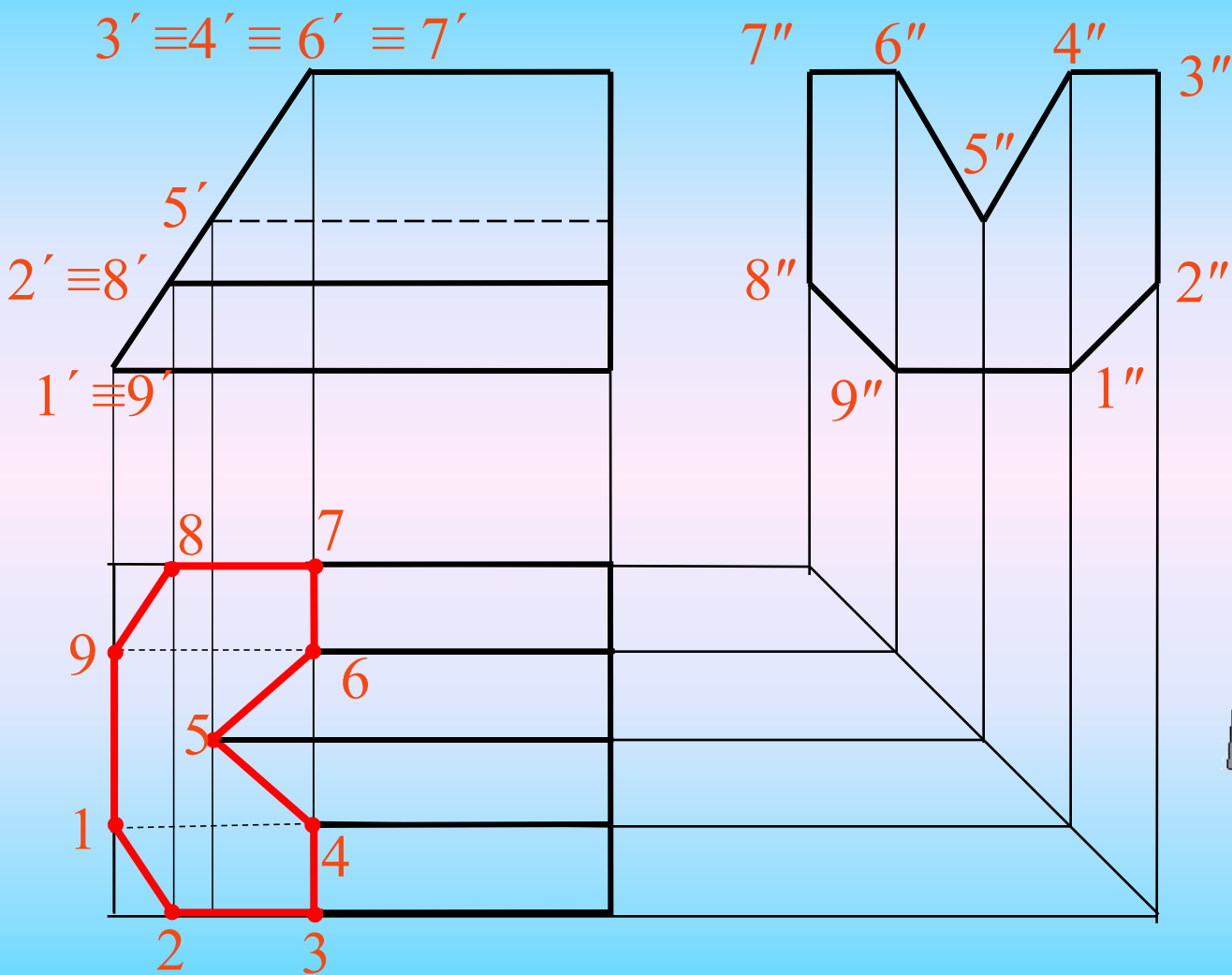


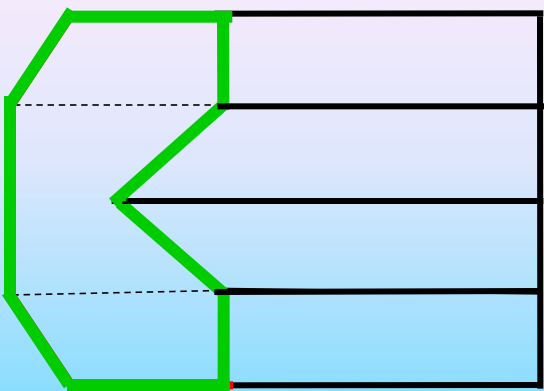
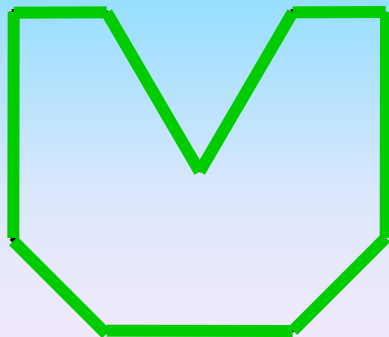
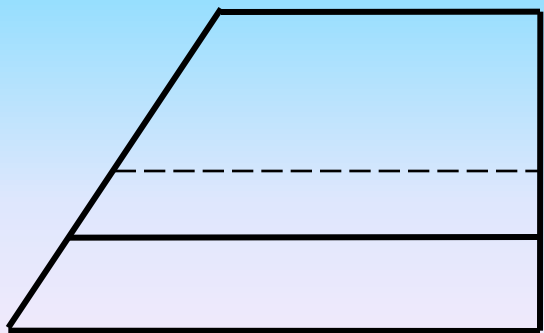
例2：求三棱锥被截切后的俯视图和左视图。



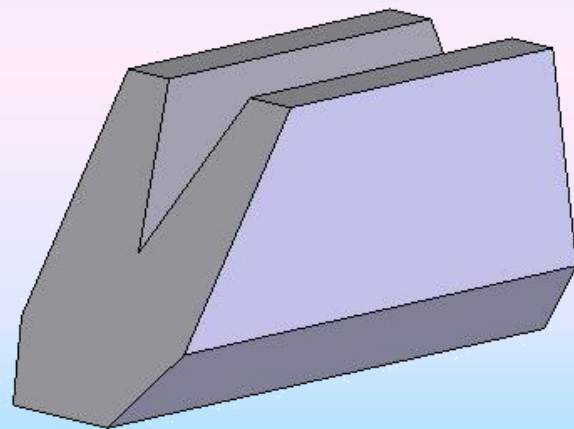


例3: 求九棱柱被正垂面截切后的俯视图。



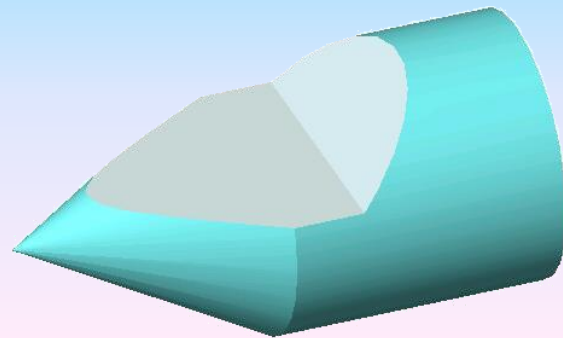
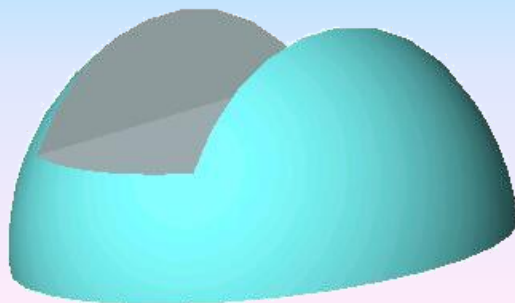
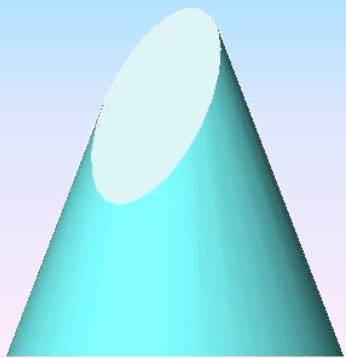


用截交线的
类似性检查

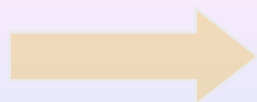


4.2 回转体的截切

一、回转体截切的基本形式

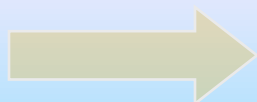


截交线性质



共有性

截交线形状



封闭的平面图形

回转体表面的形状

截平面与回转体轴线的相对位置

二、求截交线的一般步骤

1. 空间及投影分析

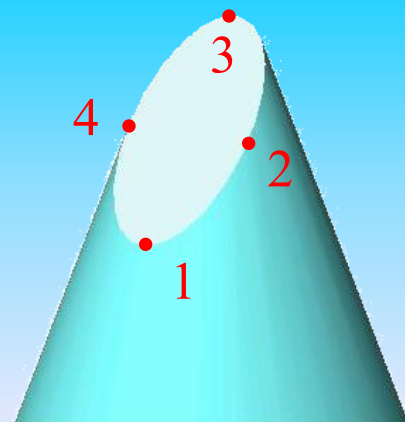
1) 确定截交线的形状

☆ 明确回转体的形状

☆ 分析截平面与回转体轴线的相对位置

2) 明确截交线的投影特性(积聚性、类似性等)

☆ 关键在分析截平面与投影面的相对位置



2. 画截交线的投影

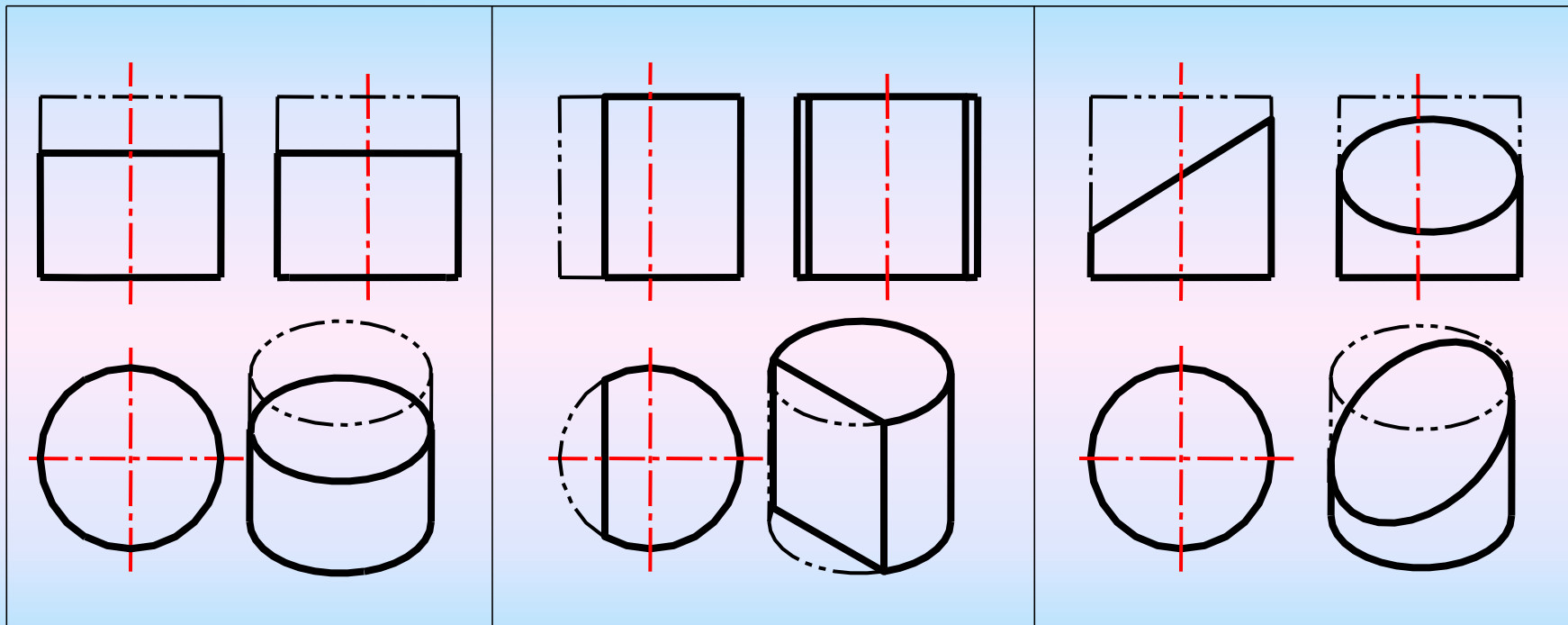
当截交线的投影为非圆曲线时，作图步骤为：

☆ 先取特殊点，后取中间点。

☆ 顺次光滑地连接各点，并判断可见性。

(一) 圆柱体的截切

截交线的形状取决于截平面与圆柱**轴线**的相对位置

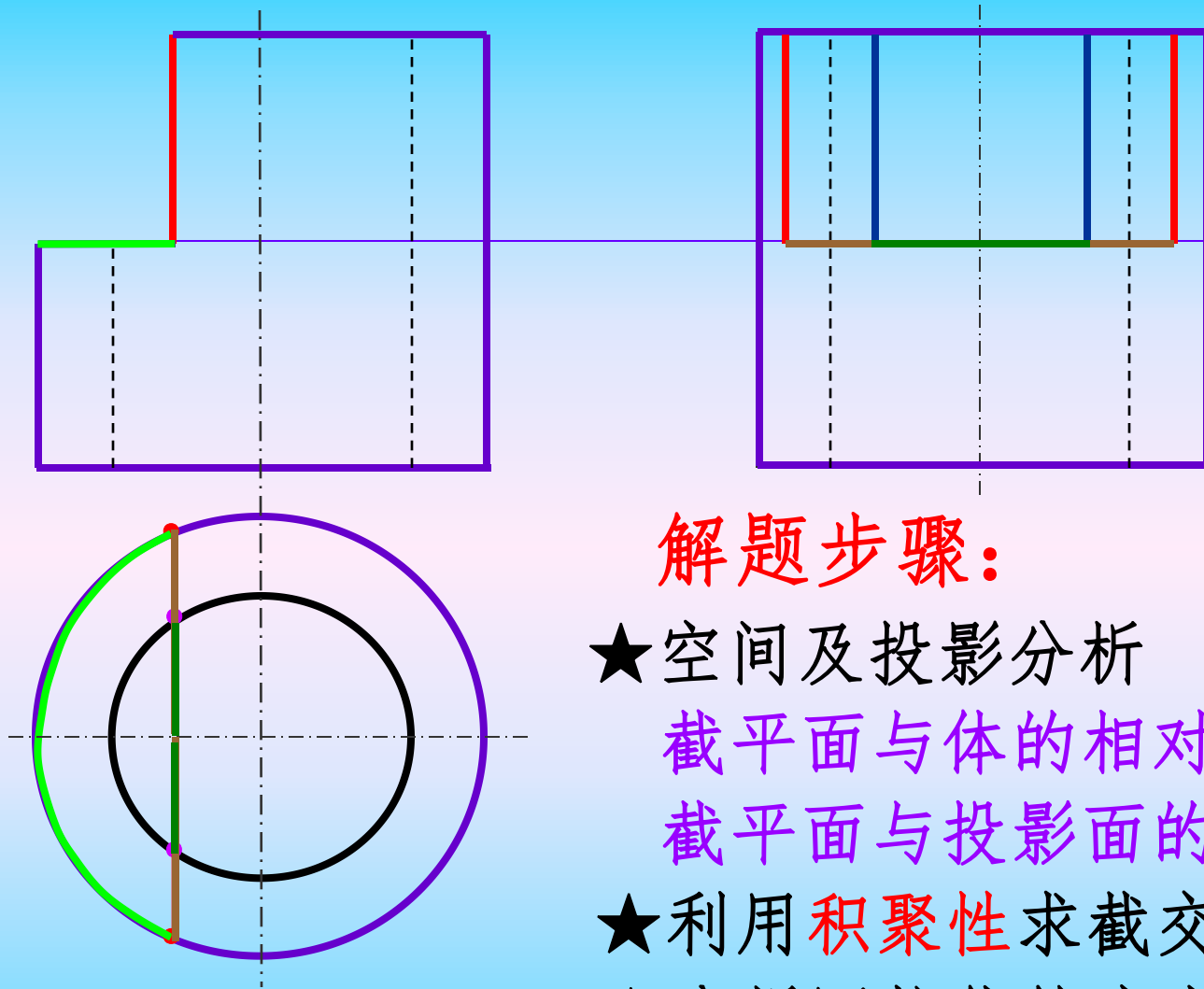


垂直
圆

平行
两平行直线

倾斜
椭圆

例 4：求左视图



同一立体被多个平面截切，要逐个截平面进行的截交线的分析和作图。

解题步骤：

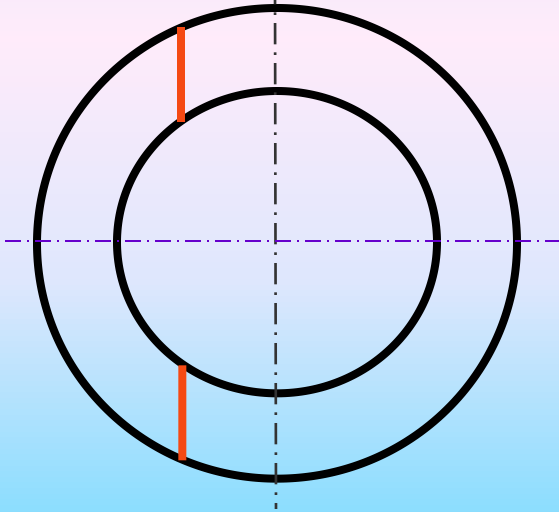
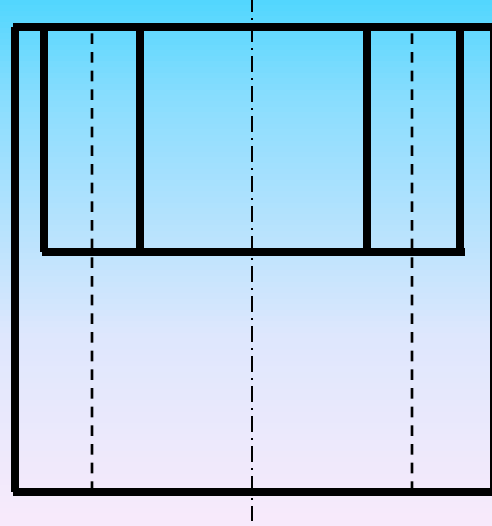
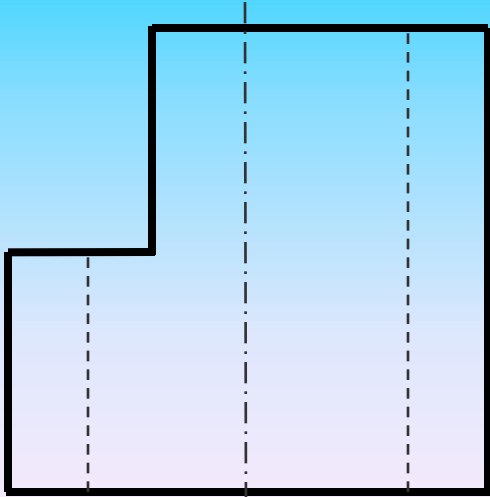
★空间及投影分析

截平面与体的相对位置

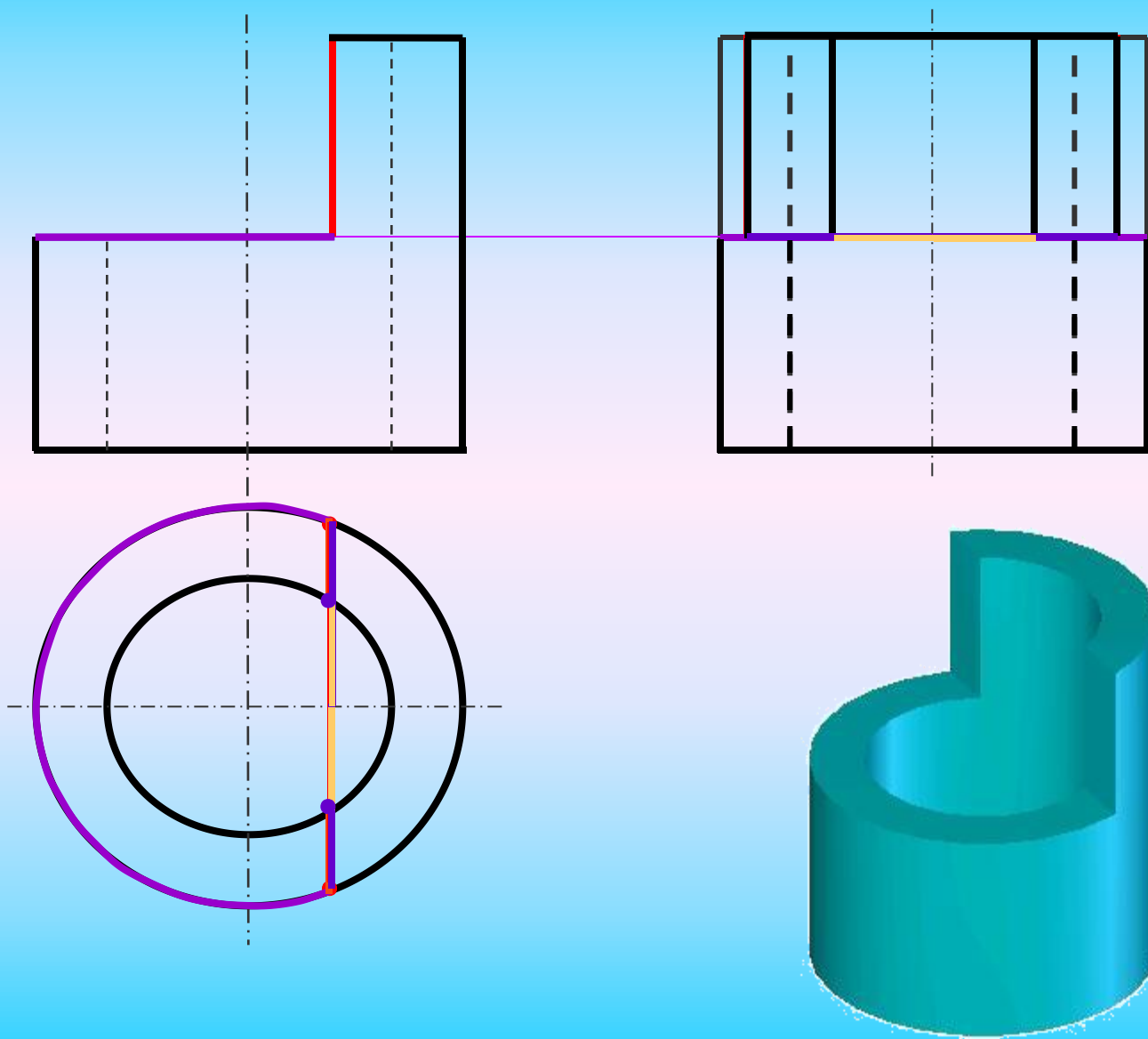
截平面与投影面的相对位置

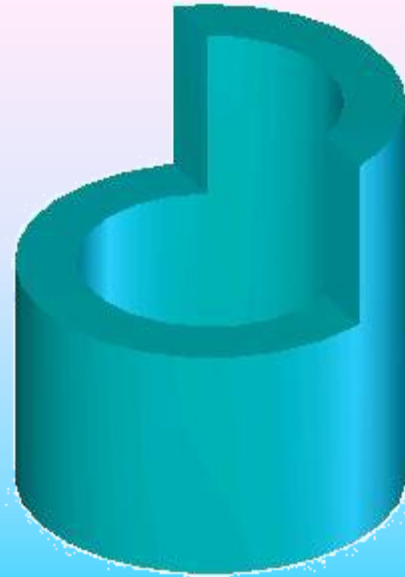
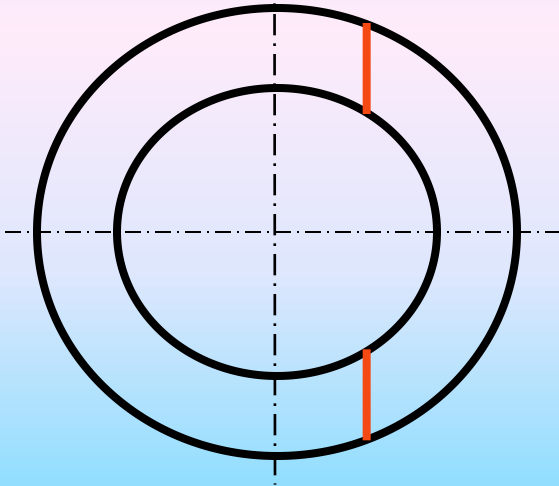
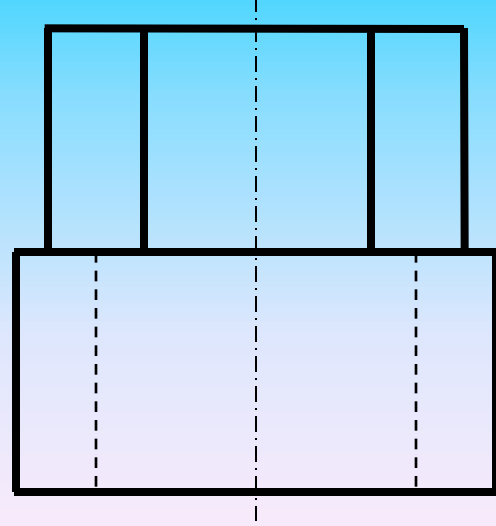
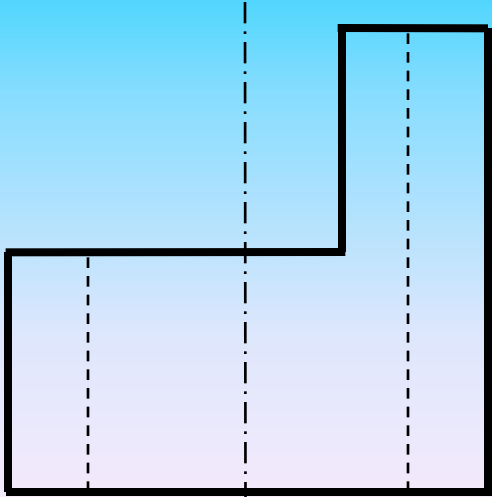
★利用积聚性求截交线

★分析圆柱体轮廓素线的投影

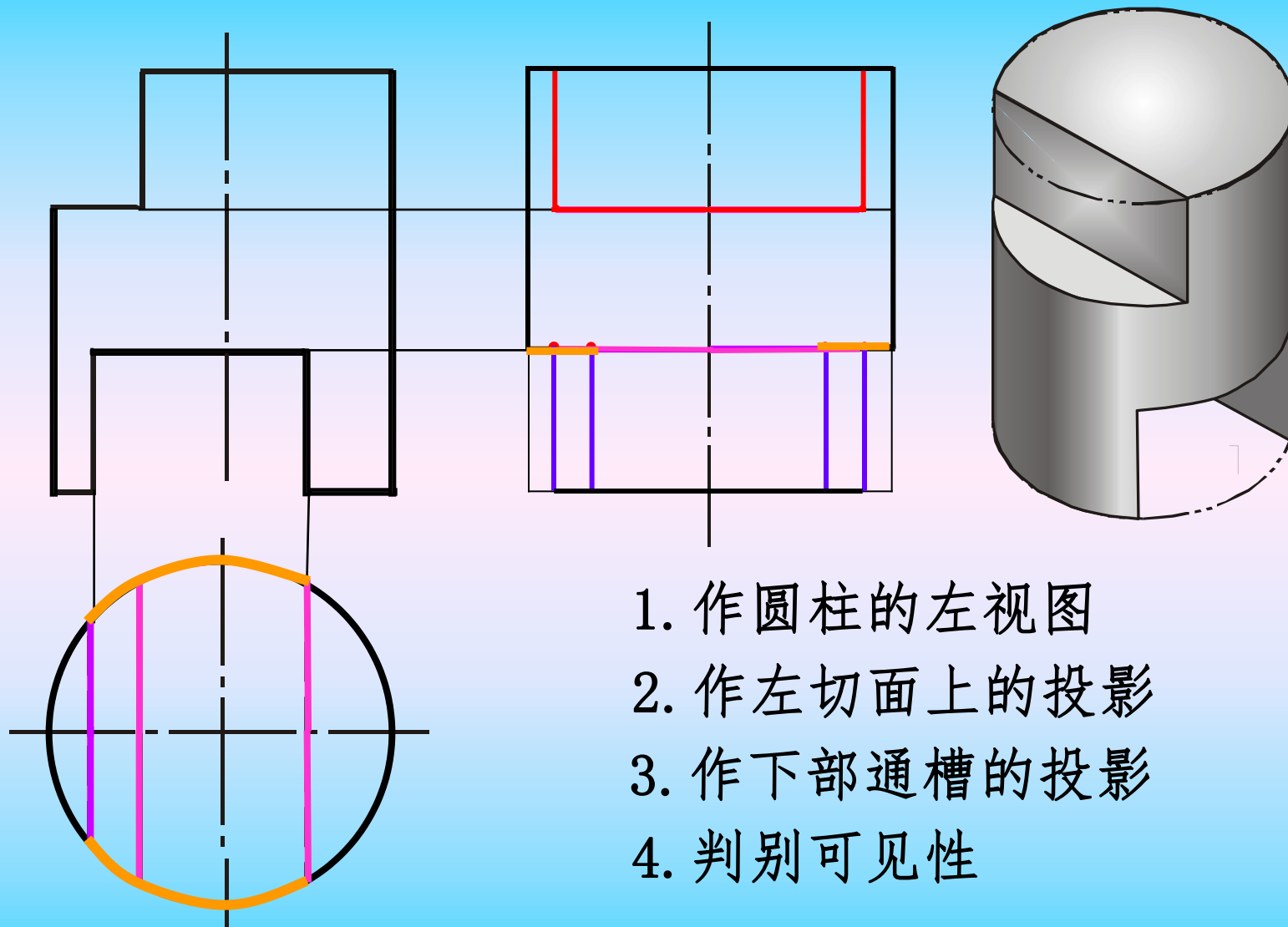


例5：求左视图

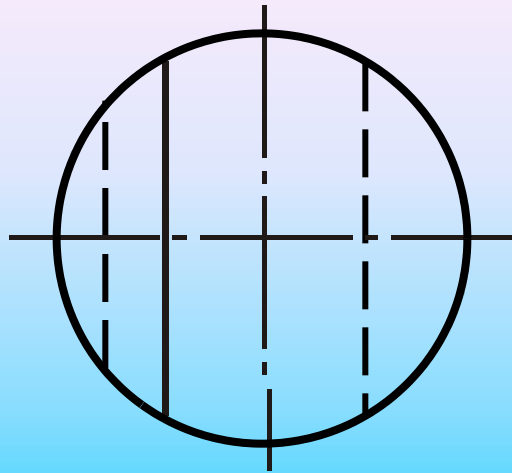
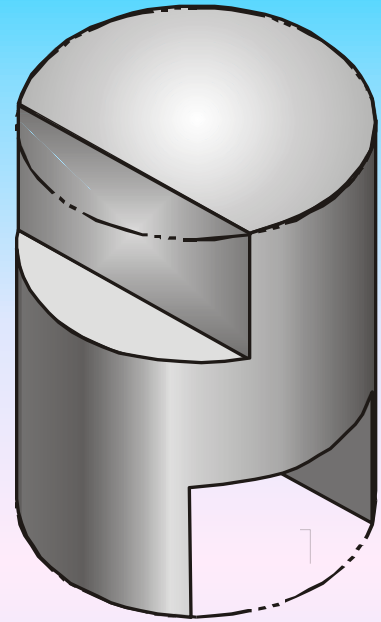
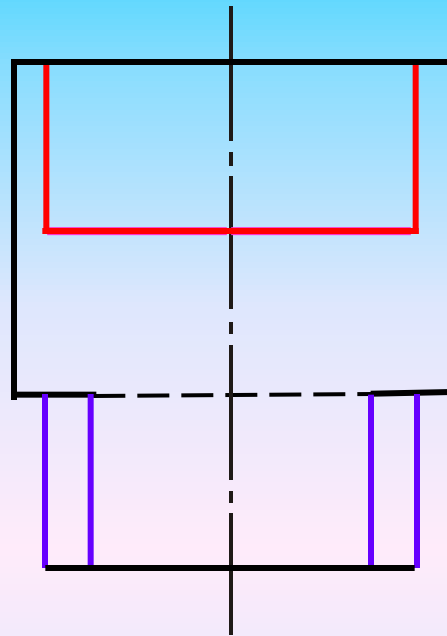
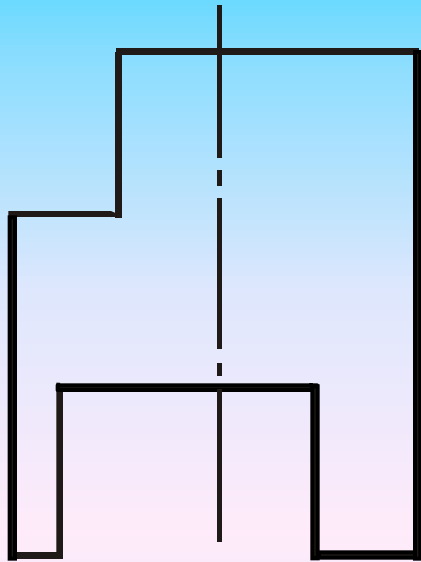




例6: 补画出立体的左视图

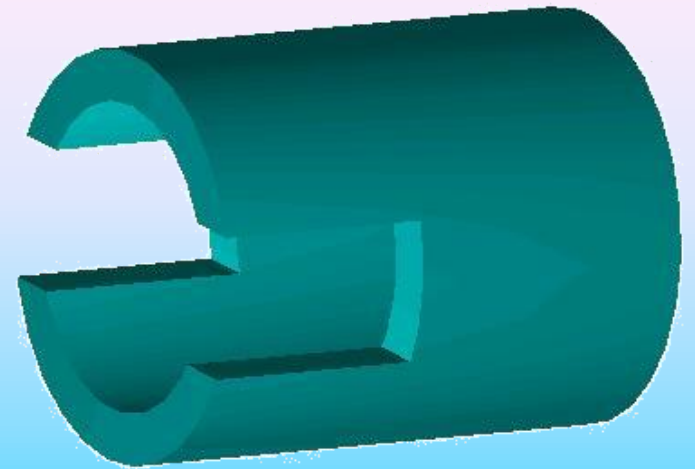
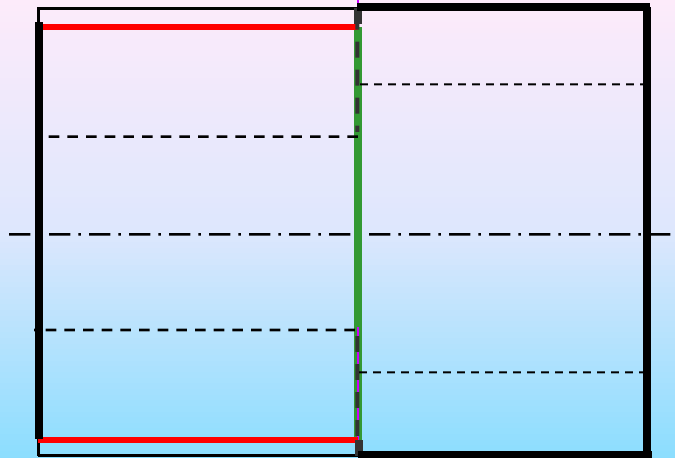
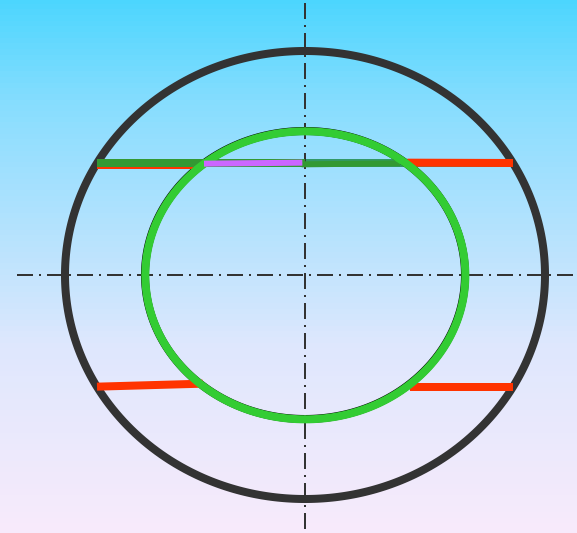
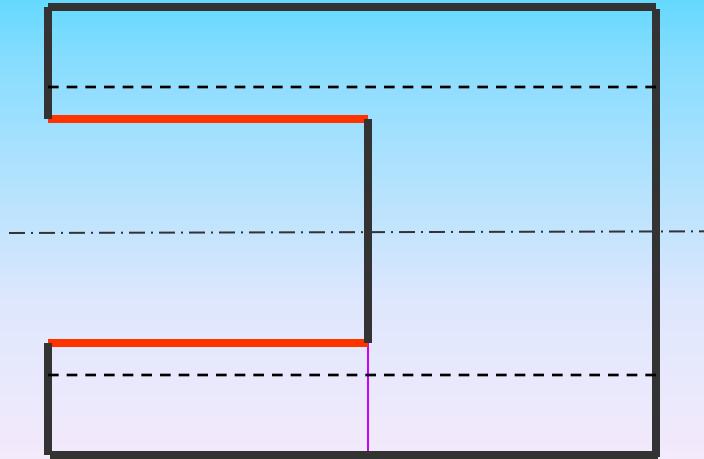


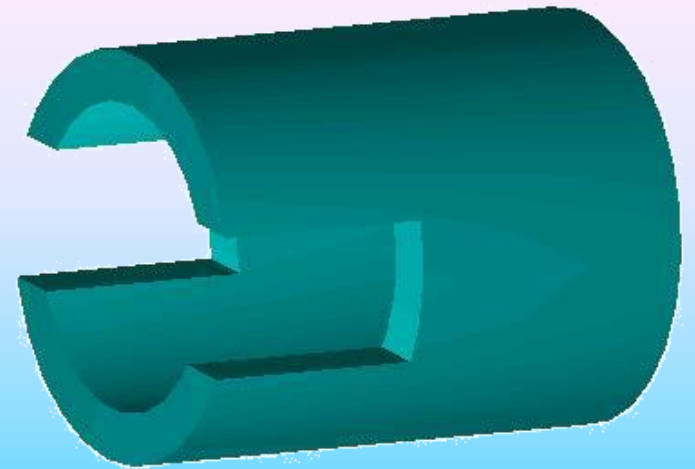
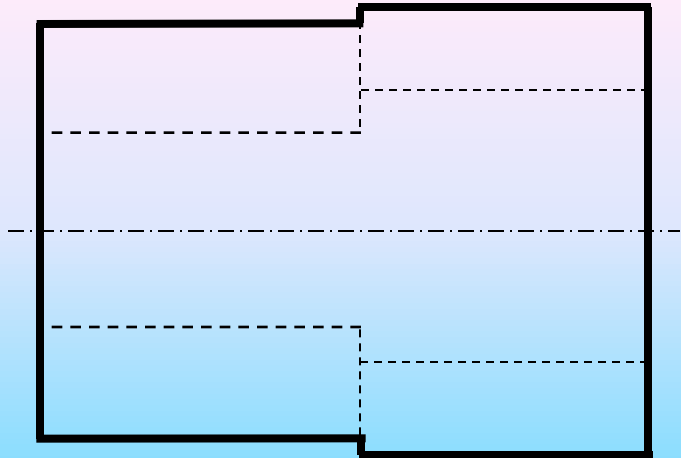
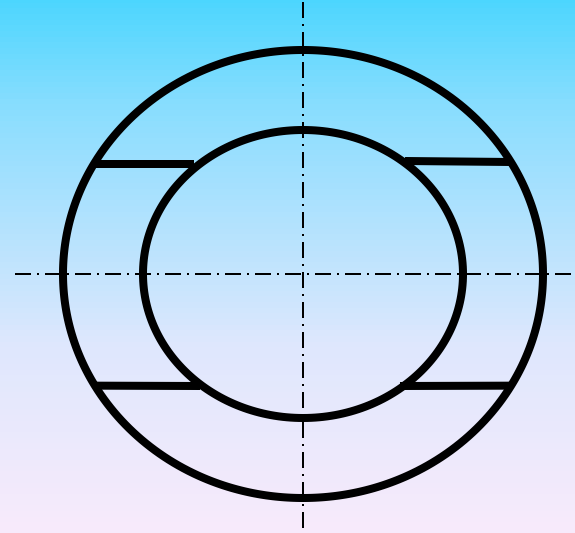
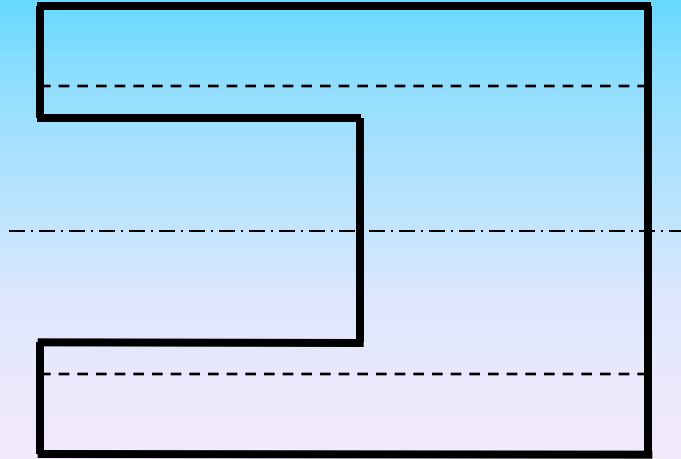
1. 作圆柱的左视图
2. 作左切面上的投影
3. 作下部通槽的投影
4. 判别可见性



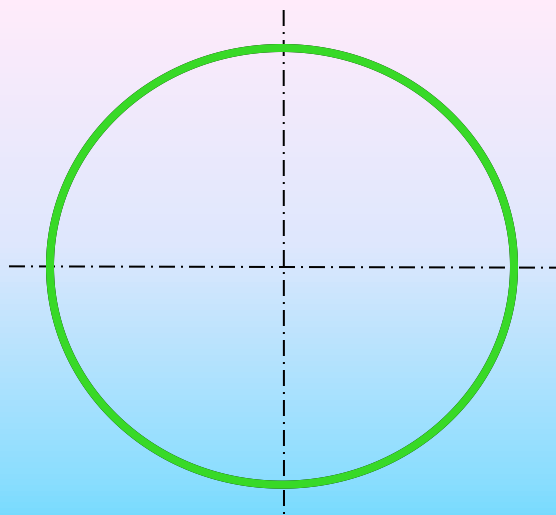
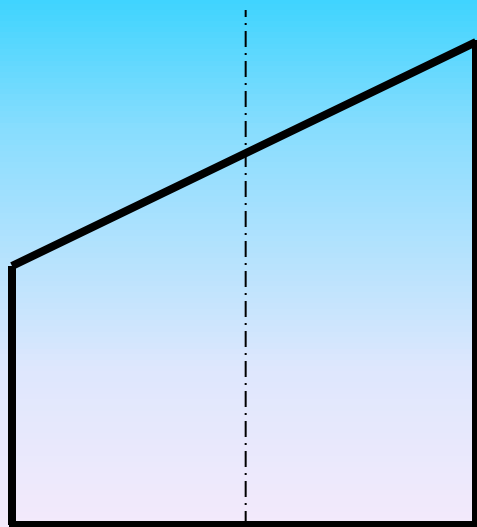
5. 整理并擦除多余的线，
完成作图。

例7：求俯视图





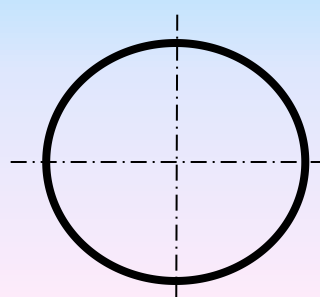
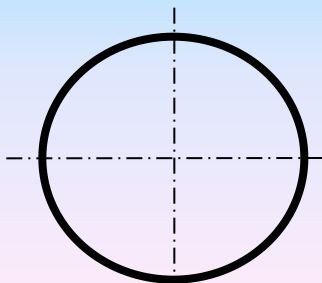
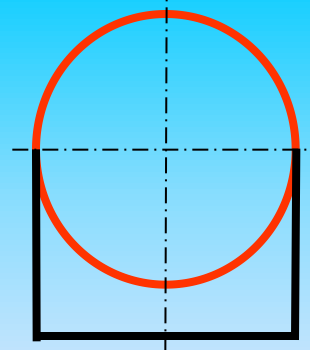
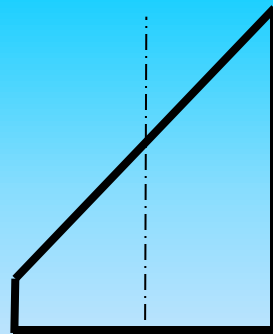
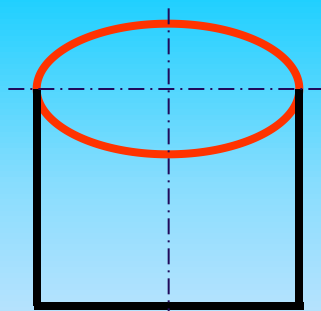
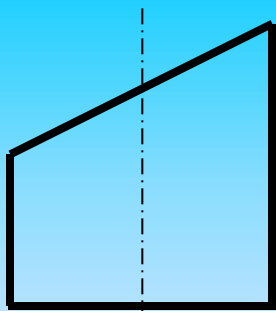
例8：求左视图



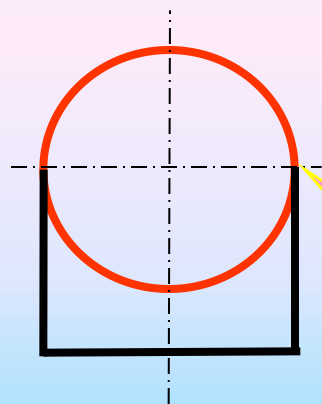
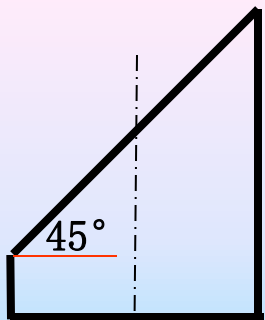
截交线的空间形状是怎样的？

截交线的已知投影呢？

截交线的侧面投影
是什么形状？

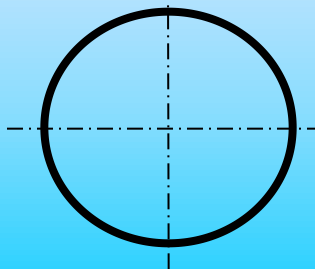


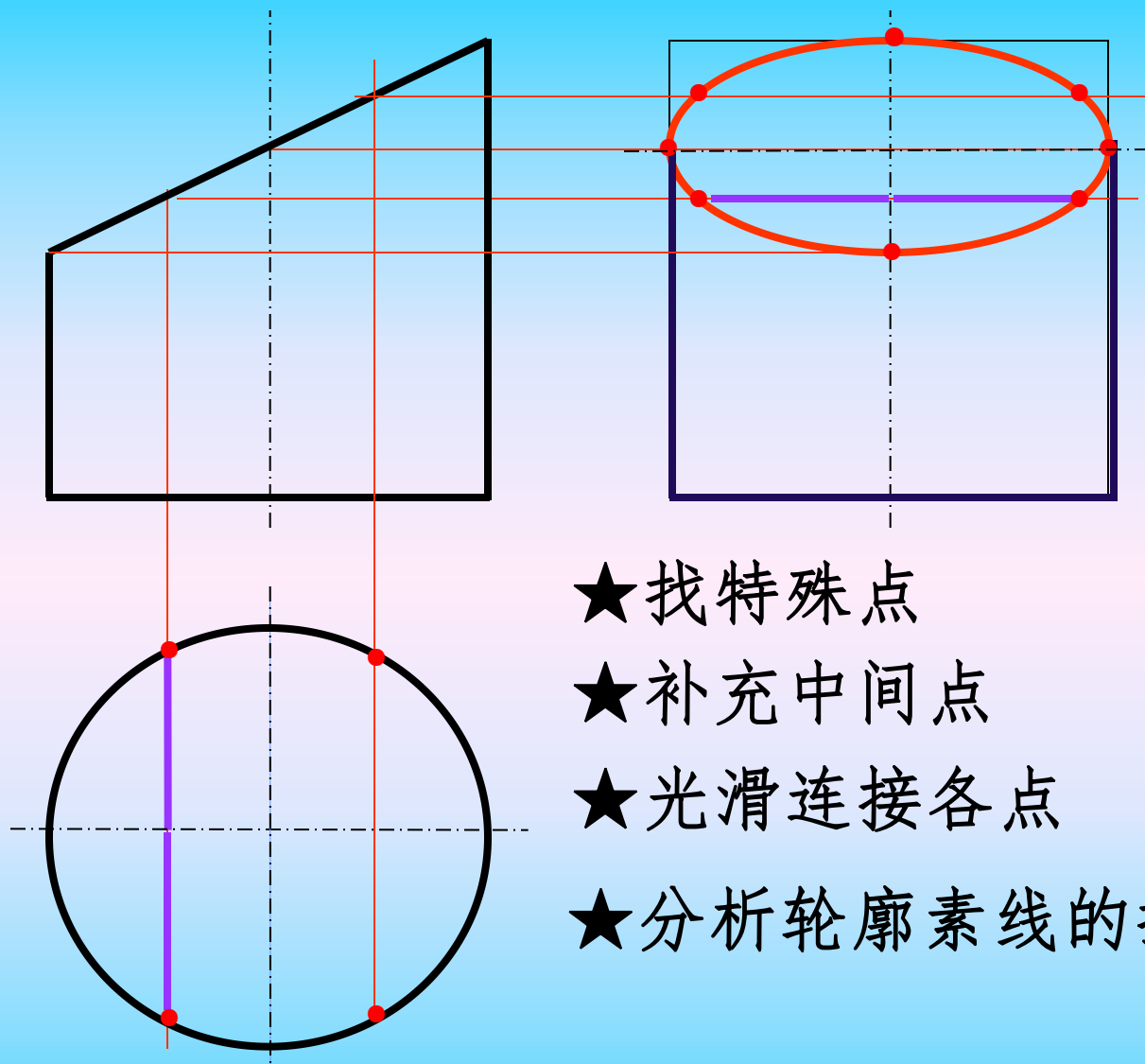
椭圆的长、短轴随截平面与圆柱轴线夹角的变而改变。



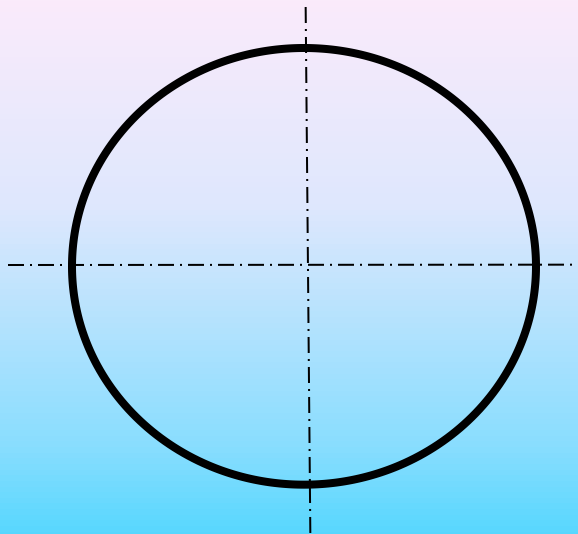
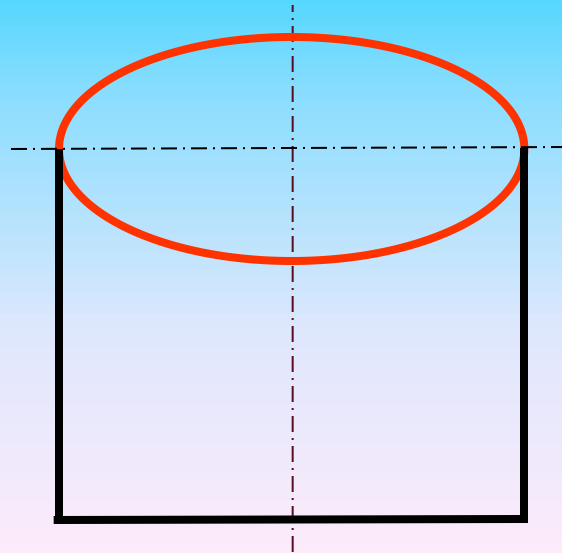
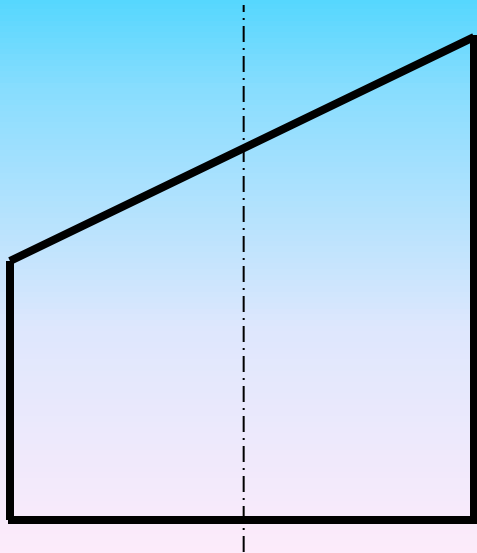
什么情况下投影为圆呢？

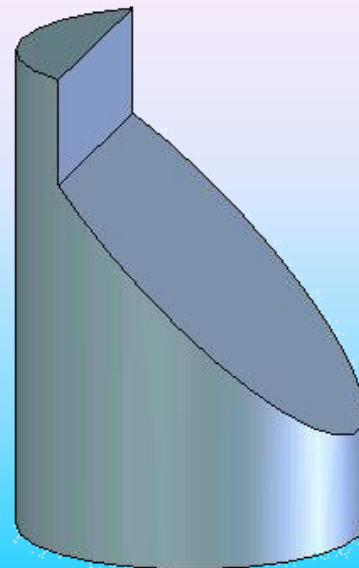
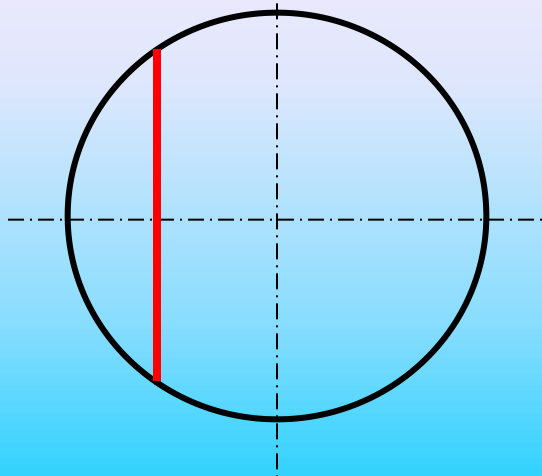
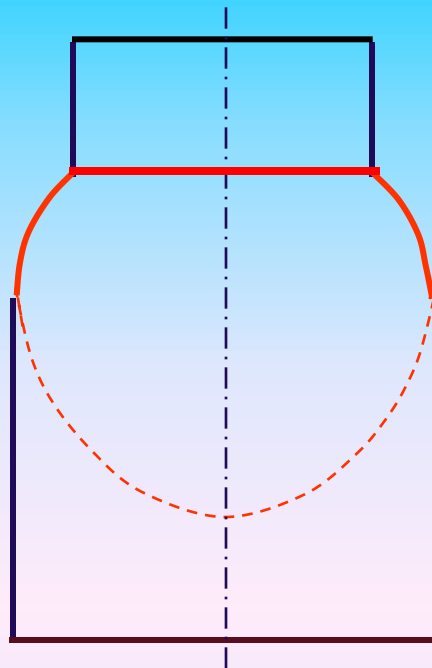
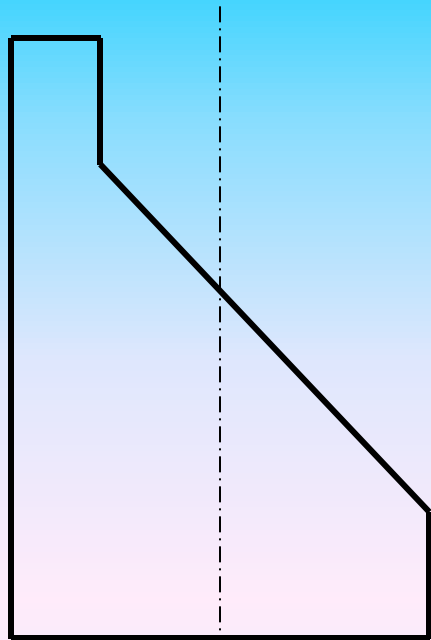
截平面与轴线成 45° 夹角时



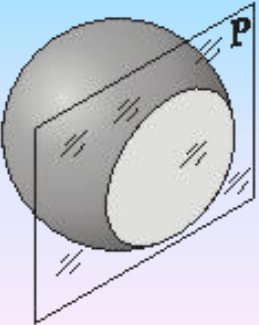
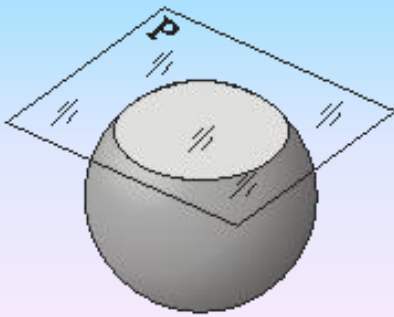
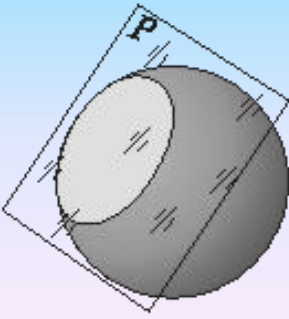
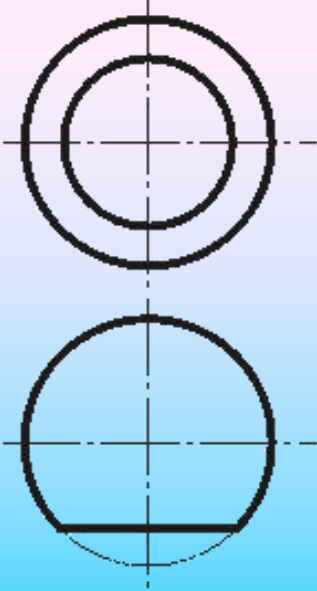
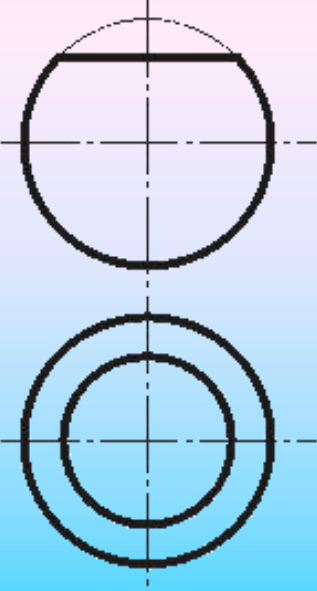
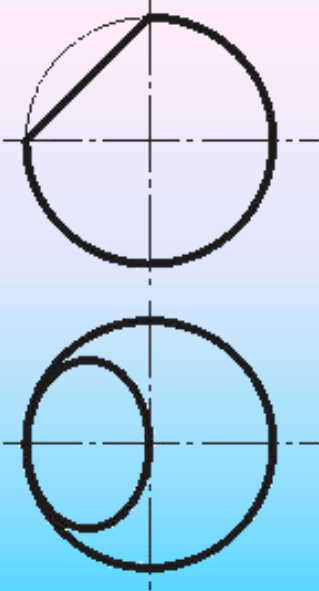


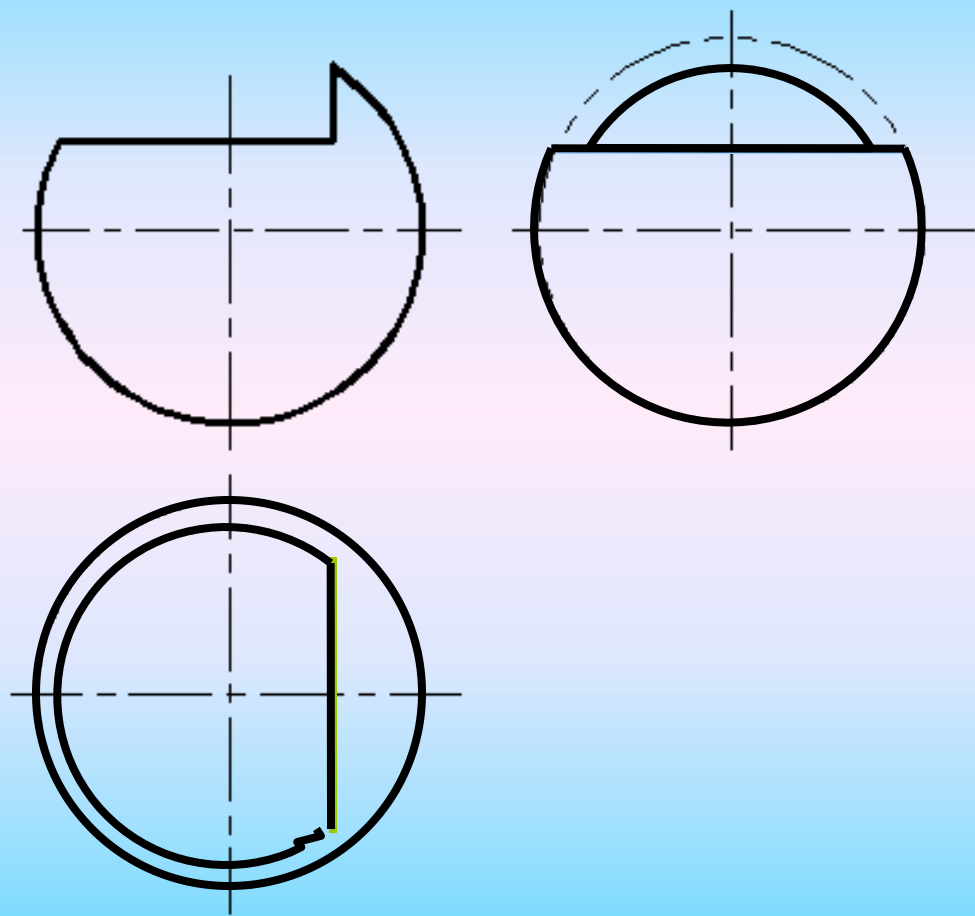
- ★找特殊点
- ★补充中间点
- ★光滑连接各点
- ★分析轮廓素线的投影



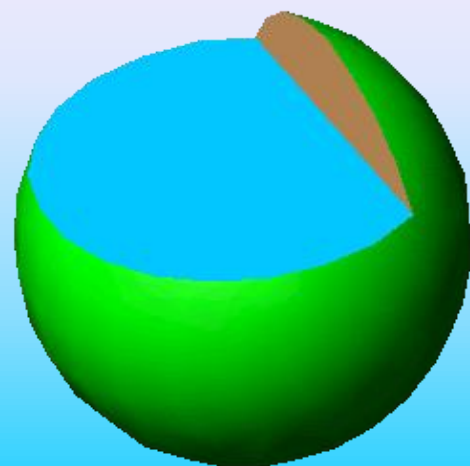


(三) 球体的截切

截平面位置	与V面平行	与H面平行	与V面垂直
轴测图			
投影图			

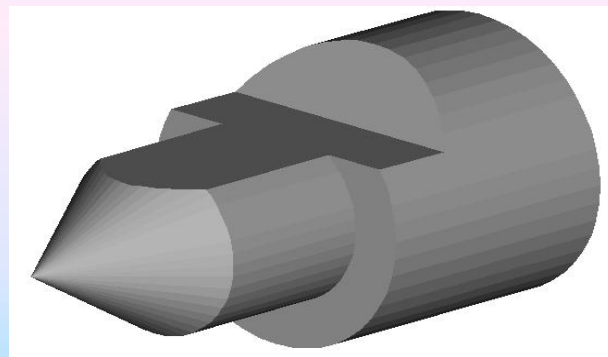
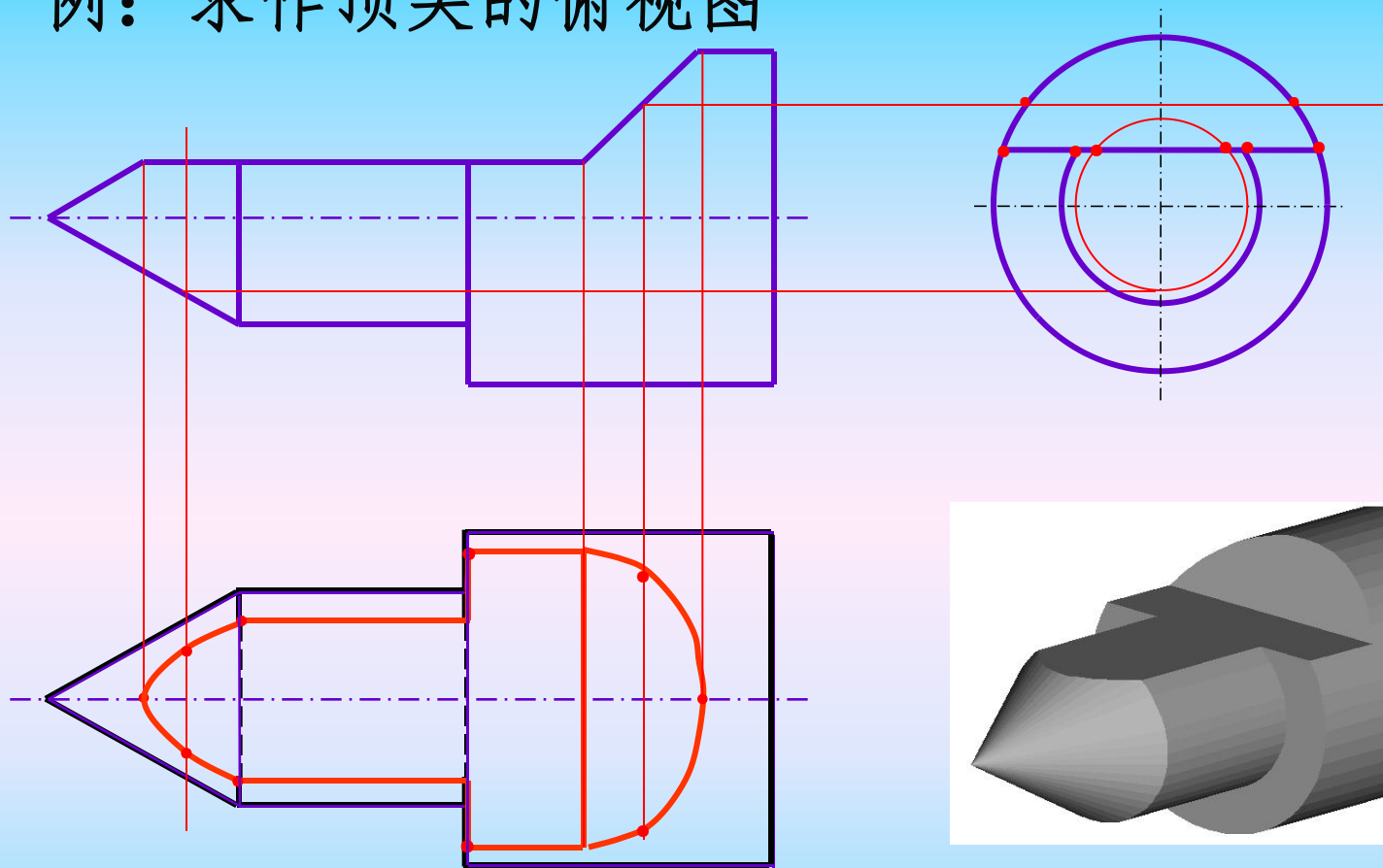


分析:球面被侧平面截切,侧面投影为圆;
球面被水平面截切,水平面投影为圆。



(四) 复合回转体的截切

例：求作顶尖的俯视图



1. 分析复合回转体由哪些基本回转体组成以及它们的连接关系。
2. 分别求出这些基本回转体的截交线，并依次将其连接。

