

請用”放映(或按F5)”模式觀看

13.9 線條之意義

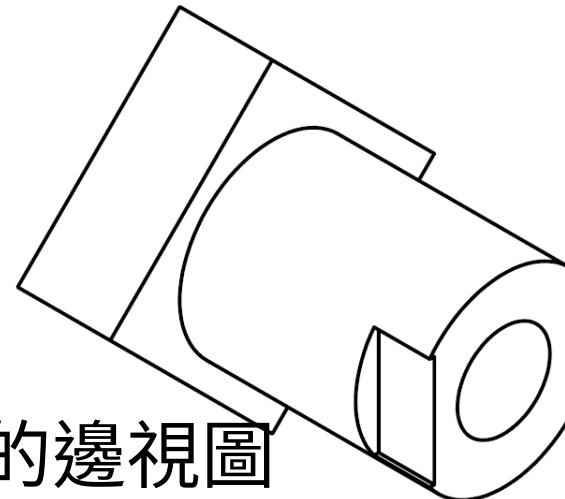
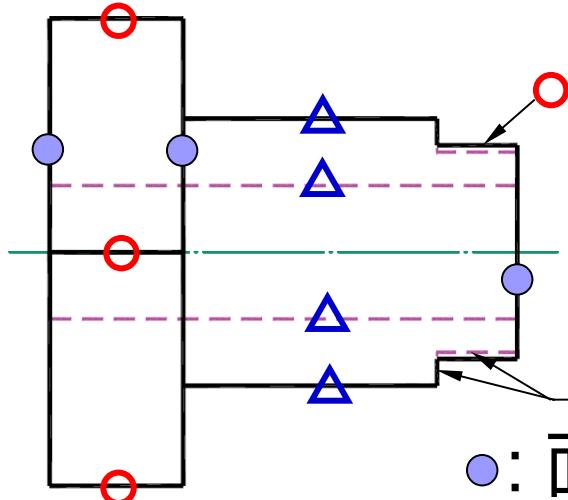
- 在正投影視圖中，用線條表現物體之輪廓外型。
- 若由觀察的方向可見該輪廓外型，則以粗實線表示。
- 位於內部之輪廓或由觀察的方向無法看到之輪廓，則以虛線表示。
- 表示物體輪廓的線條可能代表不同的意義，線條的意義分成三種。

線條的意義分成三種

- **面的邊視圖**：若一平面（或曲面）與投影面垂直，則其投影成為一直線（或一曲線），稱此線為面之邊視圖。
- **面的交線**：平面或曲面之間的交線。
- **面的極限**：圓滑曲面本身無線，在曲面最極限的位置亦須用線表示。

圖 13.31 線條之意義

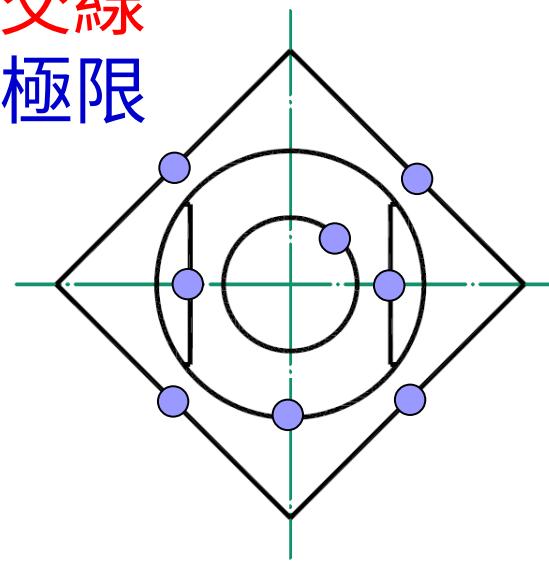
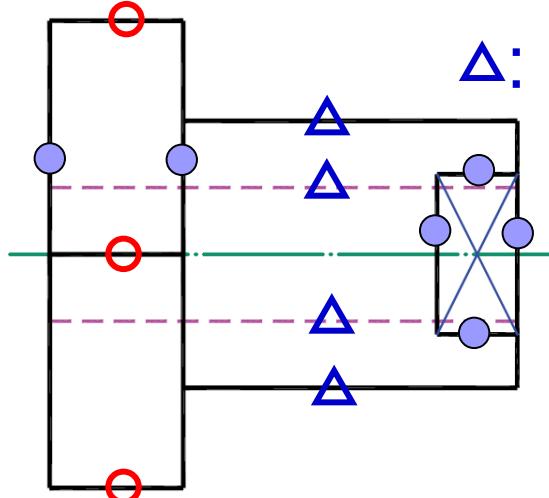
CAD圖



●: 面的邊視圖

○: 面的交線

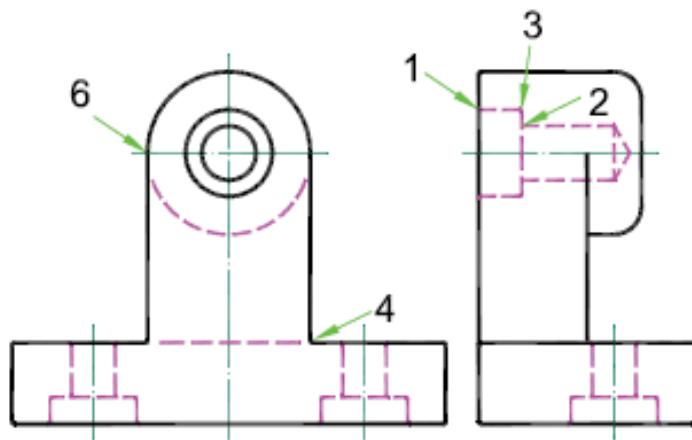
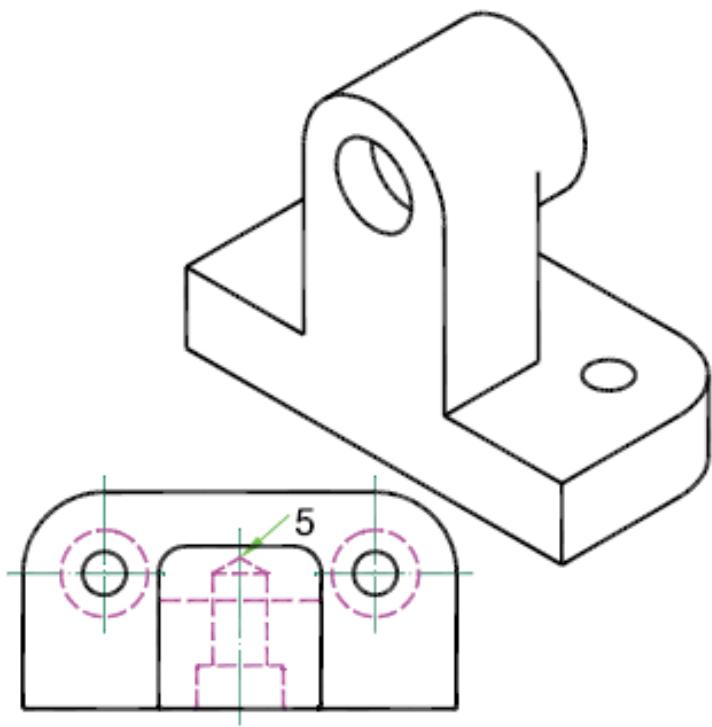
△: 面的極限



視圖中虛線的畫法

- 虛線的粗細約為實線的一半，線段長約為字高 (3mm) ，並儘量保持等長，短劃間的間隔約為線段之 $1/3$ 。
- 虛線若為實線的延續，須於連接點處先留約 1mm 再畫出。
- 數條虛線之端點交於一點時，端點處不留空隙。
- 兩虛線垂直相交時，端點處不留空隙。
- 兩虛線若互相平行且非常靠近時，其短劃應錯開畫。

(詳細畫法見第三
章)



CAD
圖

	1	2	3
正確			
錯誤			
	4	5	6
正確			
錯誤			
	7	8	9
正確			
錯誤			

視圖中中心線的畫法 -1/7

- 凡是對稱的特徵，例如圓柱、圓孔、圓錐、球體等，須於每一中心位置繪出中心線，定出其對稱中心。
- 中心線為一長劃與一短畫相間之細鏈線，短劃約 0.5mm，間隔約 1mm，中心線也可畫成圓弧狀，以表示中心圓的位置。
- 中心線通常畫超出輪廓線外約 3~6 mm。
- 兩視圖間之中心線不可延伸相連，必須中斷，中心線可當延伸線使用，但不可當尺度線使用。

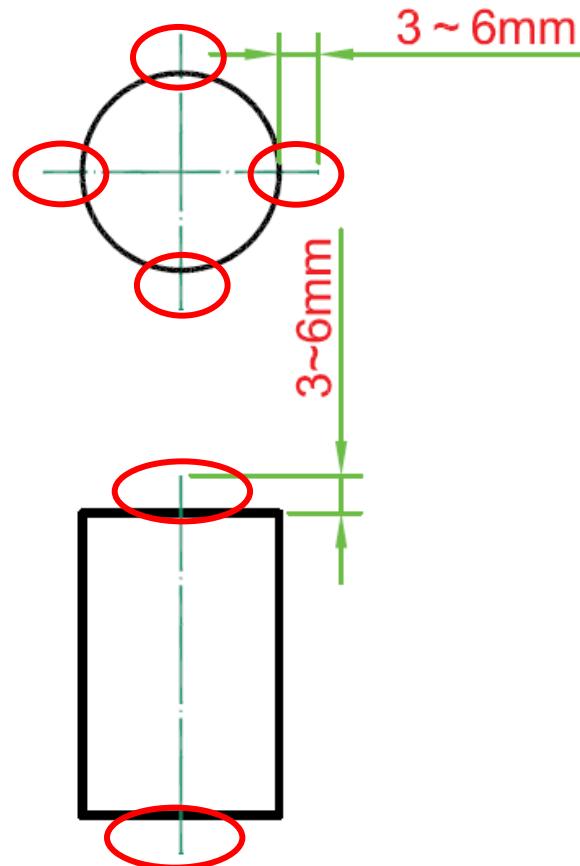
中心線的畫法 -2/7

- 中心線為一長劃與一短畫相間之細鏈線，短劃約 0.5mm ，間隔約 1mm 。



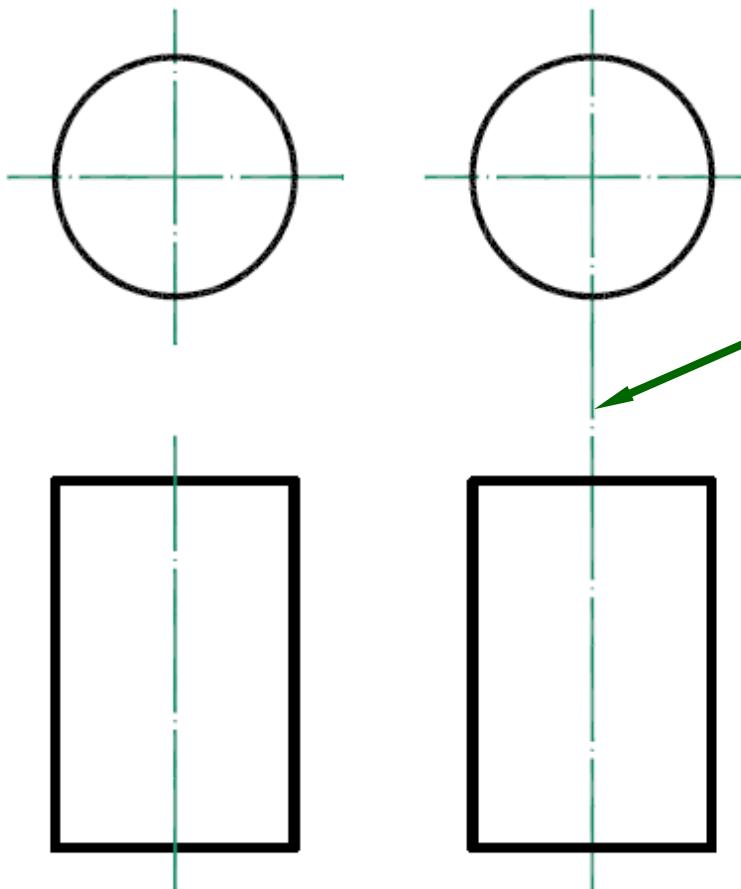
中心線的畫法 -3/7

- 中心線通常畫超出輪廓線外約 3~6 mm 。



中心線的畫法 -4/7

- 兩視圖間之中心線不可延伸相連，必須中斷。



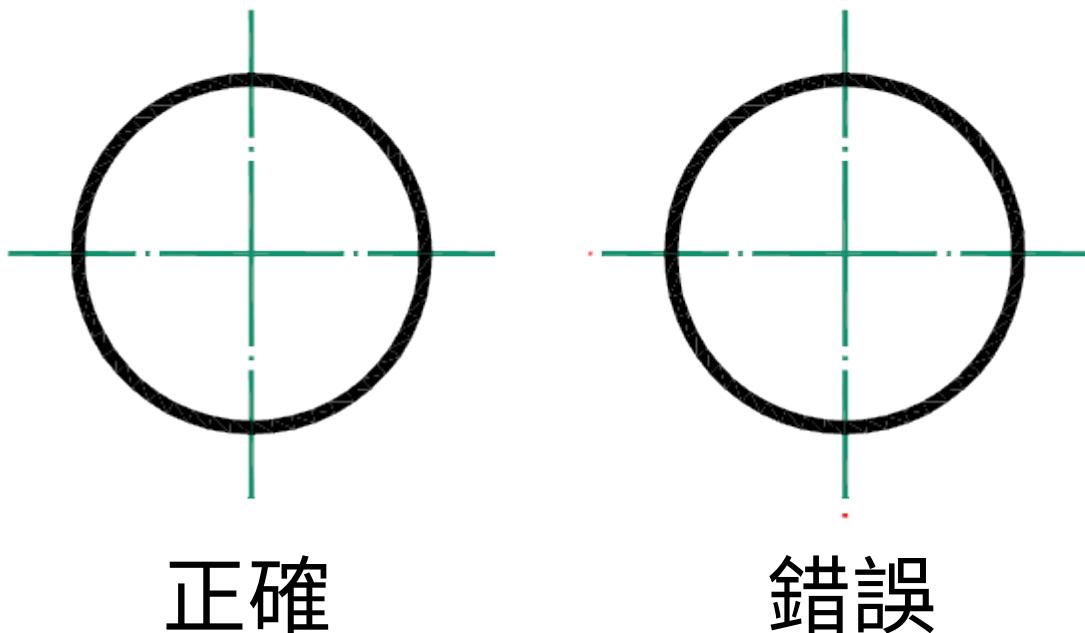
中心線不可延伸相連

正確

錯誤

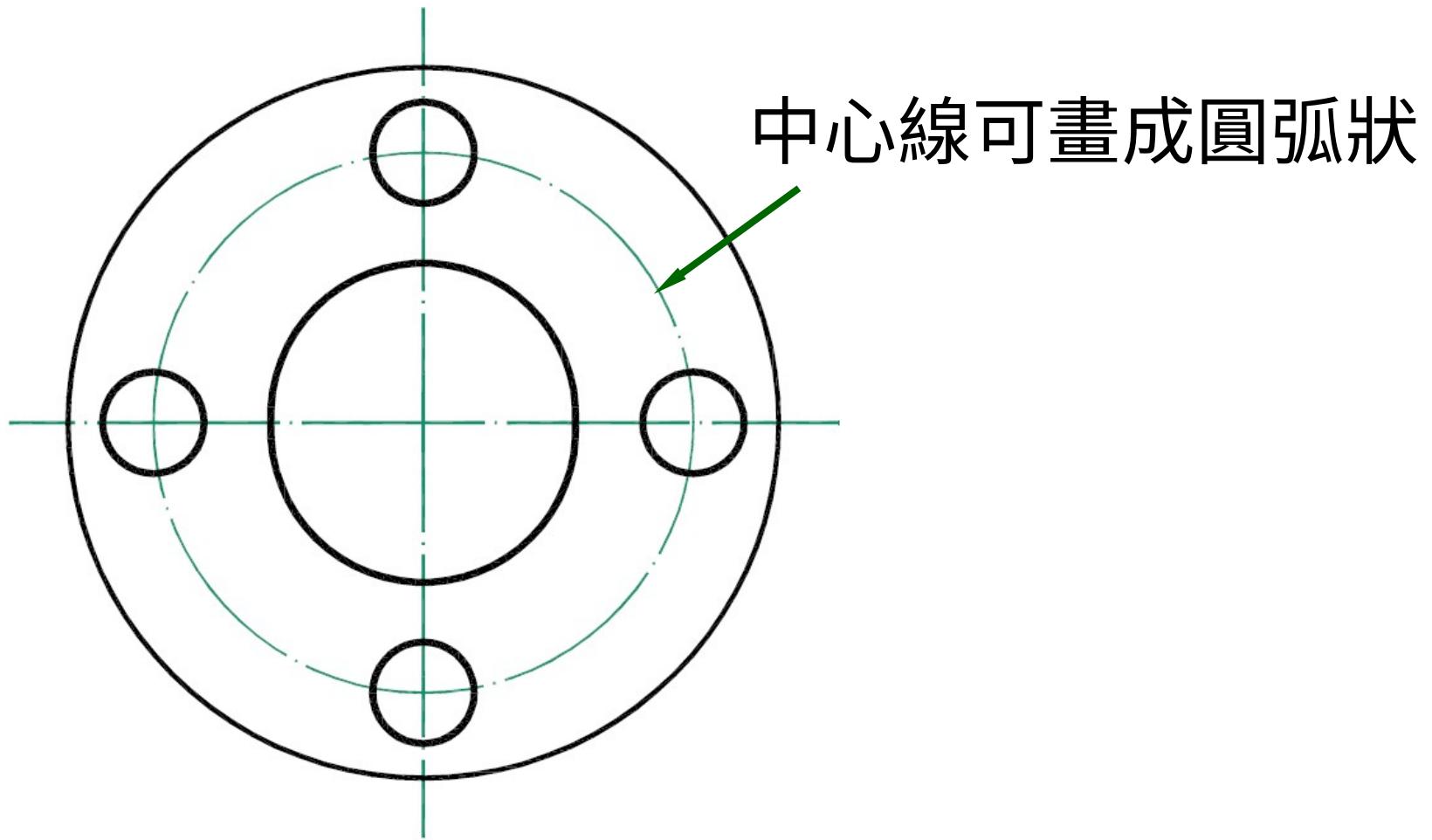
中心線的畫法 -5/7

- 中心線須以長劃結束。



中心線的畫法 -6/7

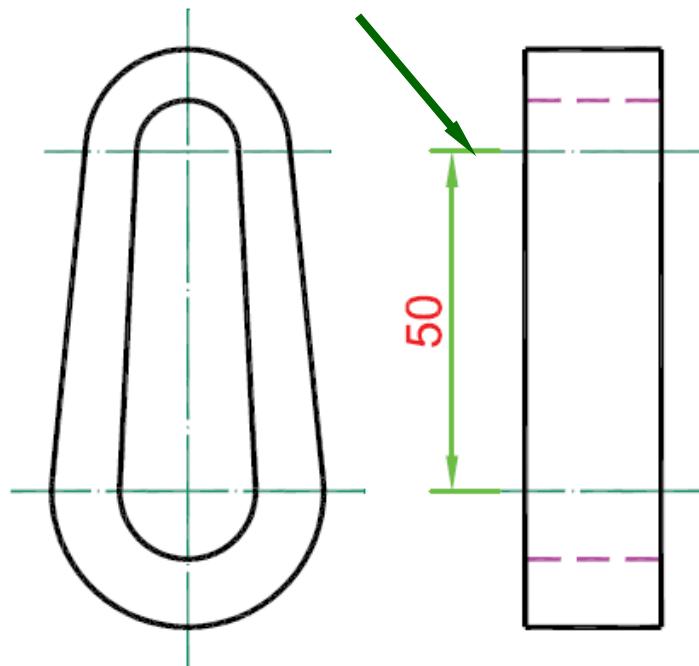
- 中心線也可畫成圓弧狀，以表示中心圓的位置。



中心線的畫法 -7/7

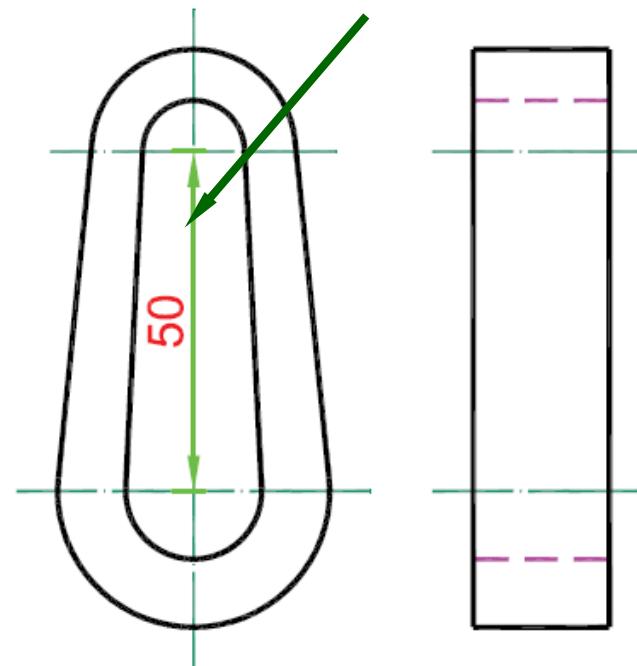
- 中心線可當延伸線使用，但不可當尺度線使用。

中心線可當延伸線使用



正確

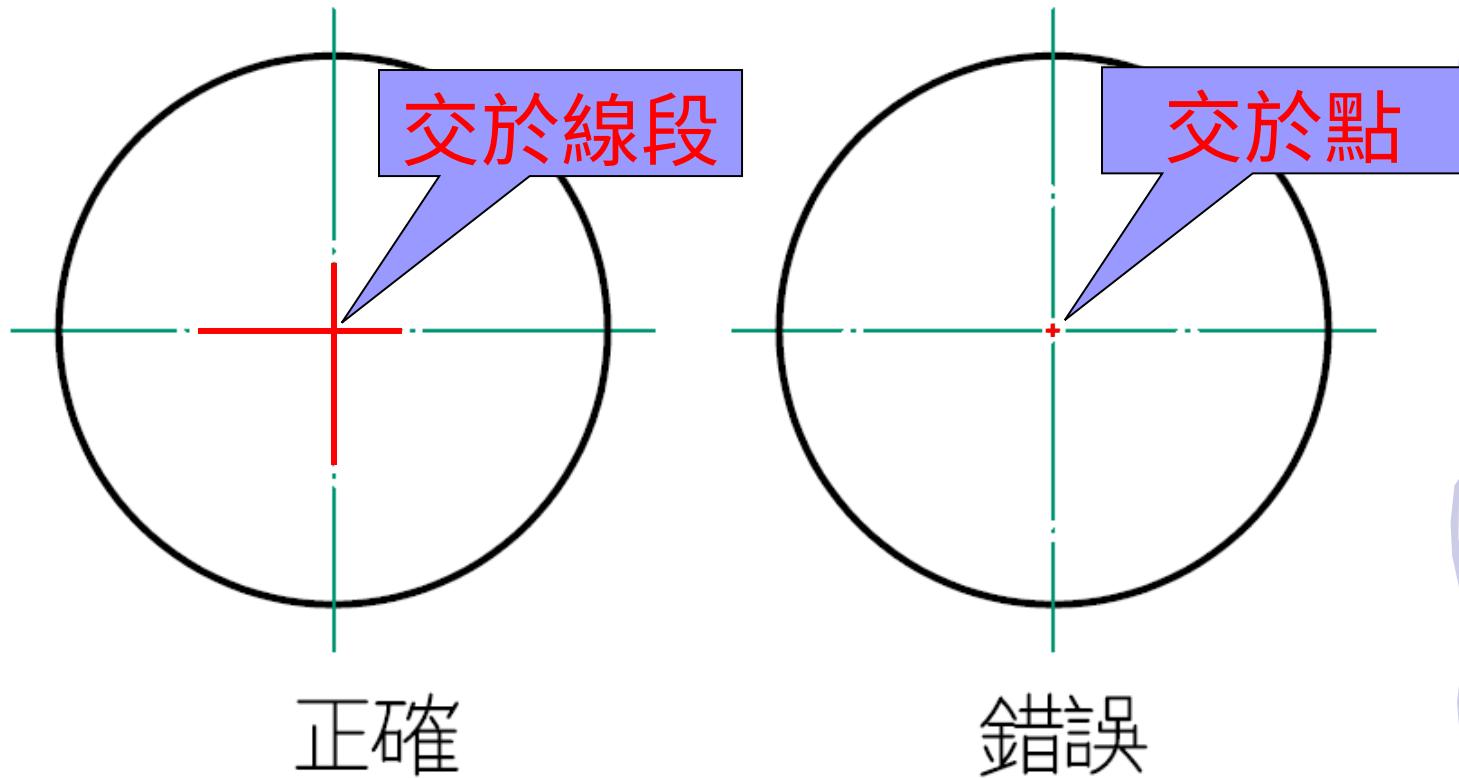
中心線不可當尺度線使用



錯誤

CNS 中心線相交的畫法

中心線畫法——交於線段



CAD圖

(98 年公布標準無此規則)

13.10 線之優先順序

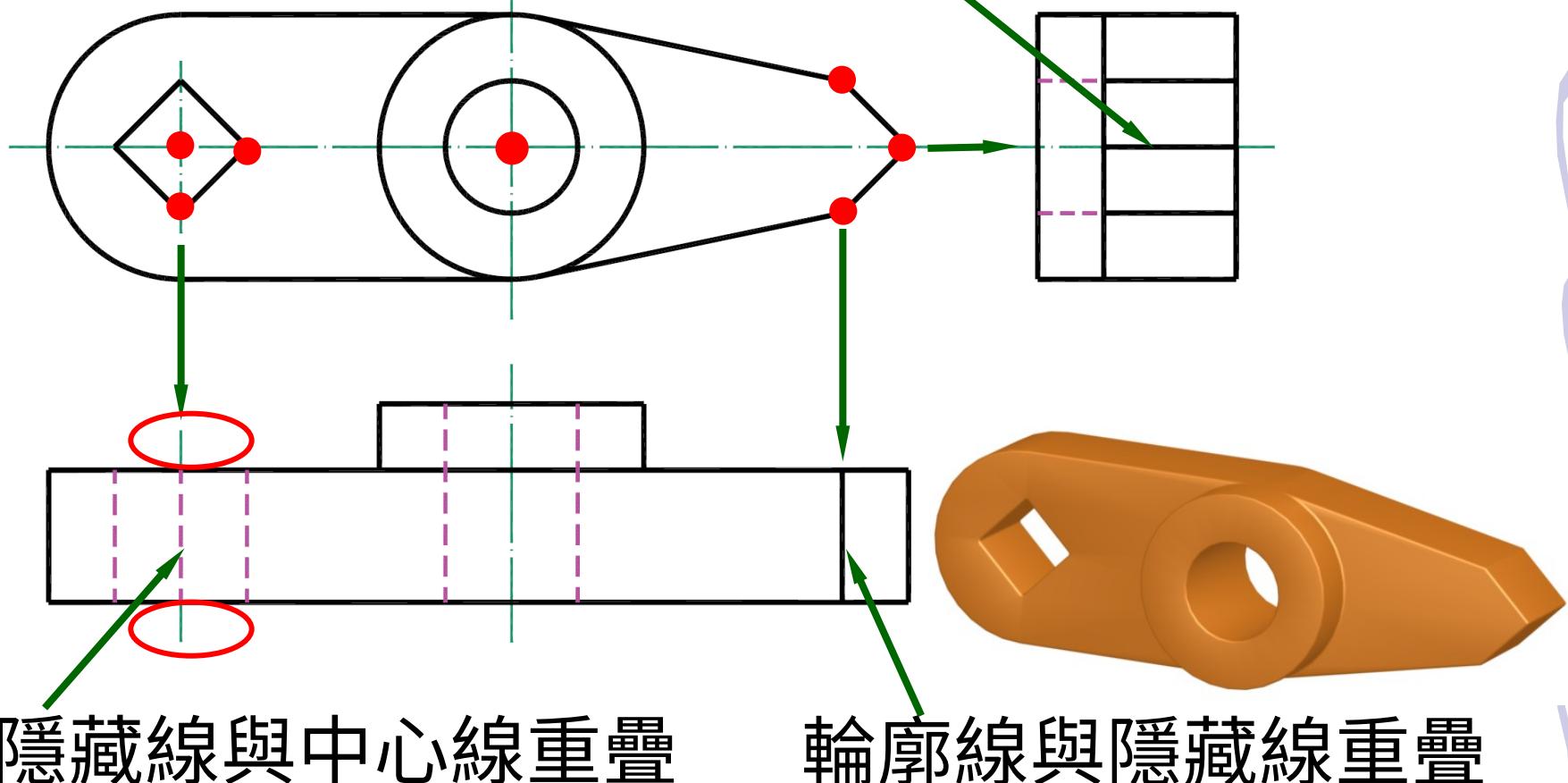
- 在視圖中，實線、虛線、中心線常有重疊的現象發生，無法將各種線同時繪出，此時須依線條之重要性決定以何種線條繪出，稱之為線之優先順序。
- 實線用來描述物體可見之輪廓，對物體形狀之描述最為重要，故**實線為第一優先**。
- 虛線也是用來描述物體形狀，列為第二優先。

線之優先順序

- 中心線與剖面線重疊時，視讀圖之方便性決定其優先次序，其他各類之線條優先順序如下：
 - 實線。
 - 虛線。
 - 中心線或剖面線。
 - 折斷線。
 - 尺度線、尺度界線。
 - 剖面線。

圖 13.34

輪廓線與隱藏線及中心線重疊

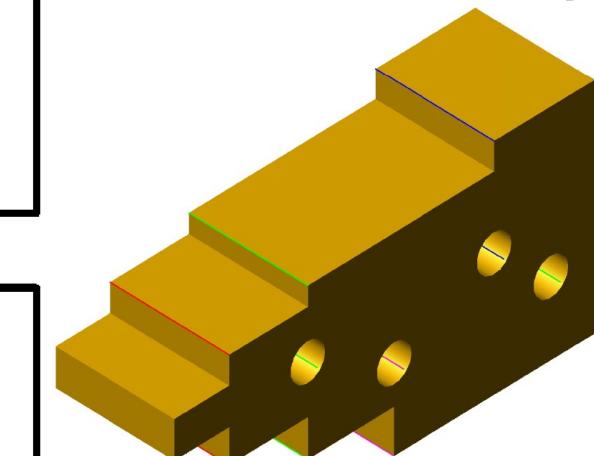
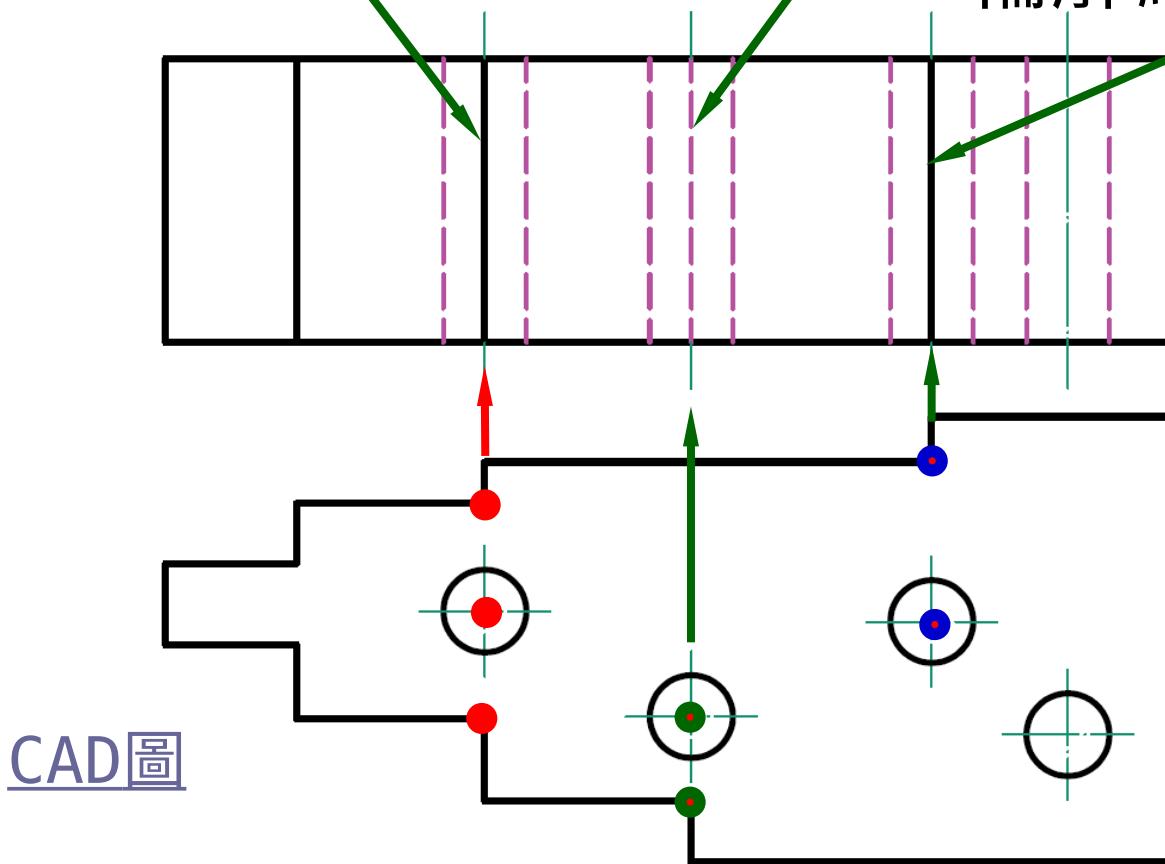


線之優先順序例題

輪廓線，隱藏線，中心線重疊

隱藏線與中心線重疊

輪廓線與中心線重疊

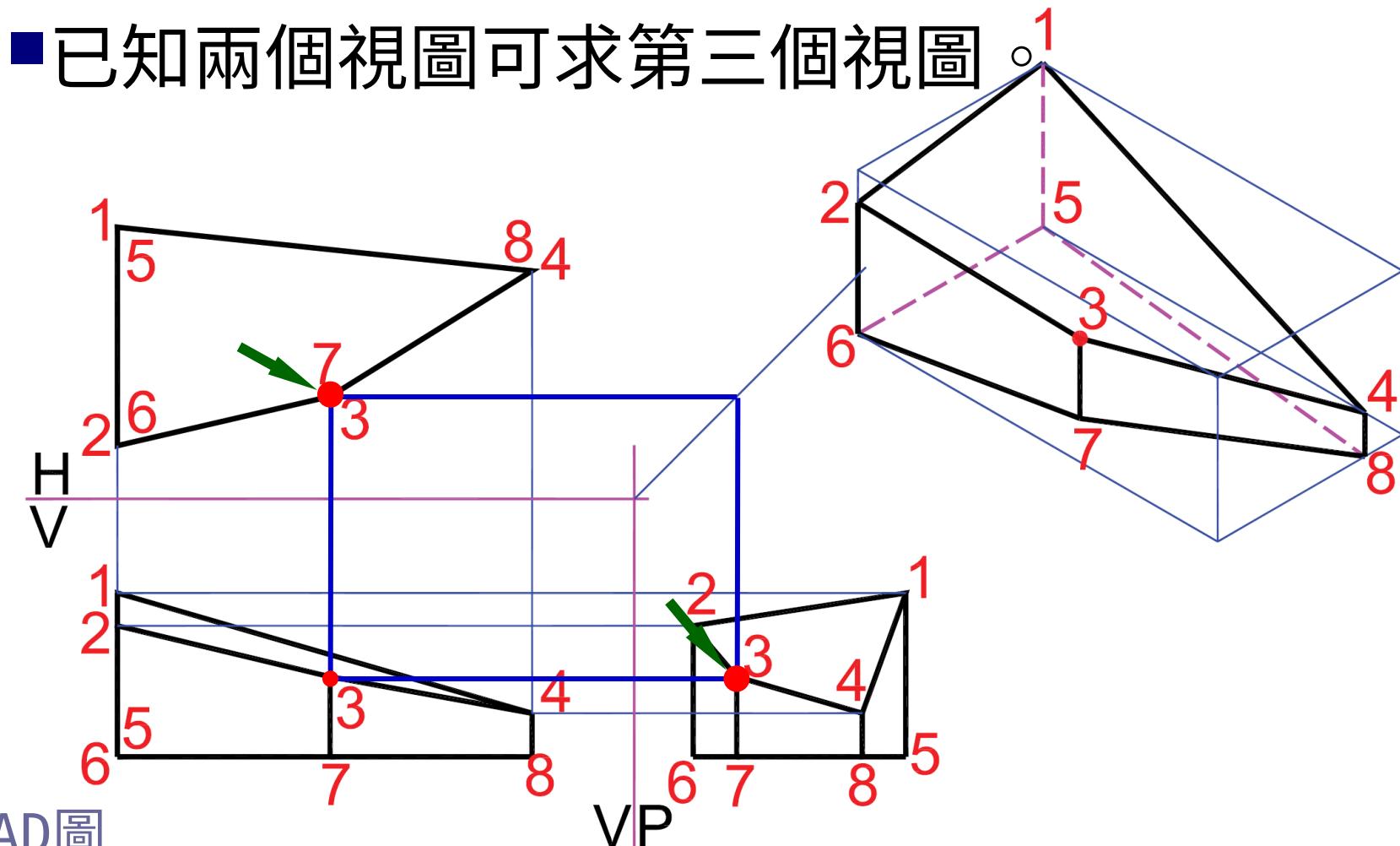


13.11 點、線、面之投影性質

- 任一點之俯視圖與前視圖在同一垂直線上，其前視圖與側視圖則在同一水平線上。
- 若一基準平面與 VP 平行，則點的投影與基準平面的距離在俯視圖及側視圖中兩者相等。
- 利用這些條件，已知其中兩個視圖可求第三個視圖。

圖 13.35 點的投影

- 已知兩個視圖可求第三個視圖。

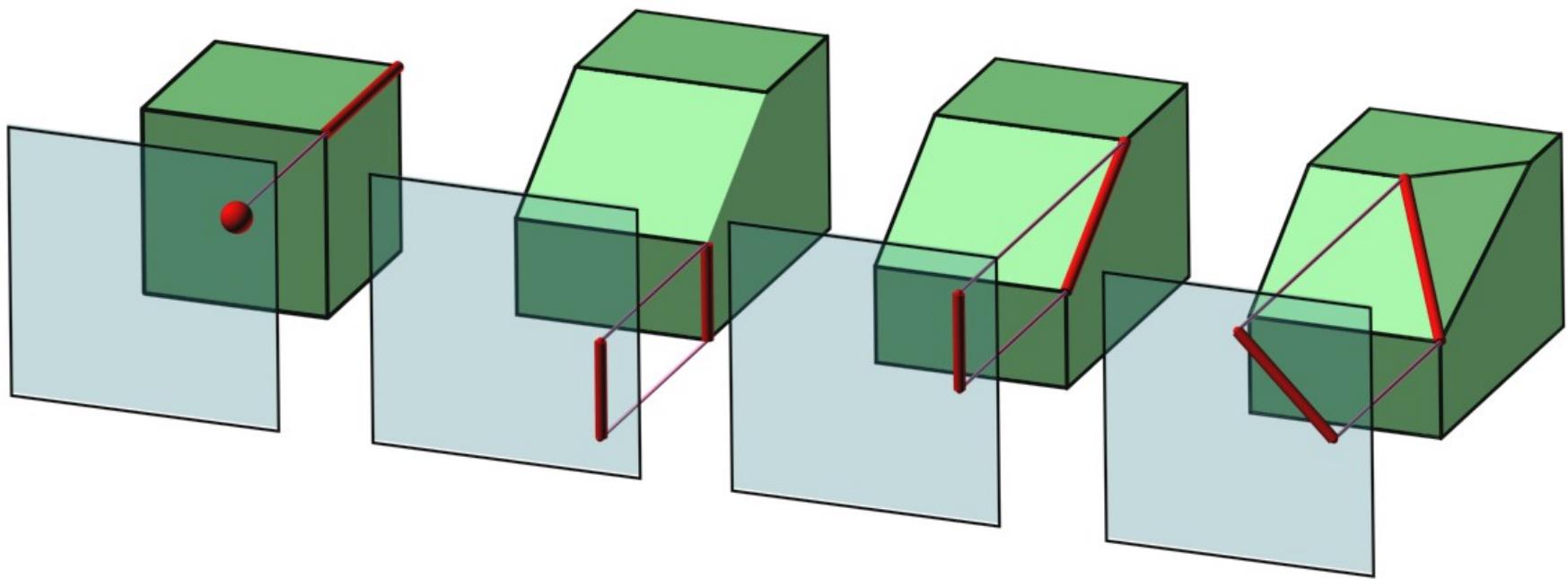


CAD圖

13.11.2 線的投影

- 線的投影是點投影的延伸，連接直線兩端點之投影即可得直線之投影。
 1. 與三個主要投影面之一垂直的直線稱之為**正垂線**。
 2. 直線若與投影面垂直，其投影呈一點，稱之為**端視圖**，正垂線在另兩個投影可顯示實長。
 3. 與三個主要投影面之一平行的直線稱之為**傾斜線** (Inclined Line)。
 4. 直線與三個主要投影面皆不垂直（也不平行）者稱之為**歪斜線**，在三個主要投影面皆顯示縮小之長度。

圖 13.36 線的投影

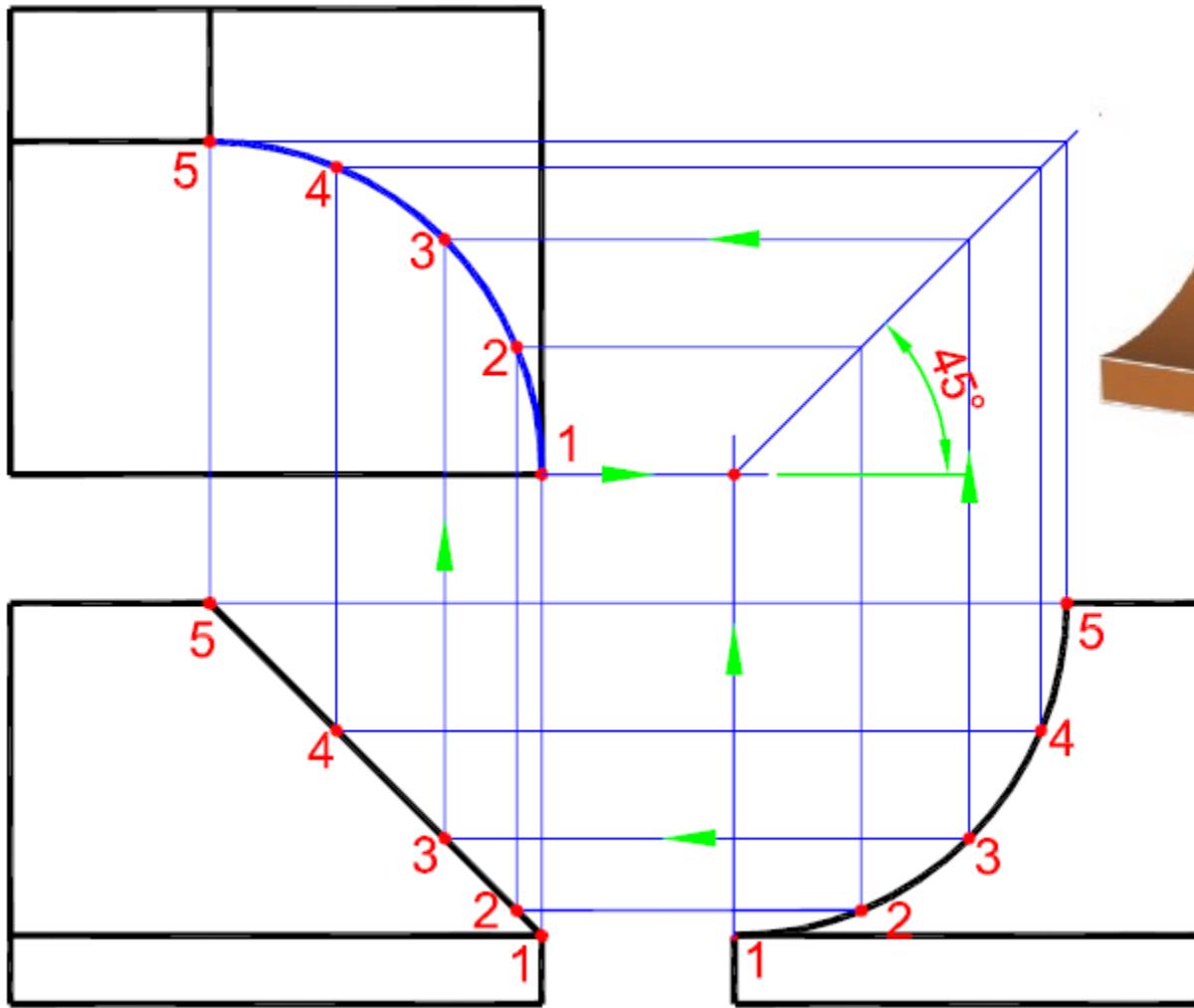


CAD圖

曲線之投影

- 曲線之投影無法以連接其兩端點之投影得之，須在曲線上定若干點，求其個別點之投影，而後以曲線板連接。
- 如圖 13.37 之曲線，可在側視圖作適當之等分，再以求點投影的方法求各點之俯視圖，而後以曲線板連接之，而得其俯視圖。

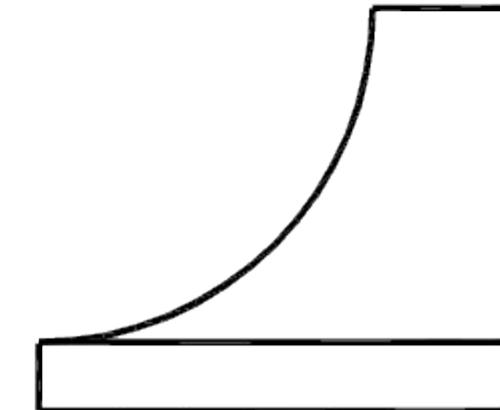
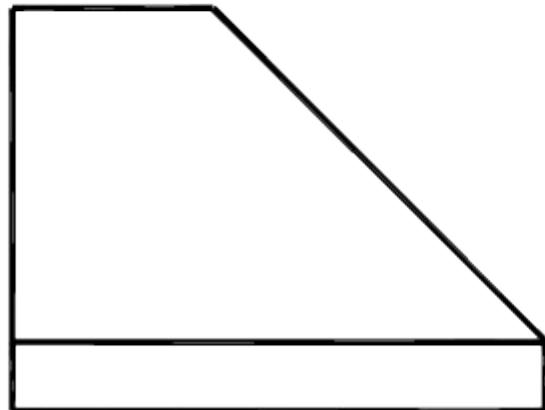
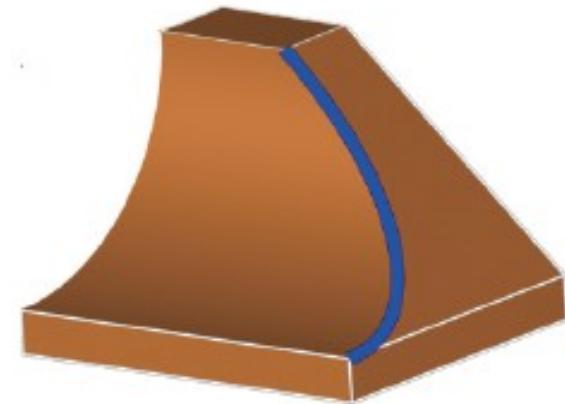
圖 13.37 曲線之投影 -0/8



CAD圖

CAD-AV
I

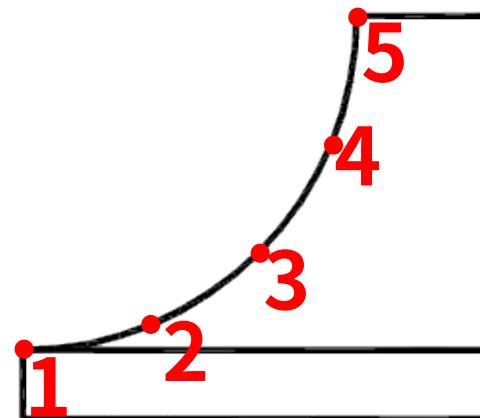
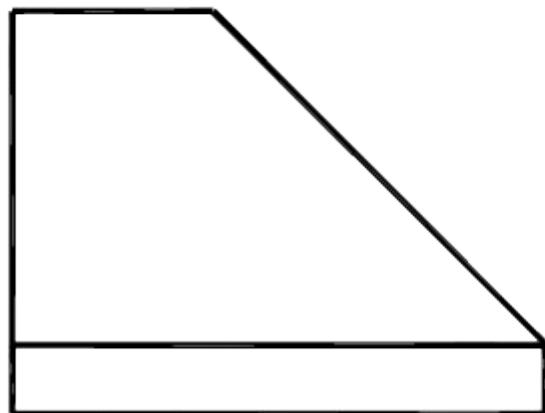
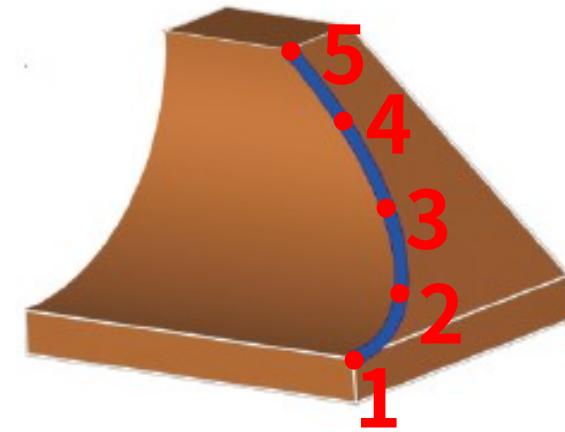
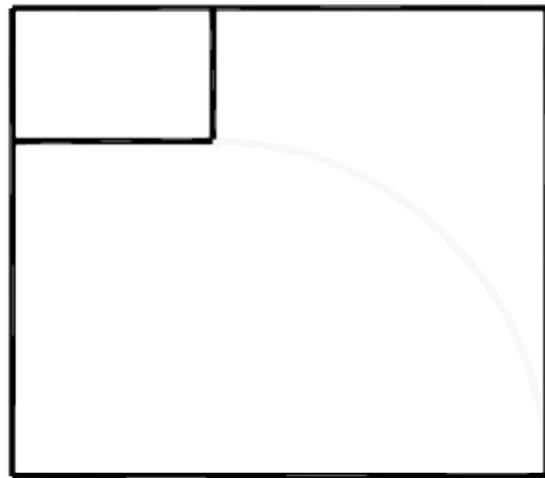
圖 13.37 曲線之投影 -1/8



CAD圖

CAD-AV
I

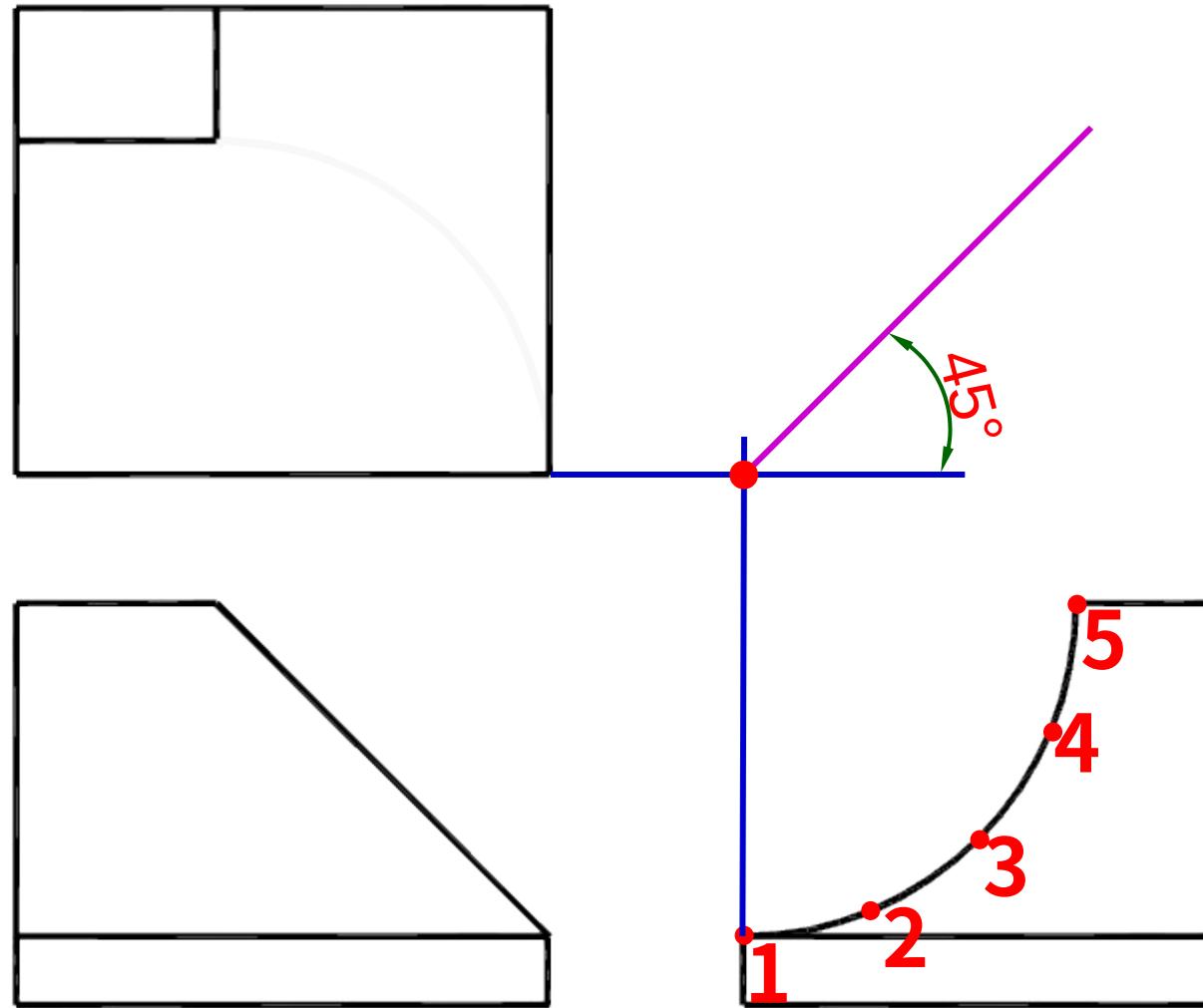
圖 13.37 曲線之投影 -2/8



CAD圖

CAD-AV
I

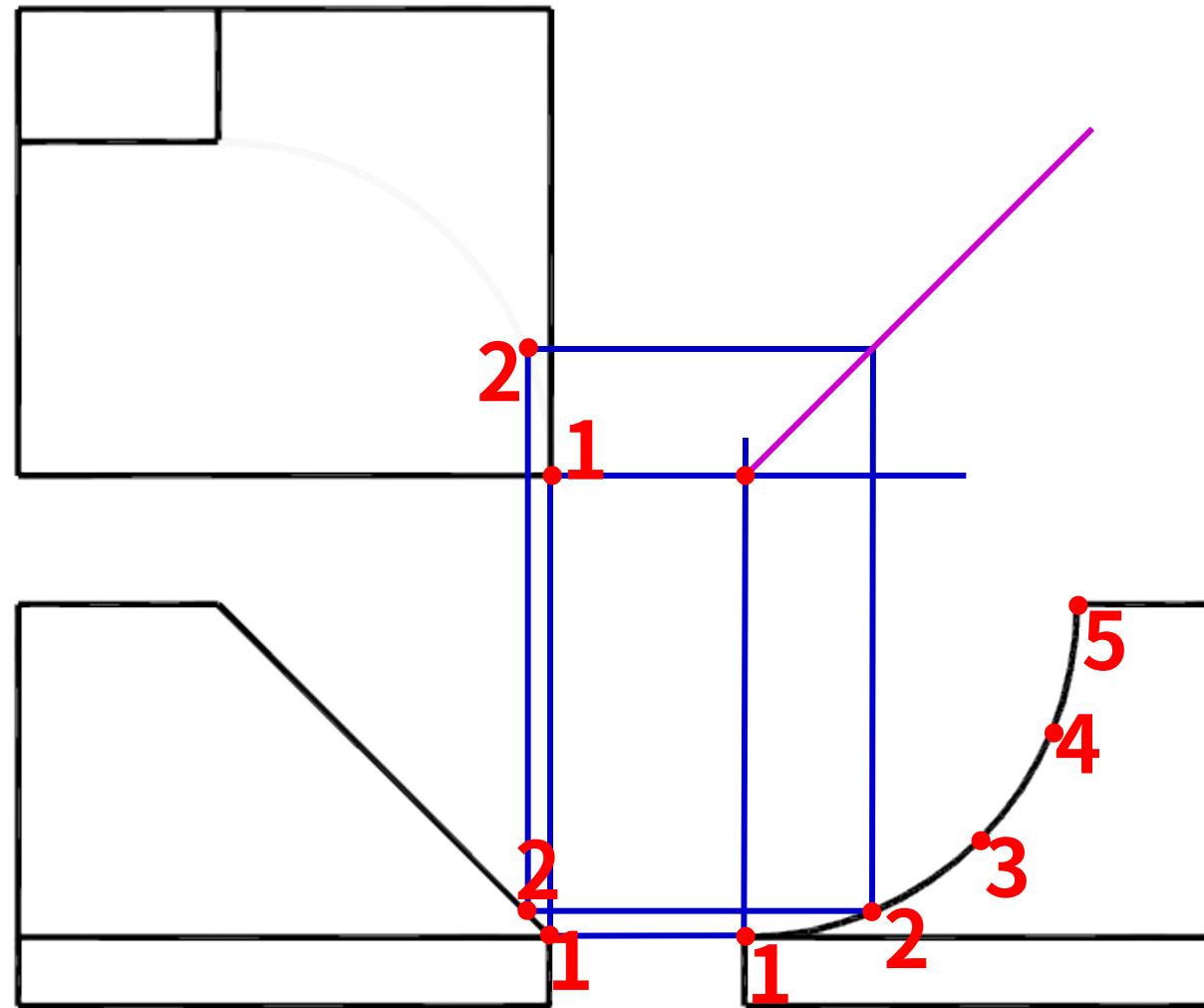
圖 13.37 曲線之投影 -3/8



CAD圖

CAD-AV
I

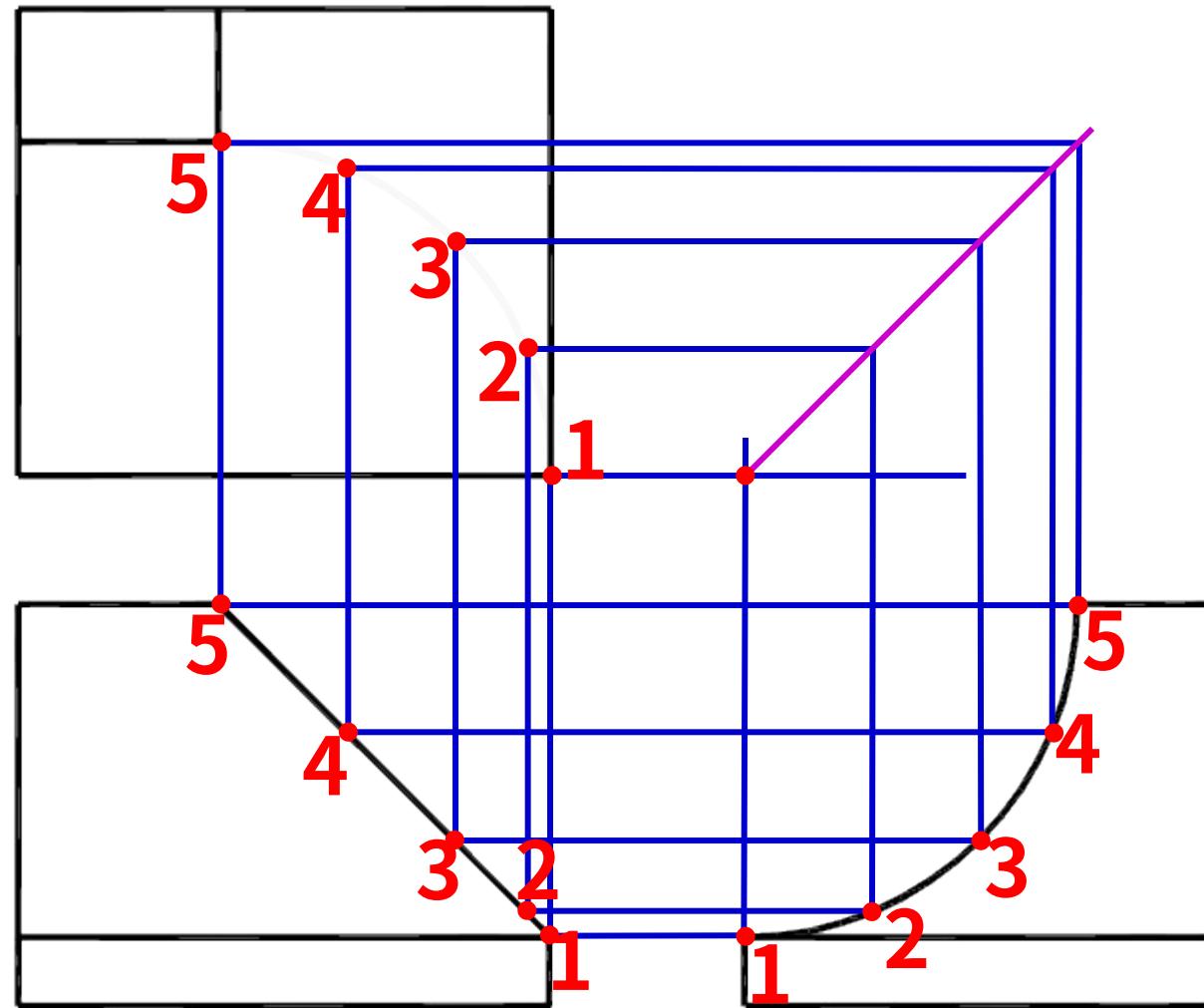
圖 13.37 曲線之投影 -4/8



CAD圖

CAD-AV
I

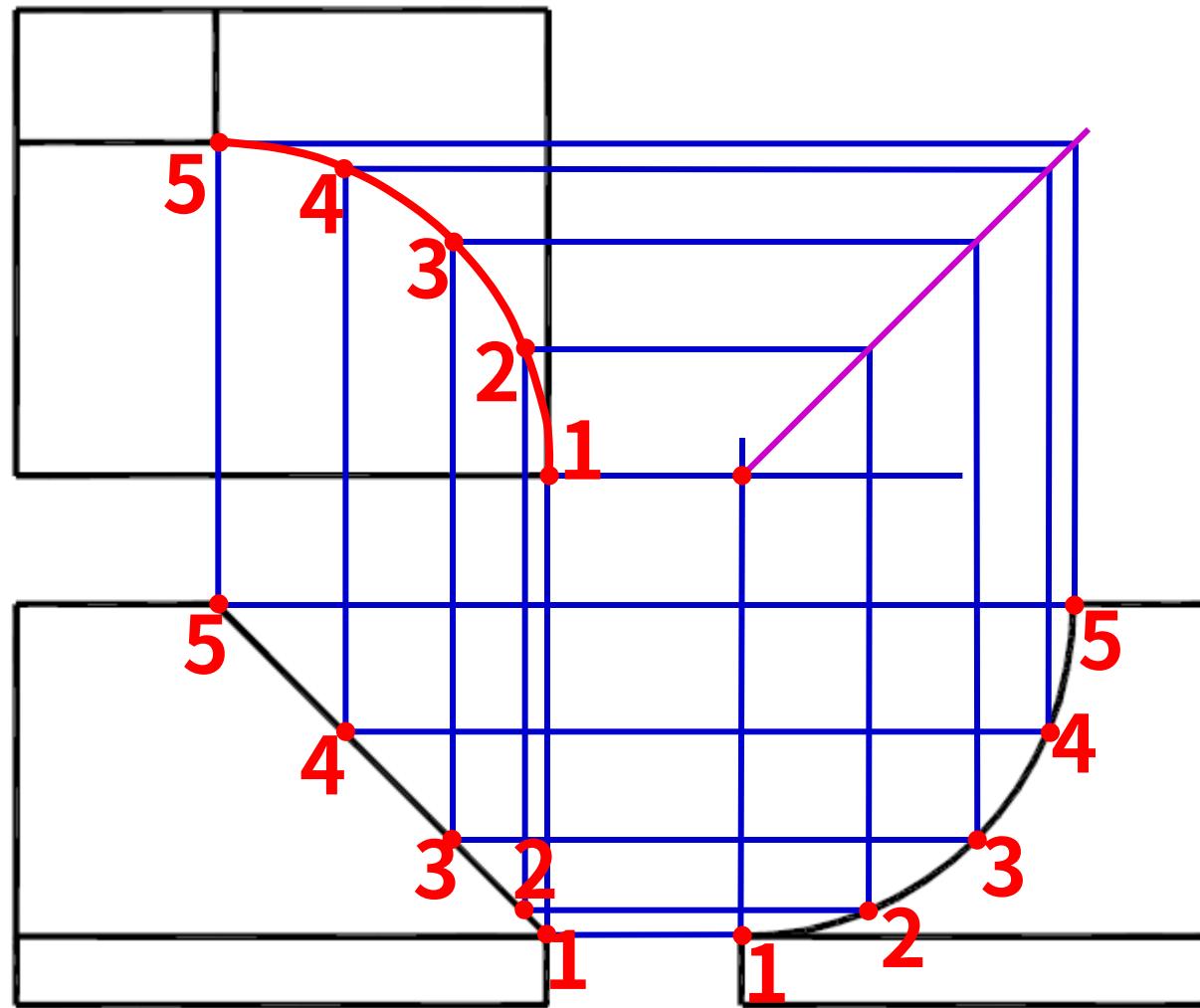
圖 13.37 曲線之投影 -5/8



CAD圖

CAD-AV
I

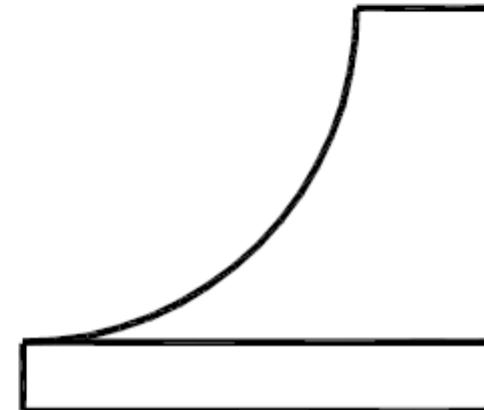
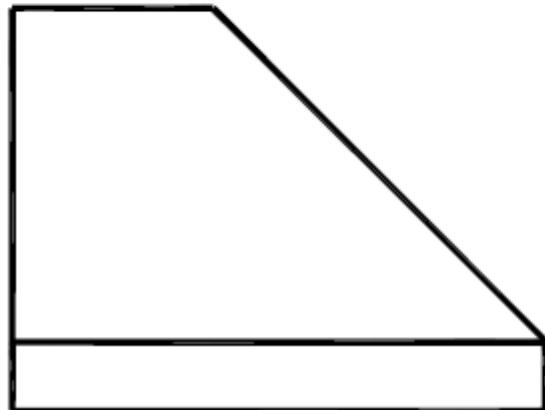
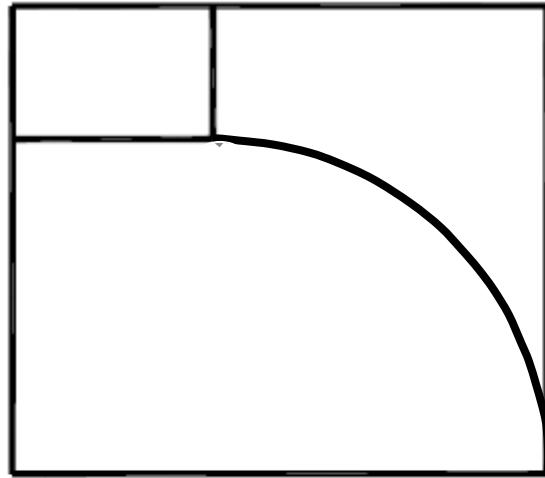
圖 13.37 曲線之投影 -6 /8



CAD圖

CAD-AV
I

圖 13.37 曲線之投影 -7/8

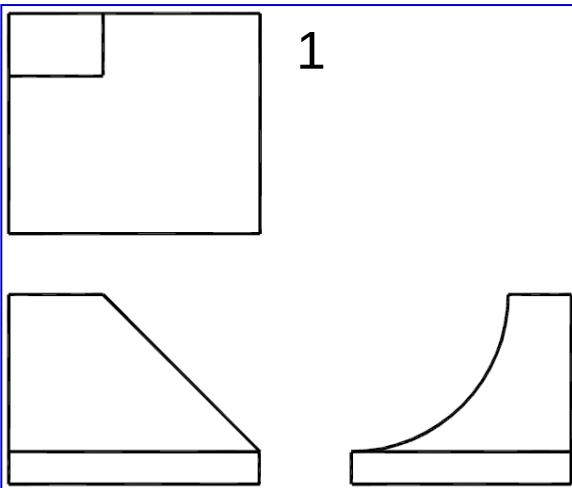


CAD圖

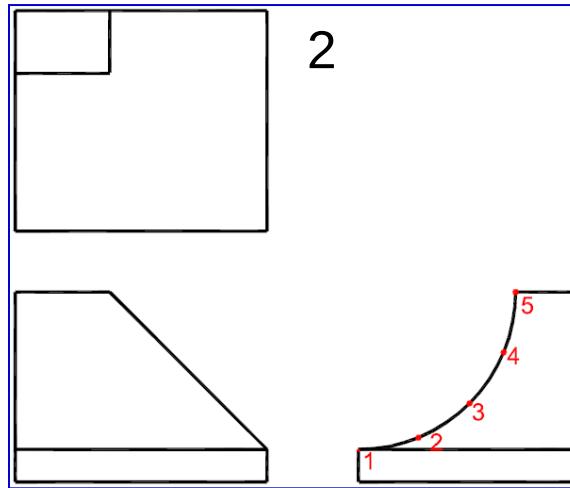
CAD-AV
I

圖 13.37 曲線之投影 -8/8

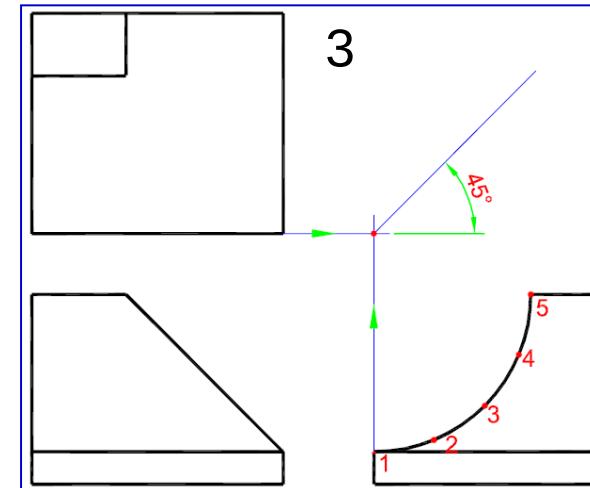
1



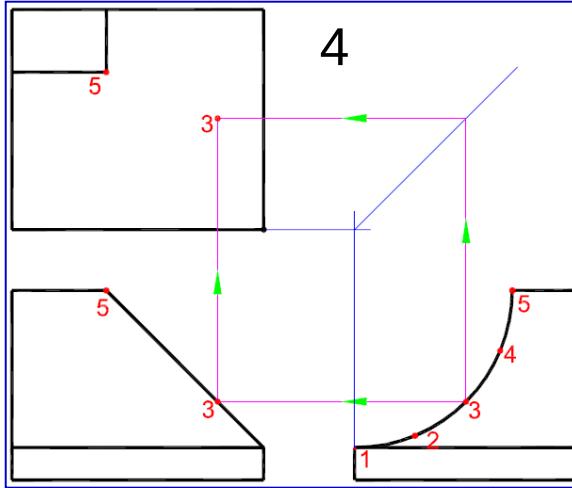
2



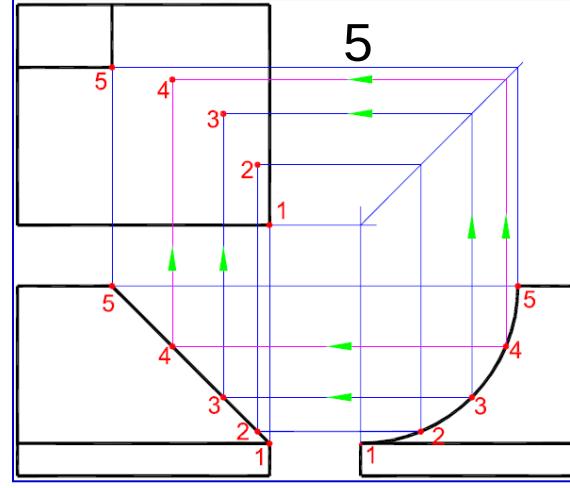
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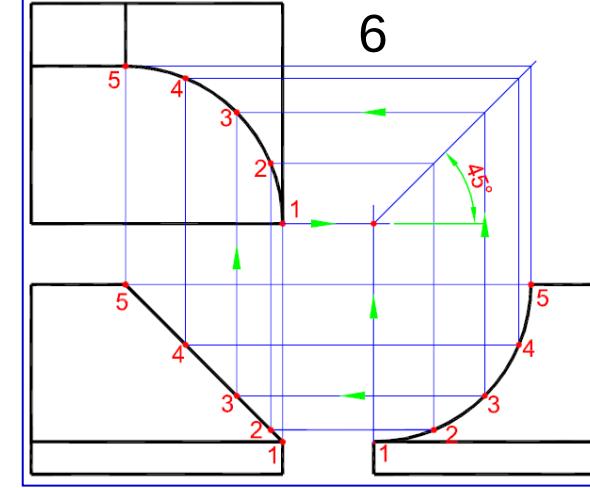
4



5

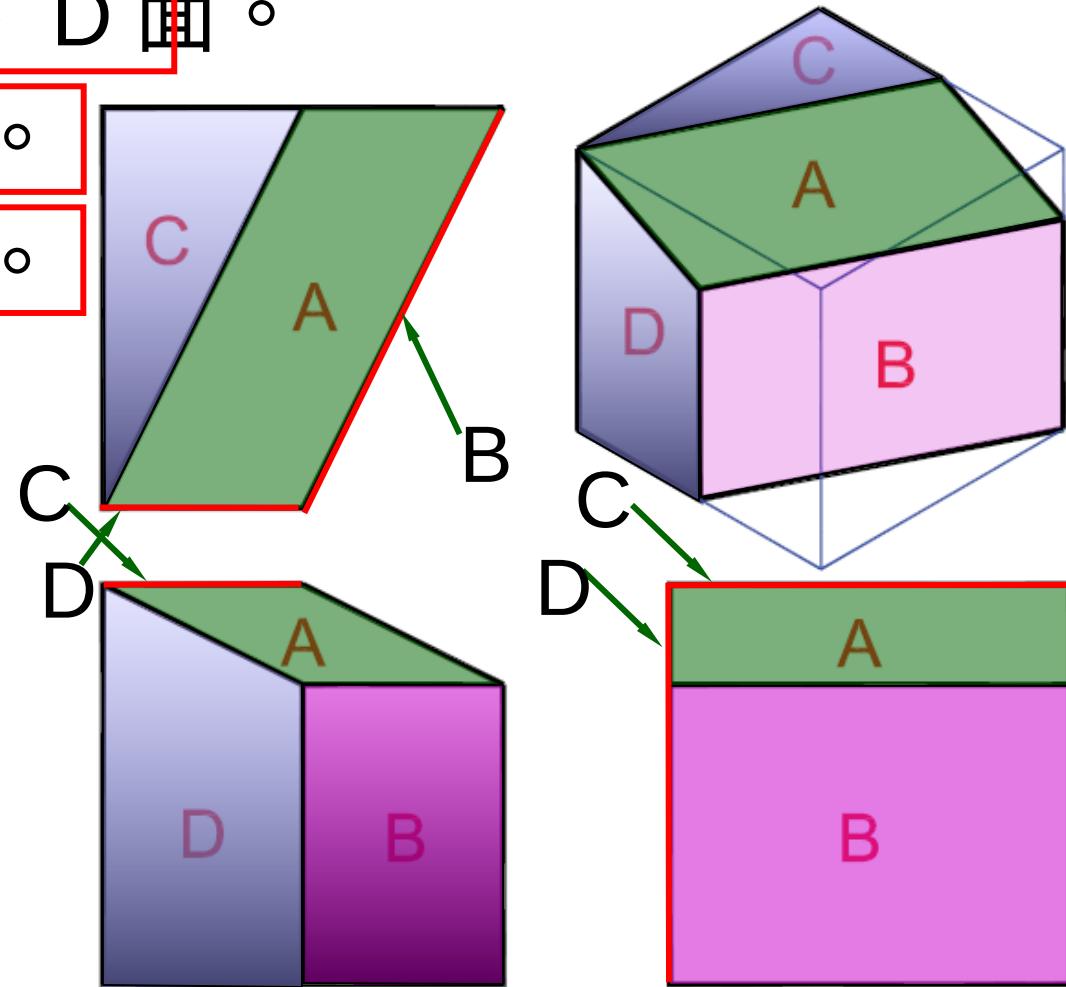


6



13.11.3 面之投影 (圖 13.38a)

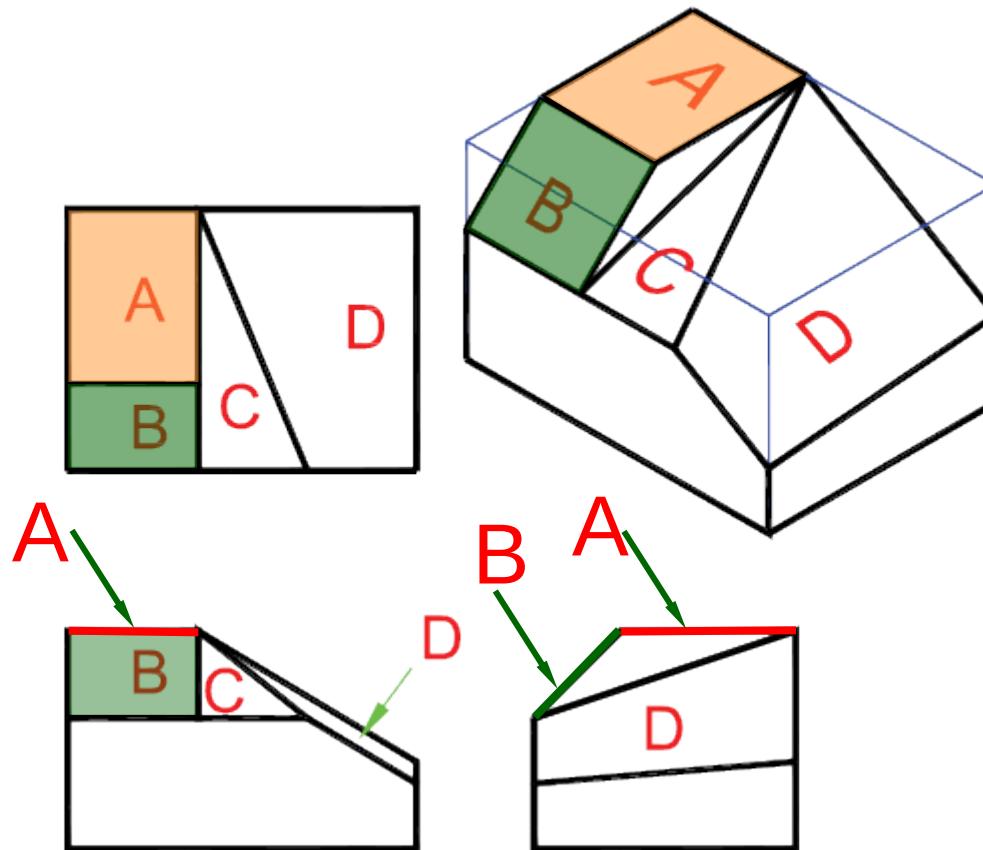
- 正垂面：C、D面。
- 單斜面：B面。
- 複斜面：A面。



CAD圖

鄰接面 (圖 13.38b)

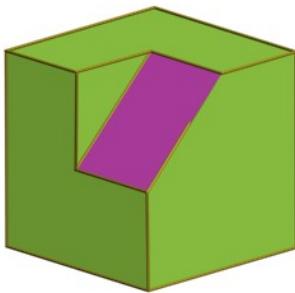
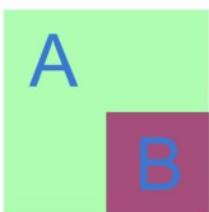
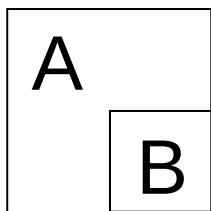
- 在一視圖中兩相鄰的面其高度或深度必定有所不同，須再從其他視圖方能判讀面之形狀與位置。



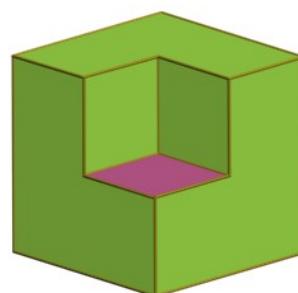
CAD圖

鄰接面 (圖 13.39)

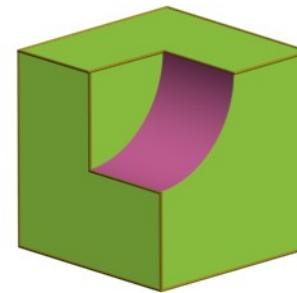
- 已知一俯視圖有 A、B 兩鄰接面，(a)~(d)
皆為其可能之物體形狀。



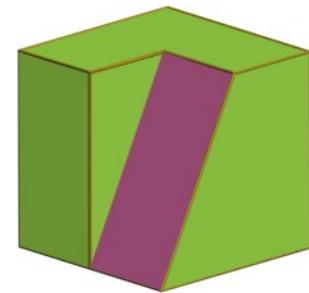
a



b



c



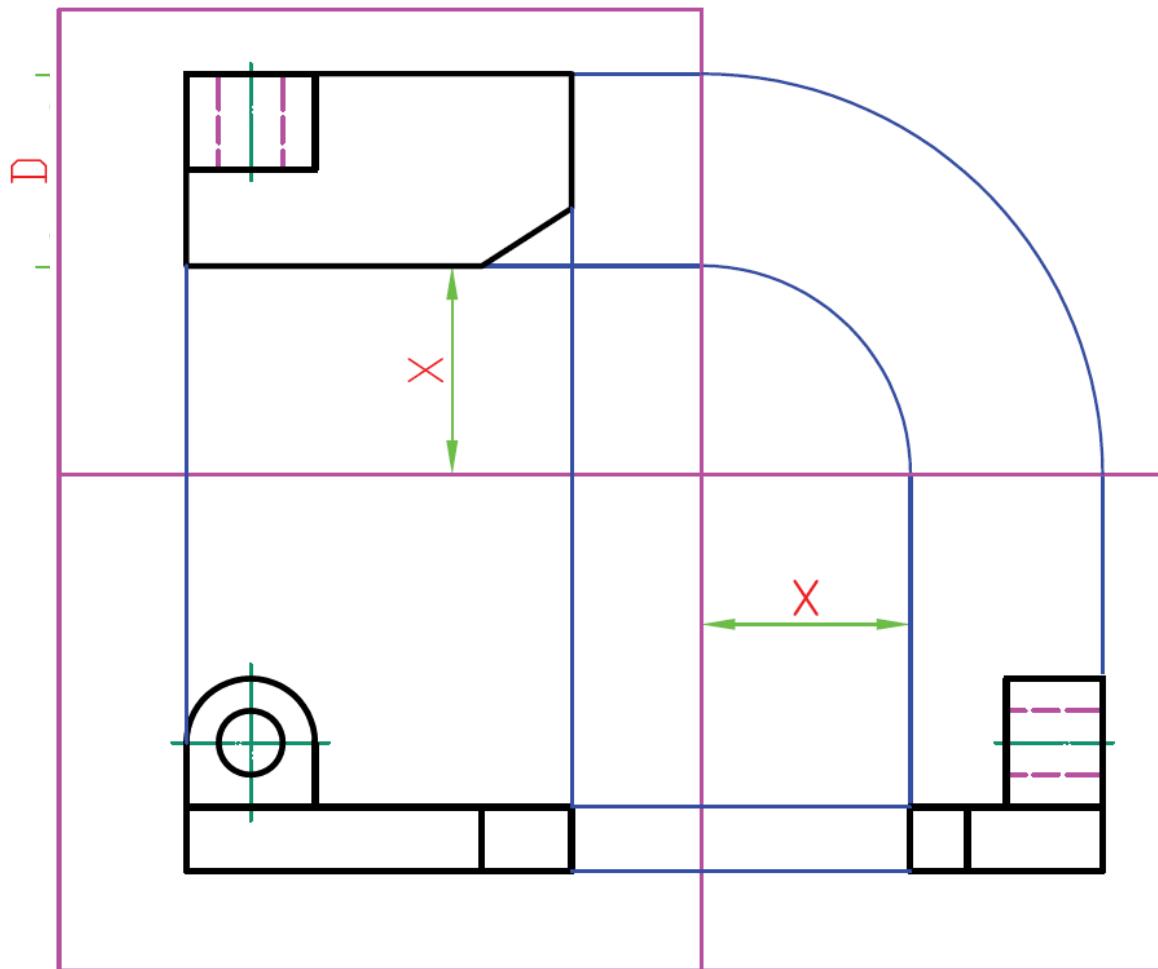
d

CAD圖

13.12 繪圖程序

- 繪製三視圖時，須保持視圖間之對應關係，前視圖與側視圖同時呈現物體之高度，兩視圖須水平對齊。
- 前視圖與俯視圖同時呈現物體之寬度，兩視圖須垂直對齊。
- 俯視圖與側視圖同時呈現物體之深度，但深度尺寸無法在俯視圖與側視圖間直接投影，需用移轉的方法。

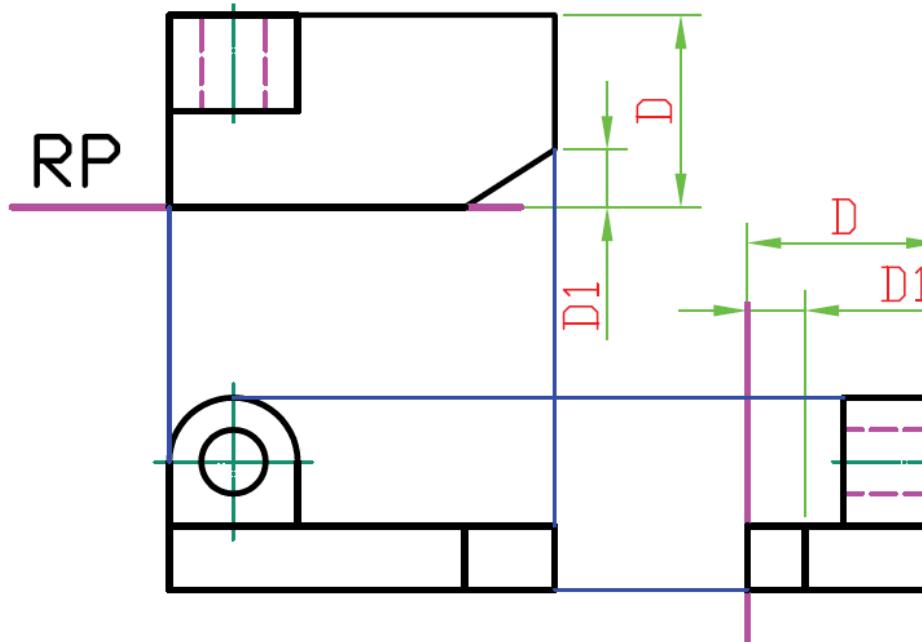
基線與參考線的關係 1/4



CAD圖

投影箱展開

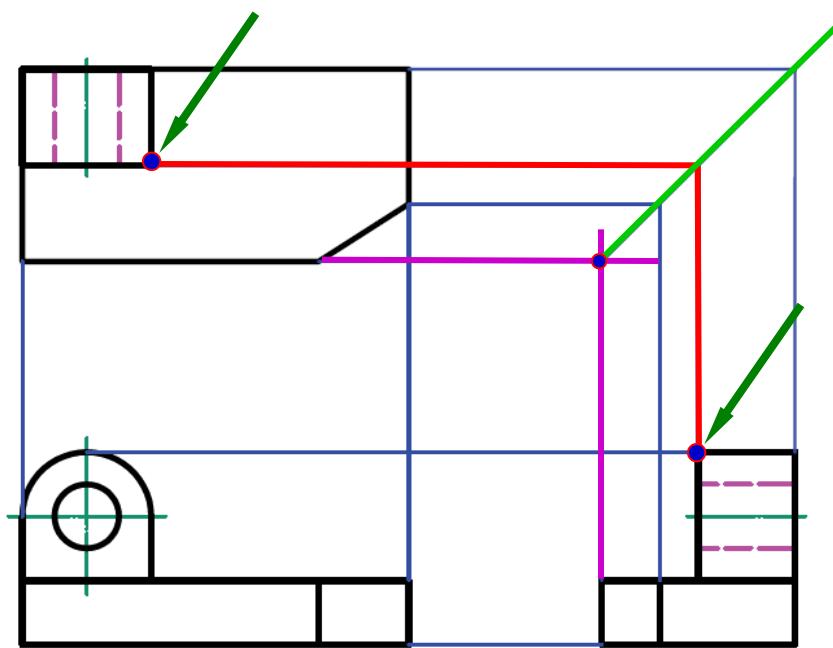
基線與參考線的關係 2/4



CAD圖

以參考線為基準

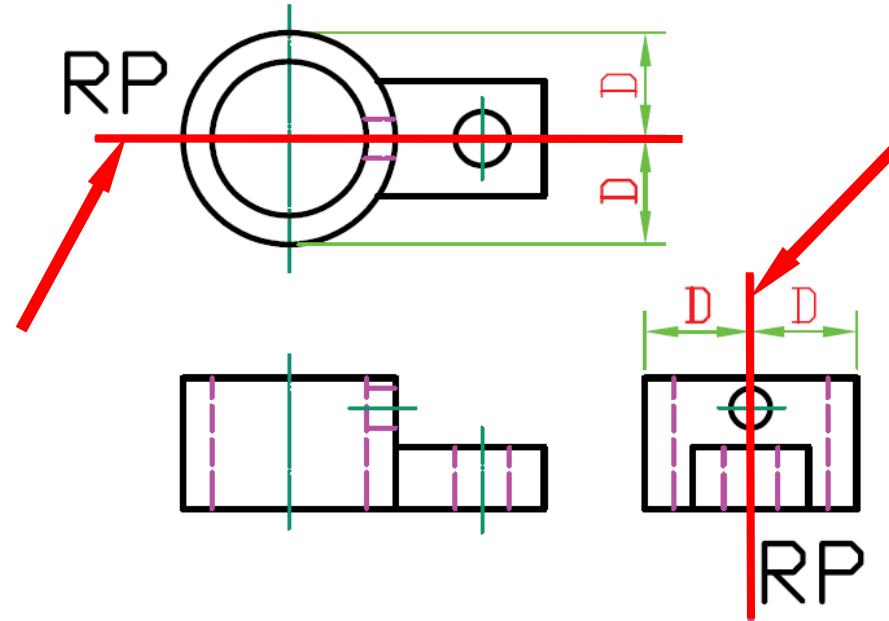
基線與參考線的關係 3/4



CAD圖

以物體前緣為基準

基線與參考線的關係 4/4



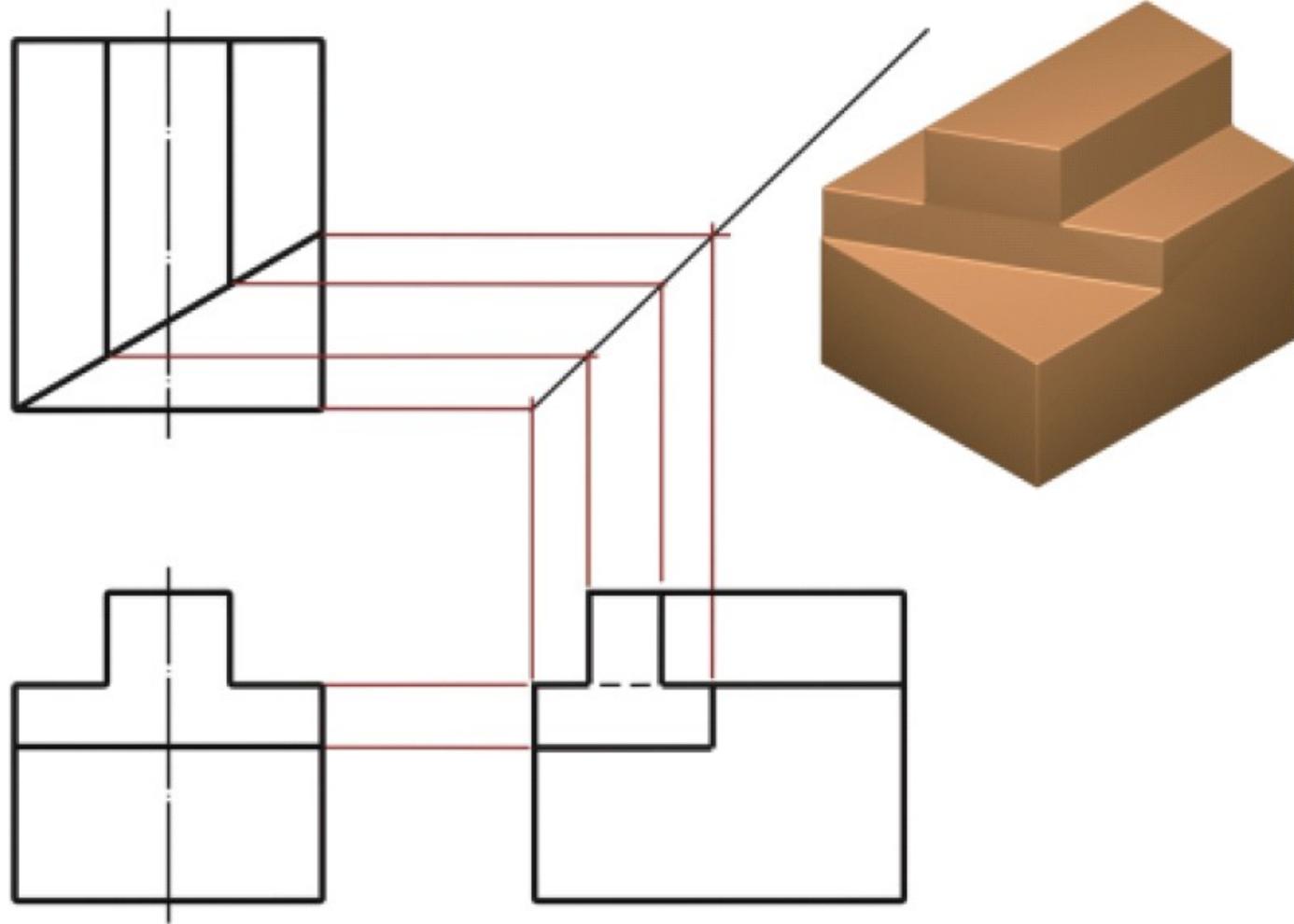
CAD圖

以物體中心為基準

45° 反射線法繪圖法

1. 45° 反射線法：如圖，過俯視圖與側視圖之相同基準分別作水平線與垂直線相交，過交點作 45° 傾斜線。
2. 俯視圖各點可水平投射到斜線上，再轉向垂直向下定出側視圖之位置。
3. 反之，如已知側視圖則可反向垂直投射到斜線，再轉向水平投射定出俯視圖之位置。

圖 13.40 45° 反射線法繪右側視圖 -1/8

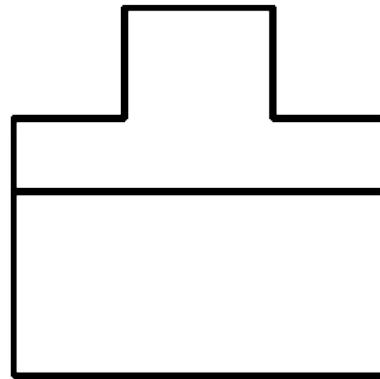
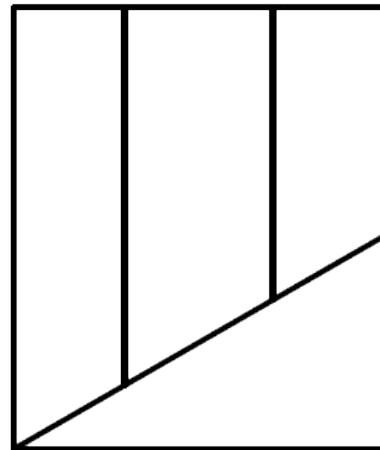
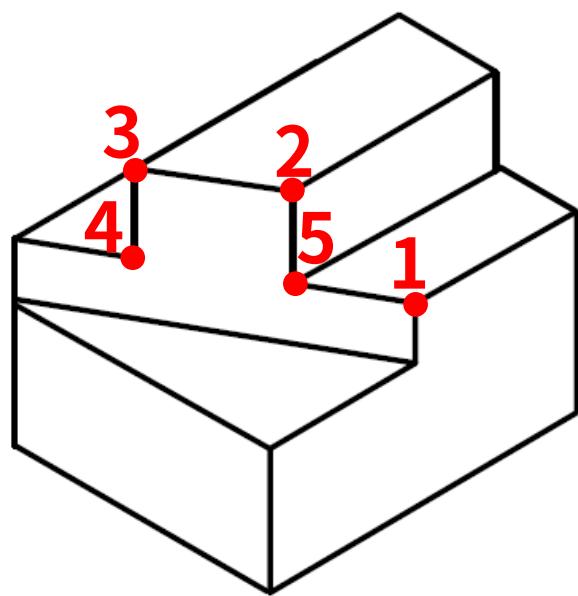


CAD圖

C

AD-AVI

圖 13.40 45° 反射線法繪右側視圖 -2/8

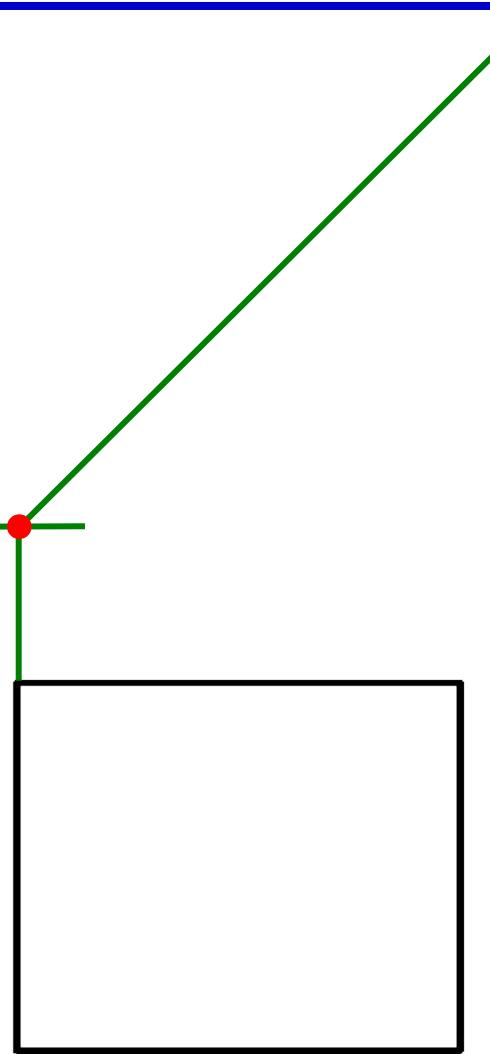
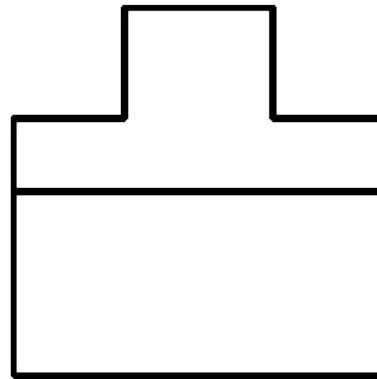
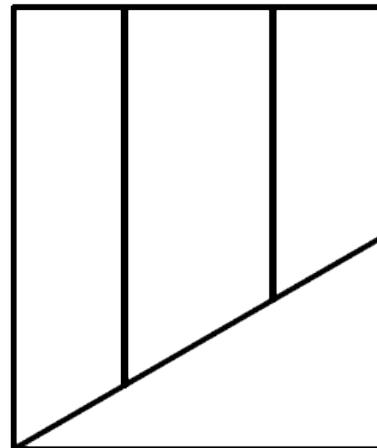
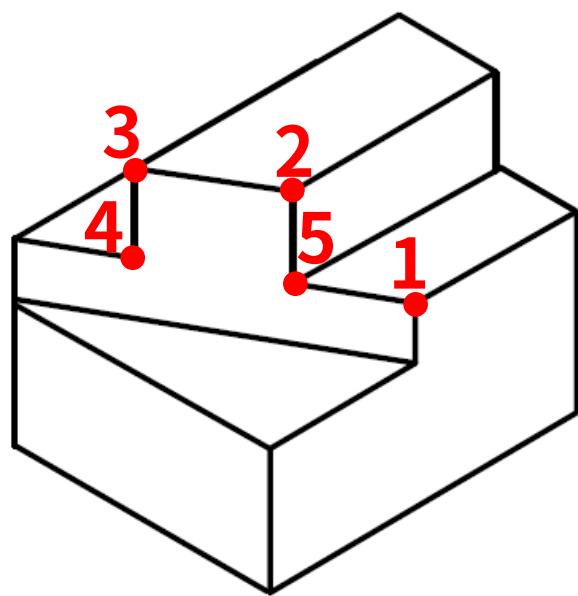


CAD圖

C

AD-AVI

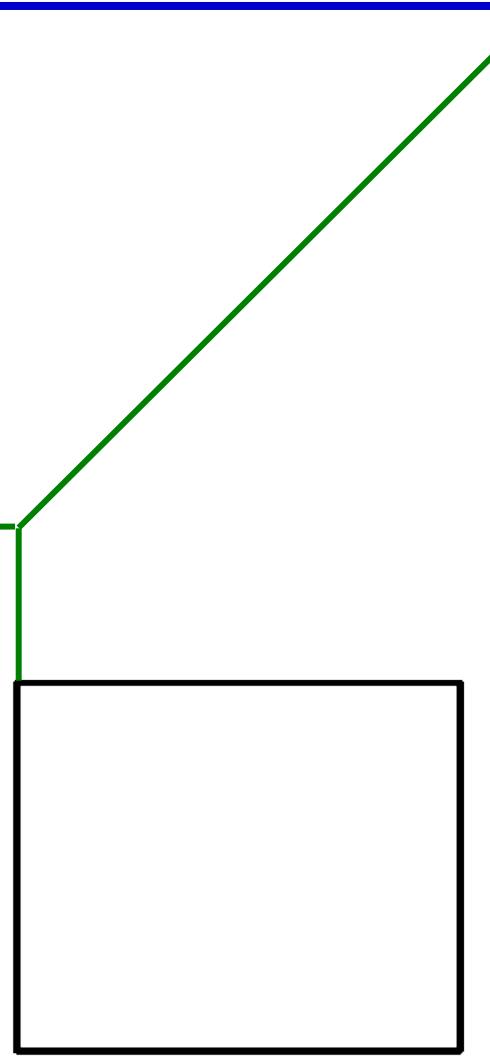
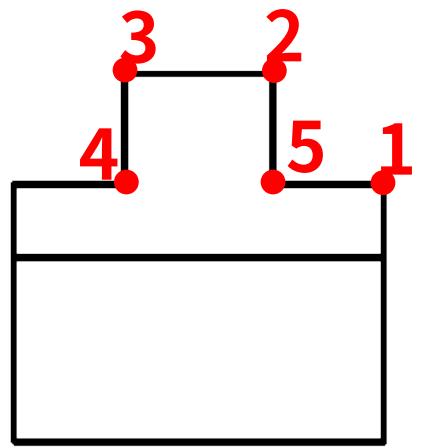
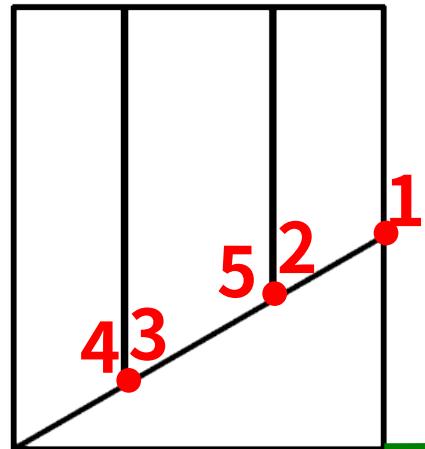
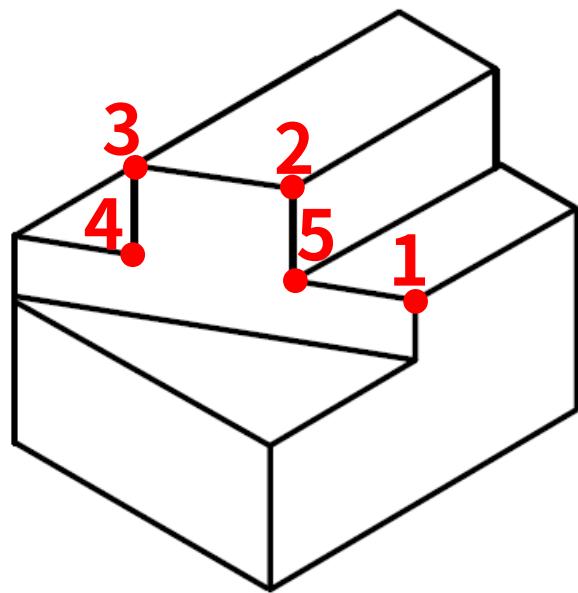
圖 13.40 45° 反射線法繪右側視圖 -3/8



CAD圖

C
AD-AVI

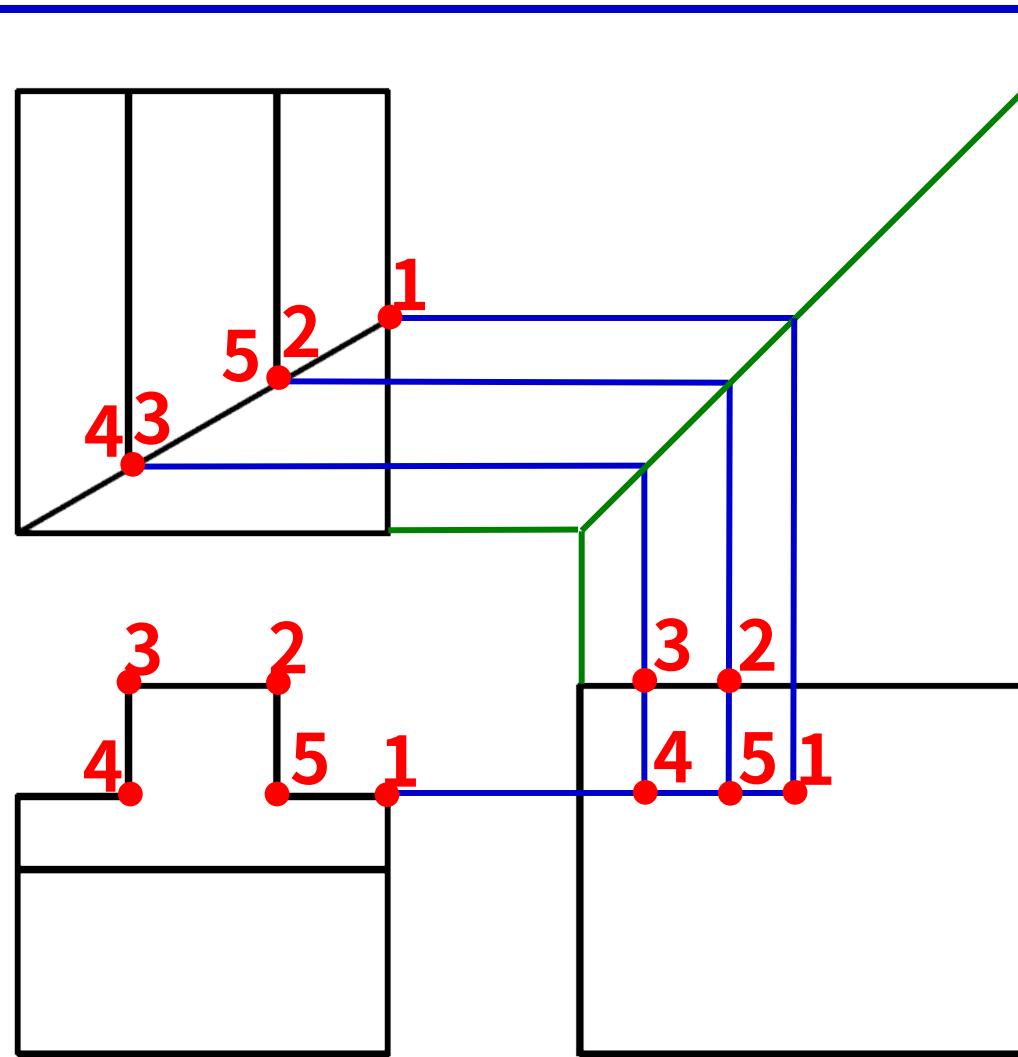
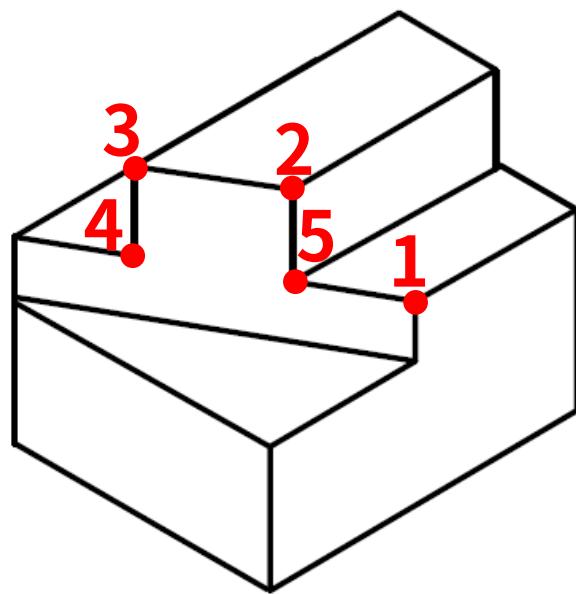
圖 13.40 45° 反射線法繪右側視圖 -4/8



CAD圖

C
AD-AVI

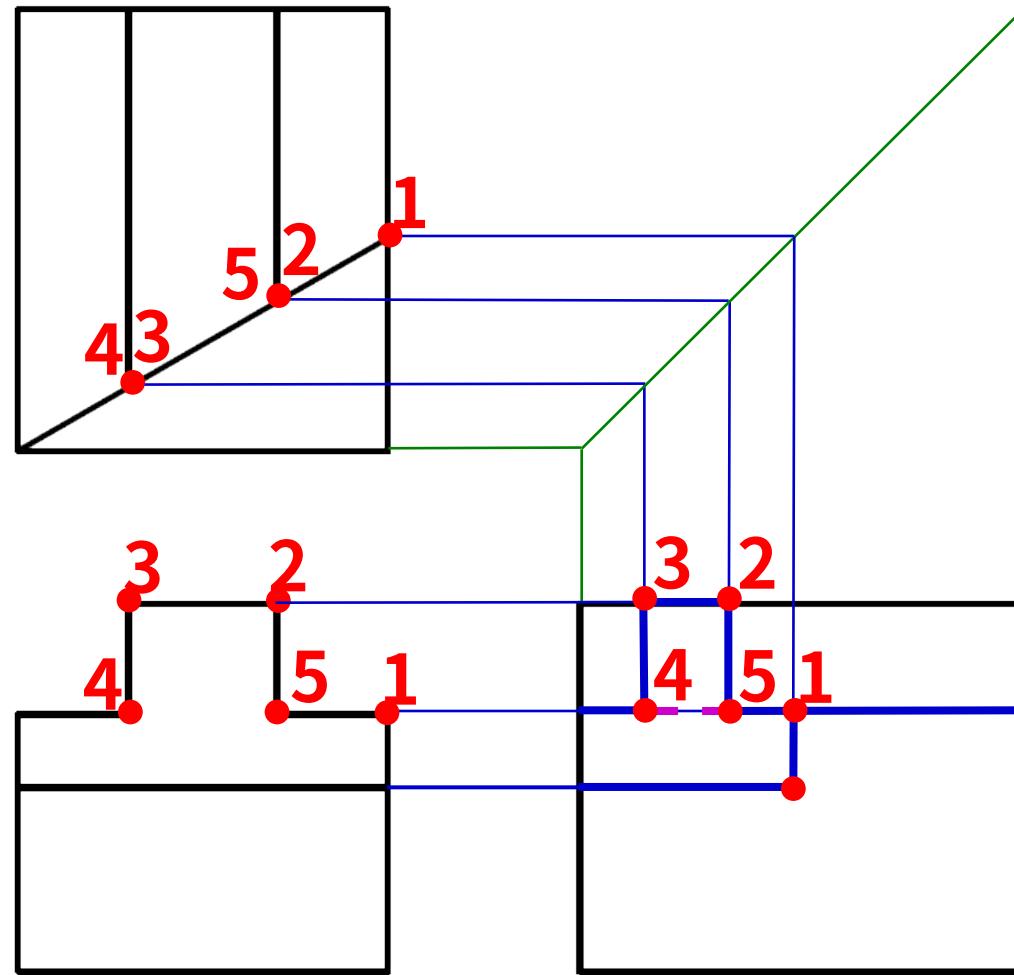
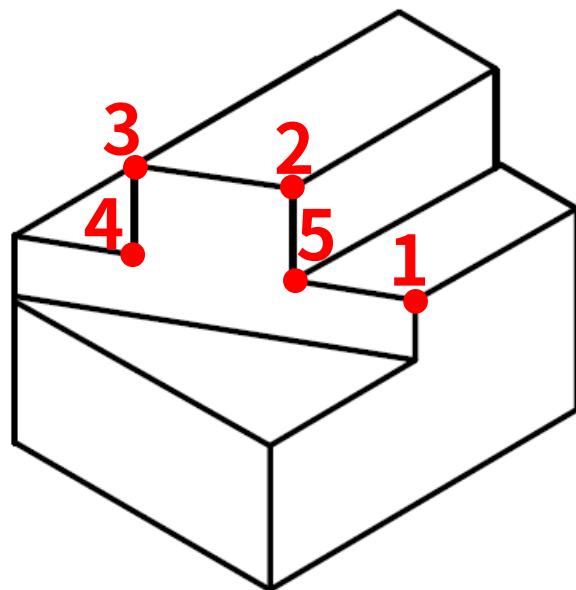
圖 13.40 45° 反射線法繪右側視圖 -5/8



CAD圖

C
AD-AVI

圖 13.40 45° 反射線法繪右側視圖 -6/8

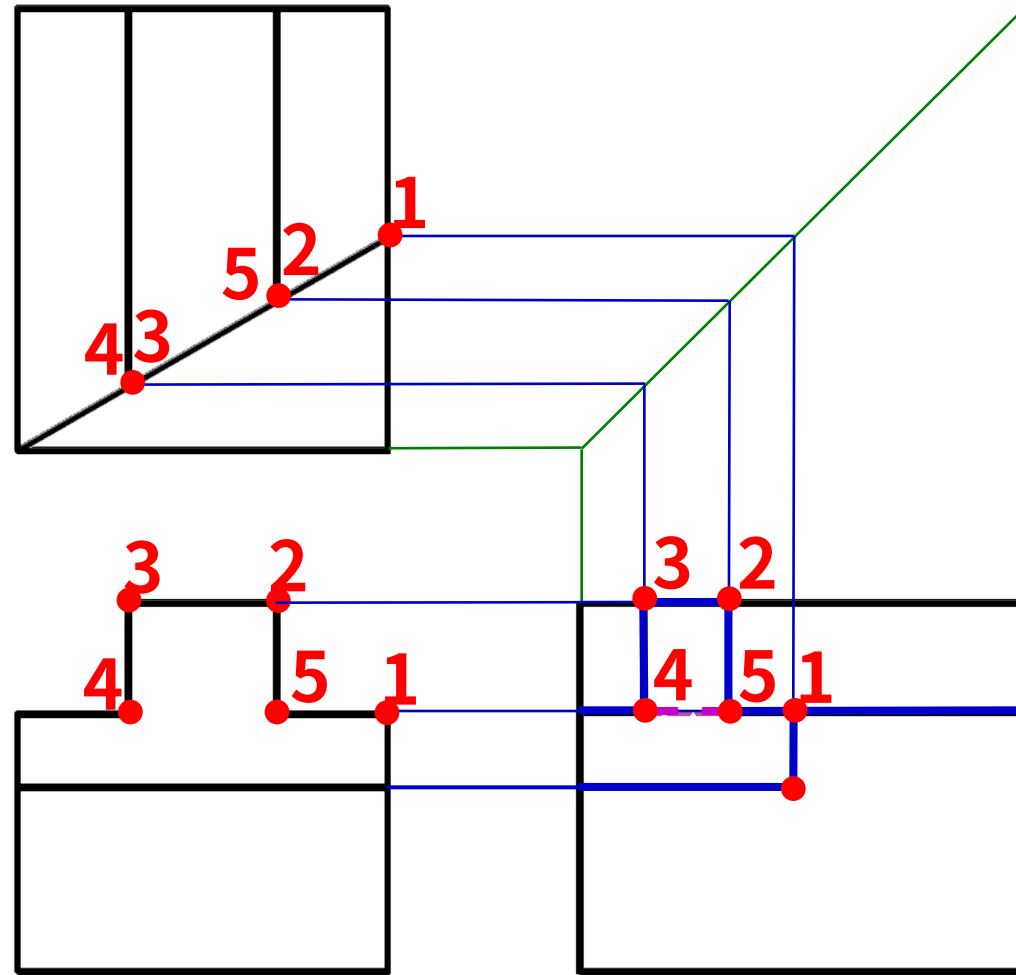
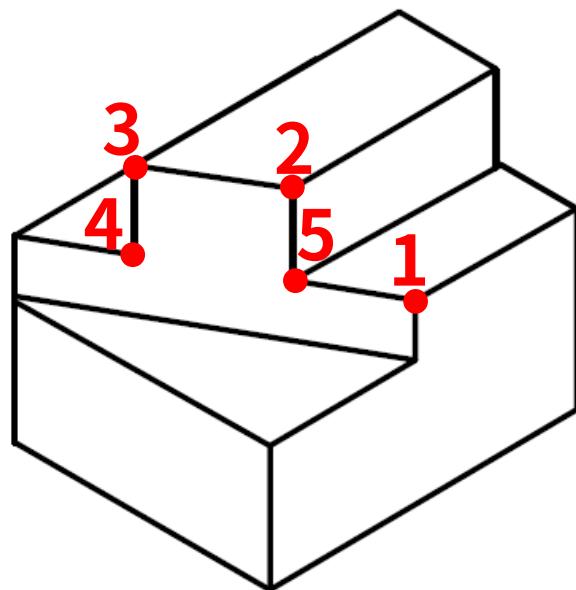


CAD圖

C

AD-AVI

圖 13.40 45° 反射線法繪右側視圖 -7/8



CAD圖

C

AD-AVI

圖 13.40 45° 反射線法繪右側視圖 -8/8

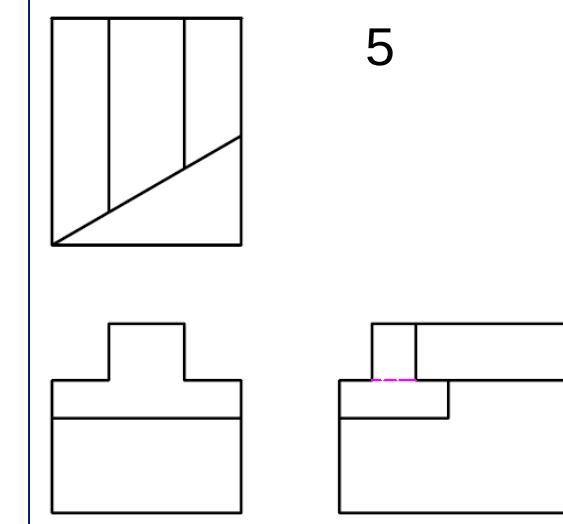
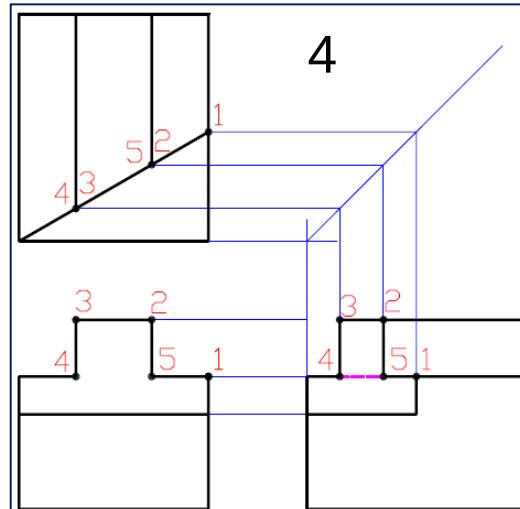
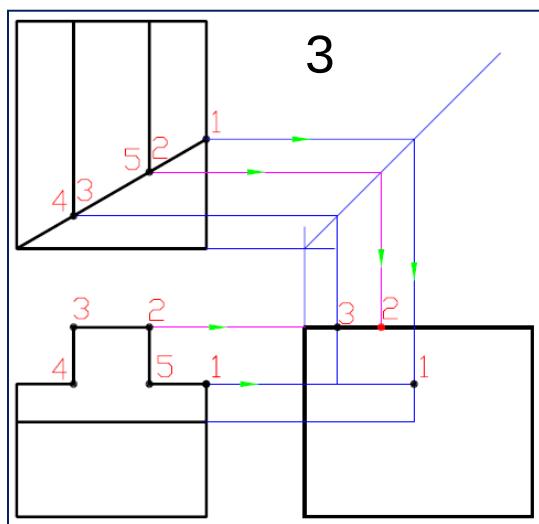
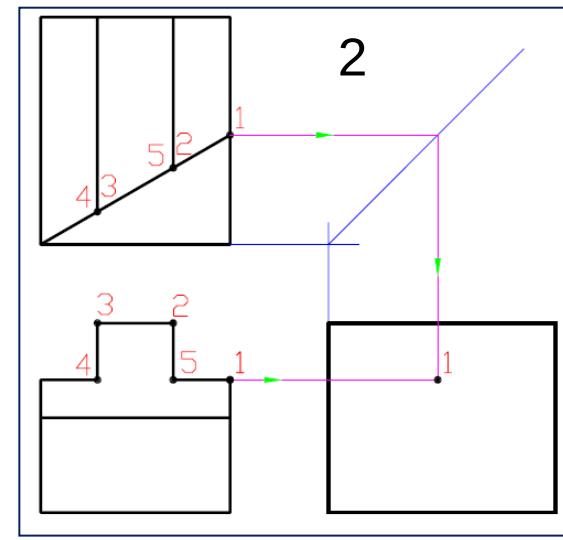
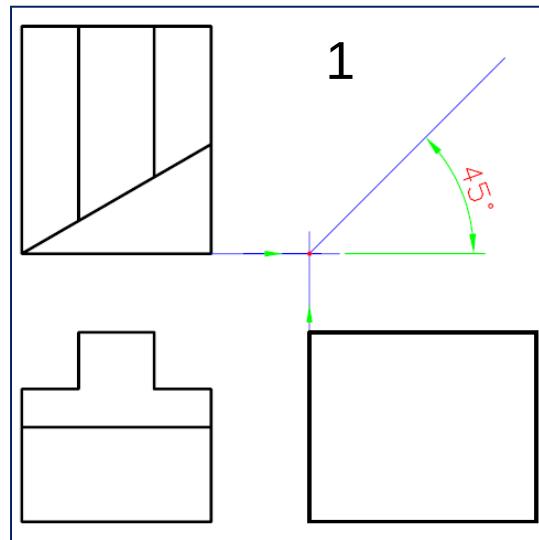
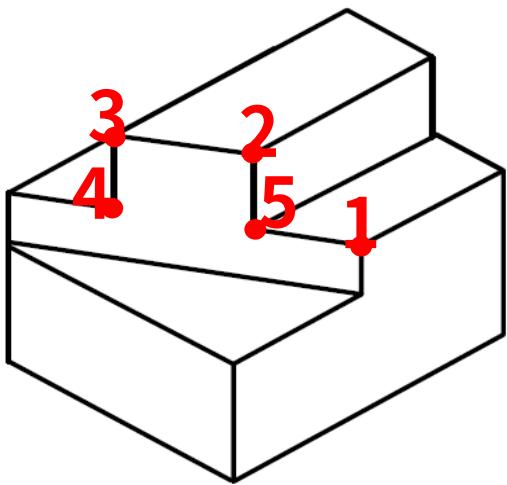
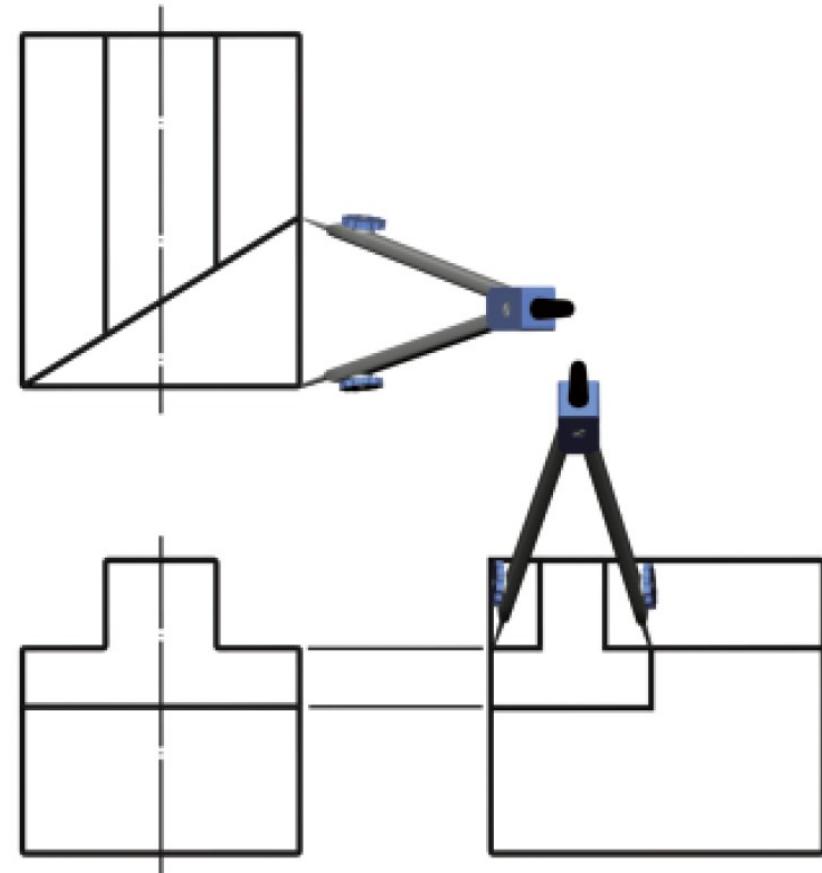
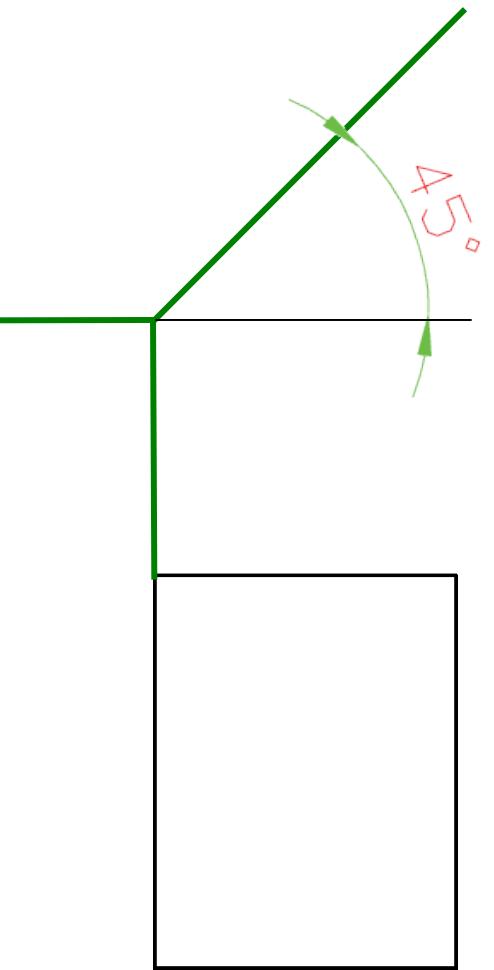
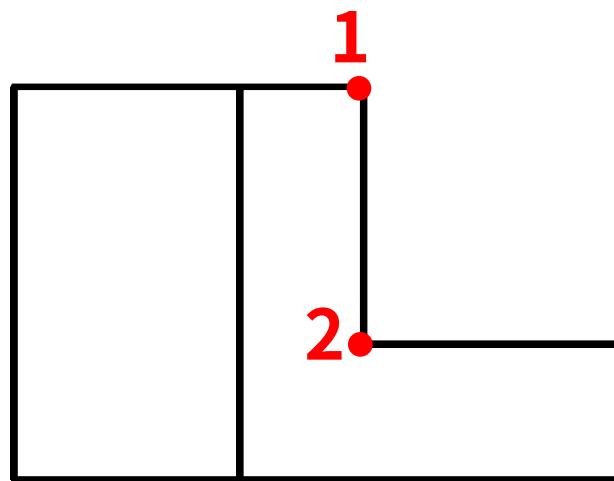
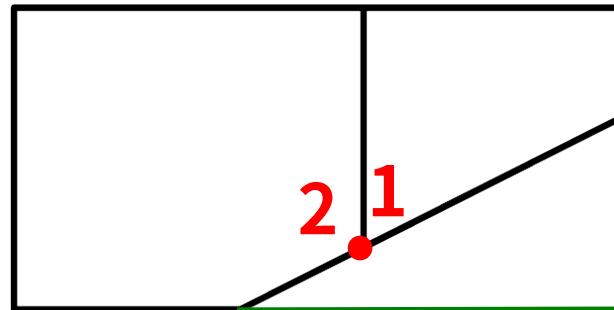
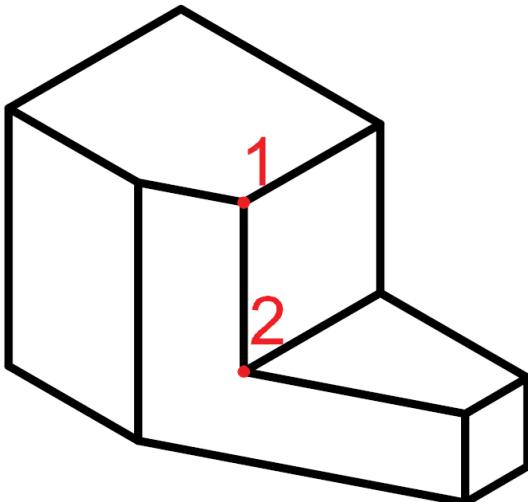


圖 13.41 分規移轉法

- 利用分規（或有刻度之直尺）直接量度，將深度由一視圖移轉到另一視圖。

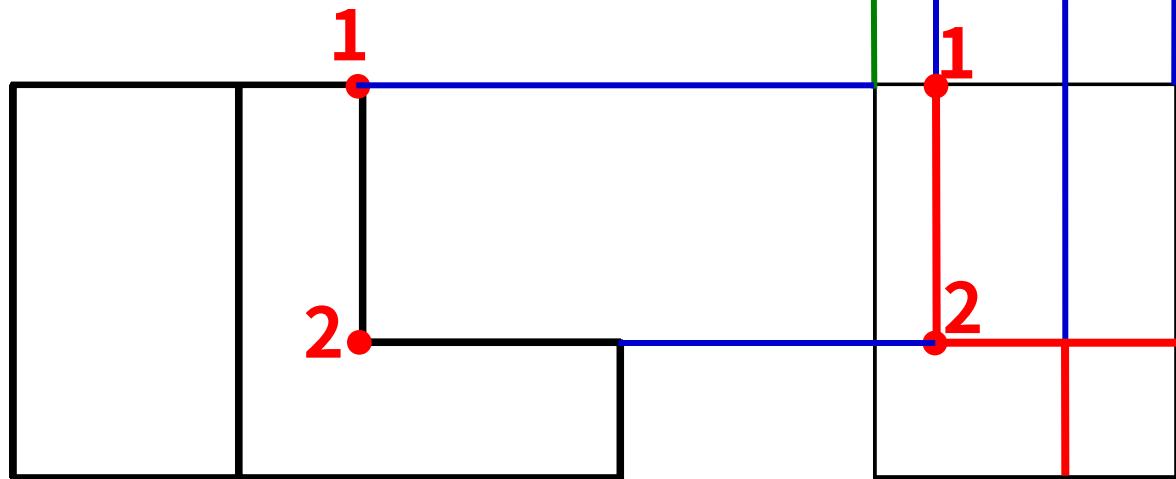
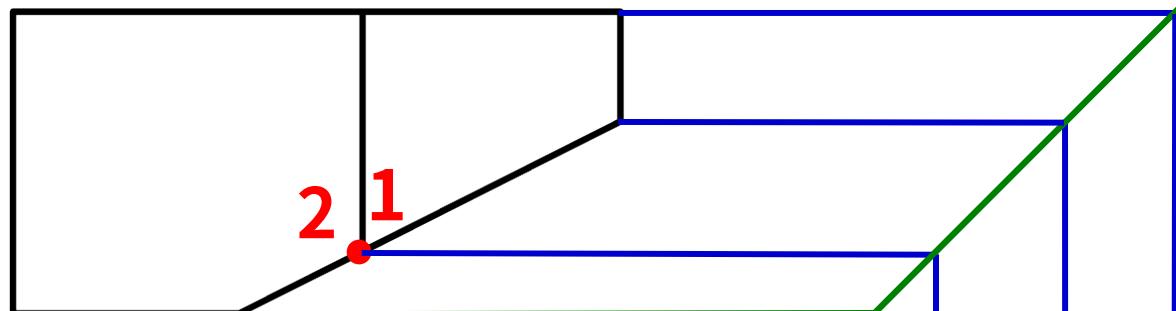
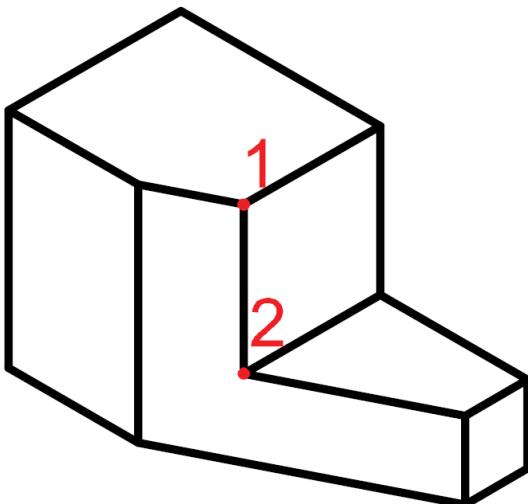


反射線法繪右側視圖例題— -1/4



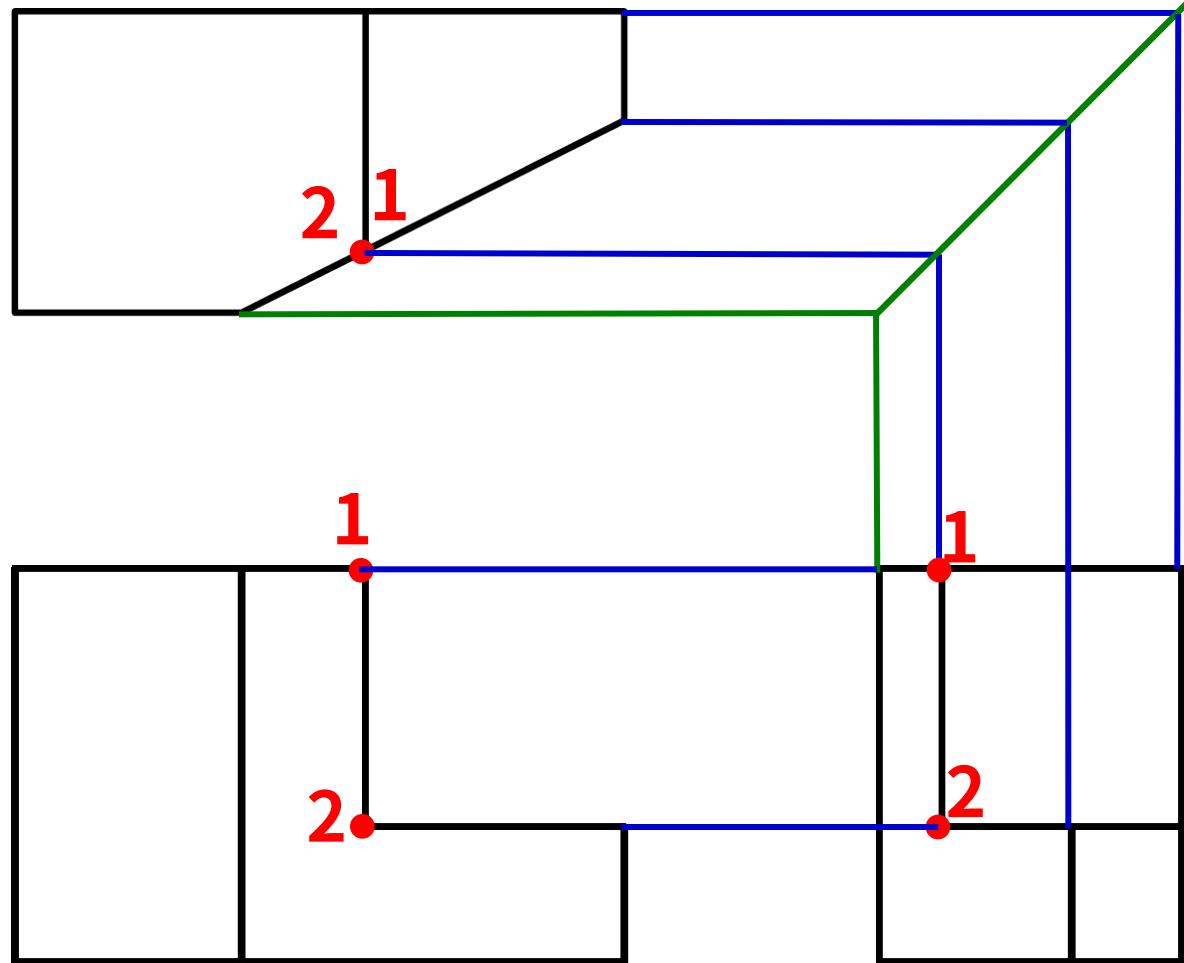
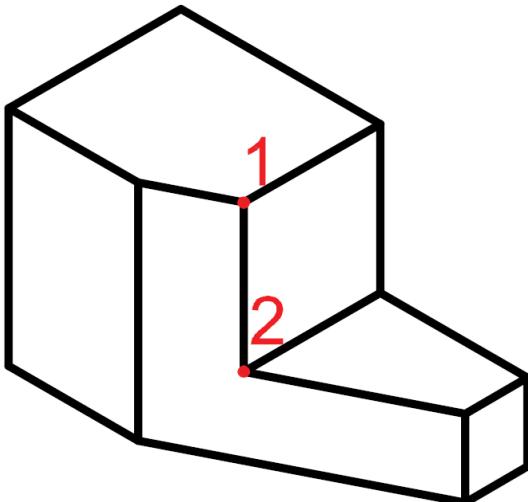
CAD圖

反射線法繪右側視圖例題— -2/4



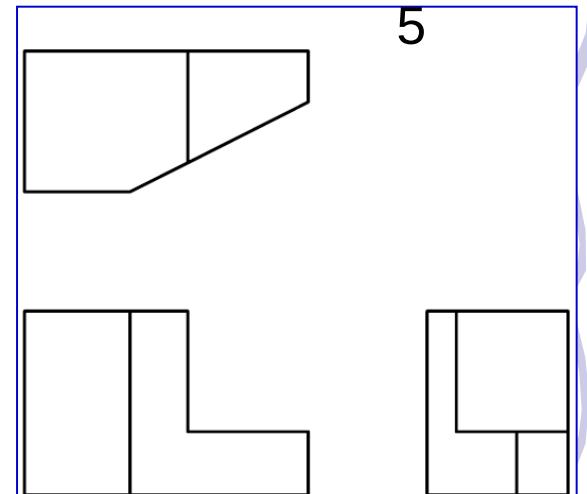
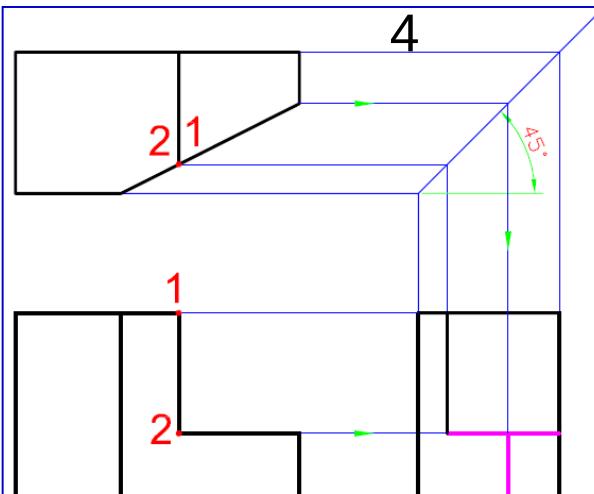
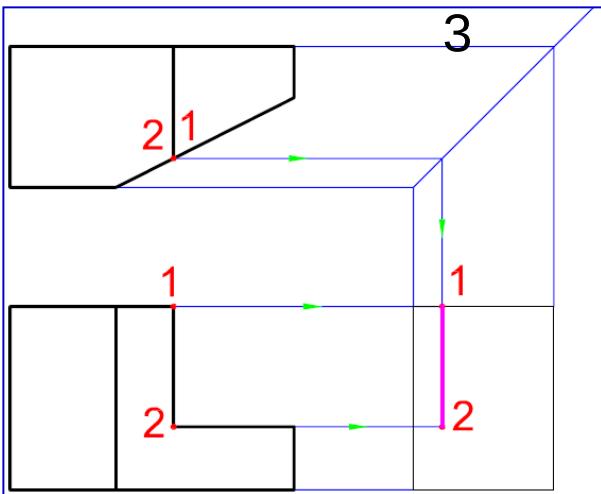
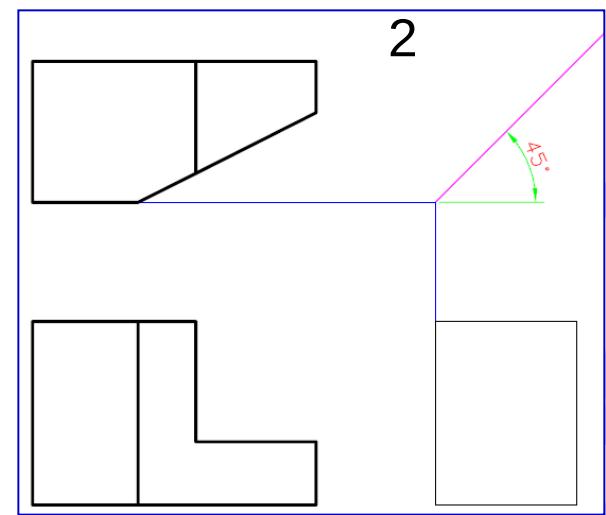
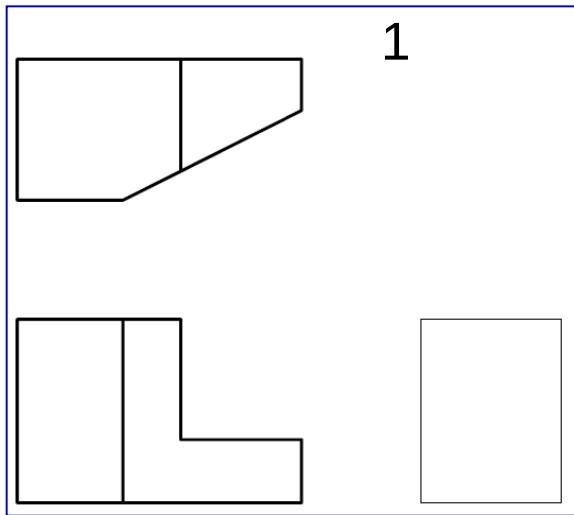
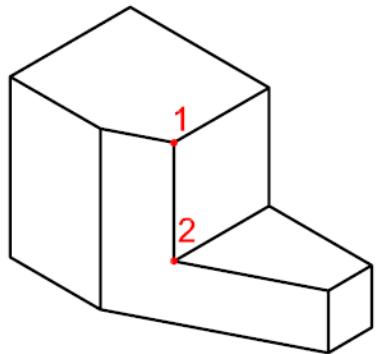
CAD圖

反射線法繪右側視圖例題— -3/4

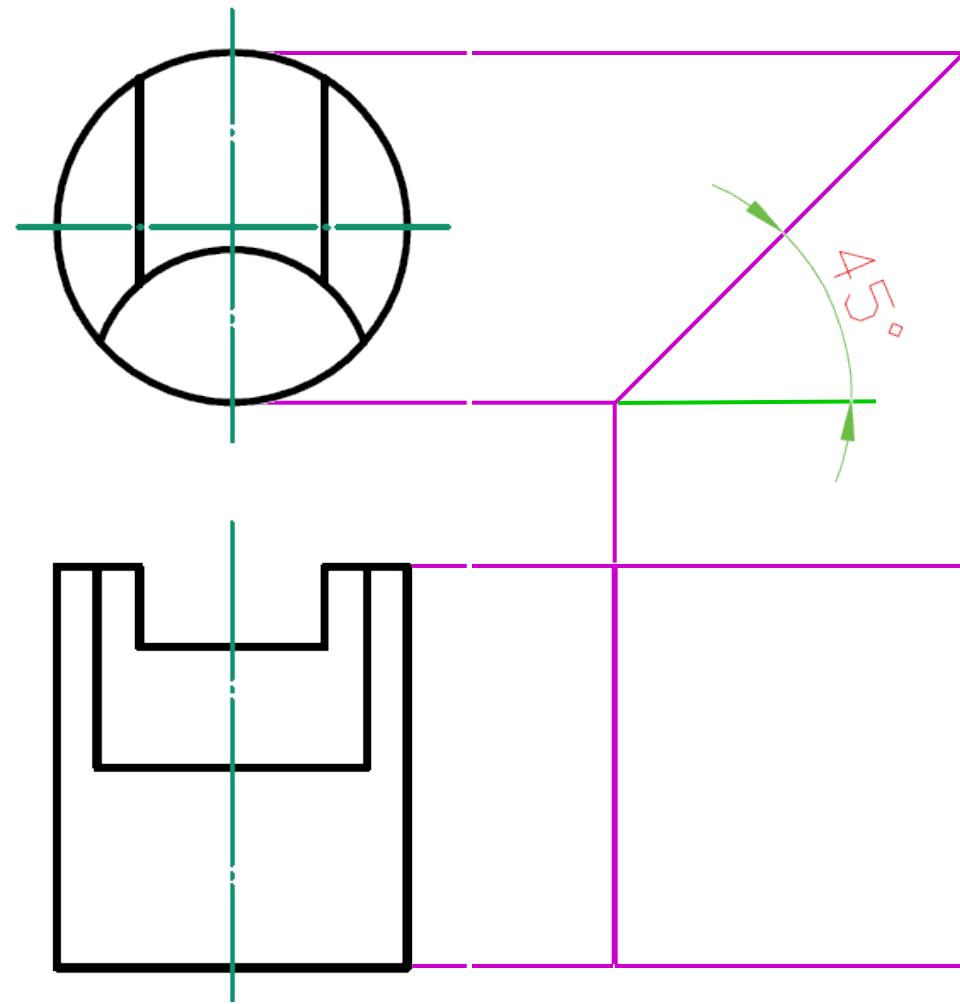
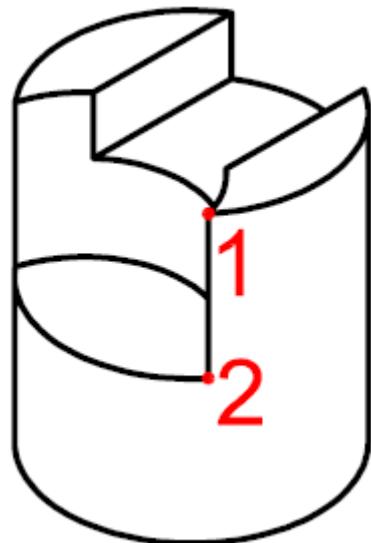


CAD圖

反射線法繪右側視圖例題一 -4/4

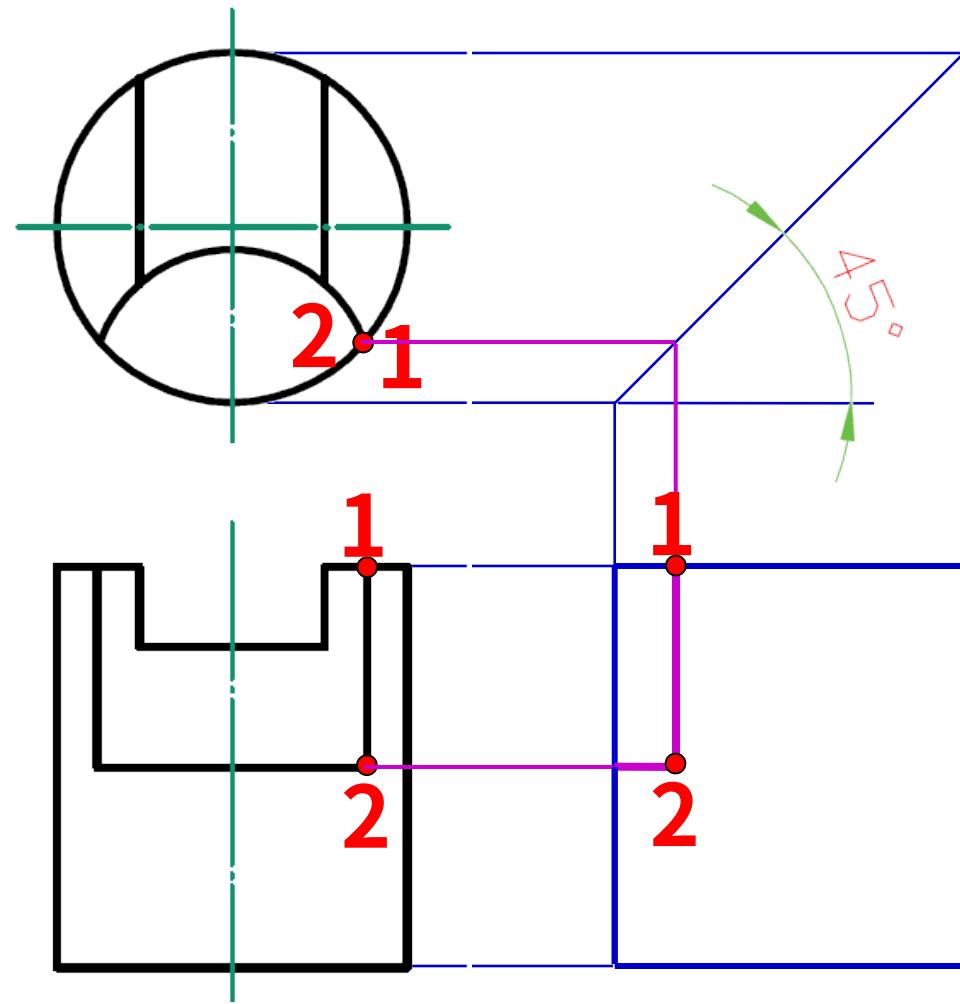
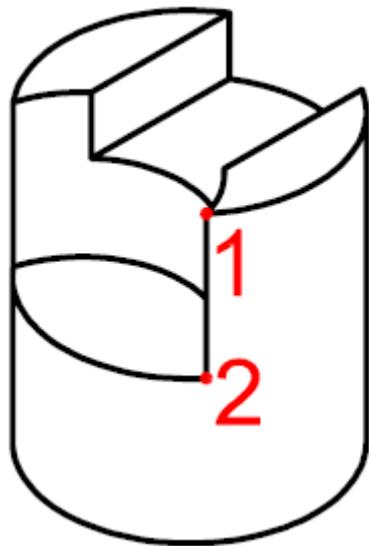


反射線法繪右側視圖例題二 1/6



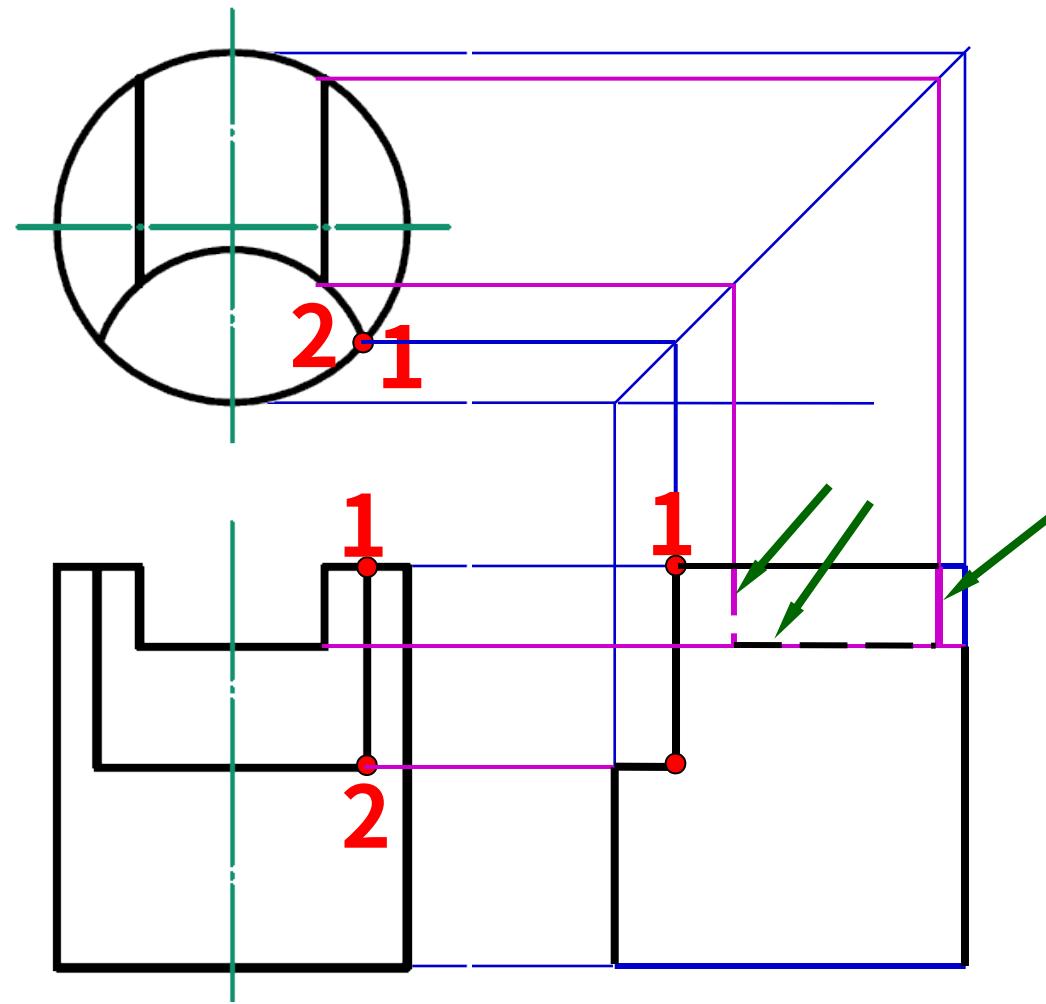
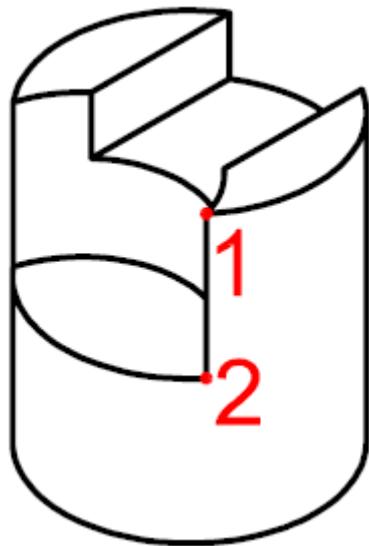
CAD圖

反射線法繪右側視圖例題二 2/6



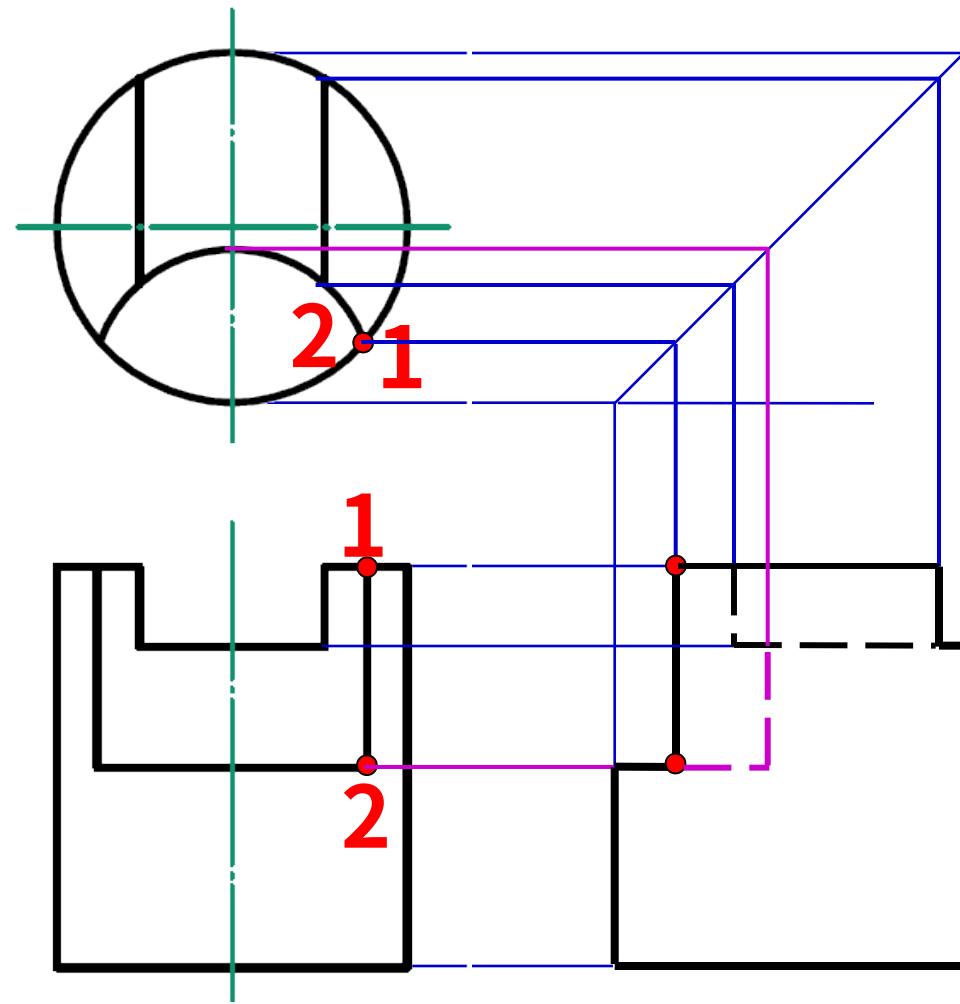
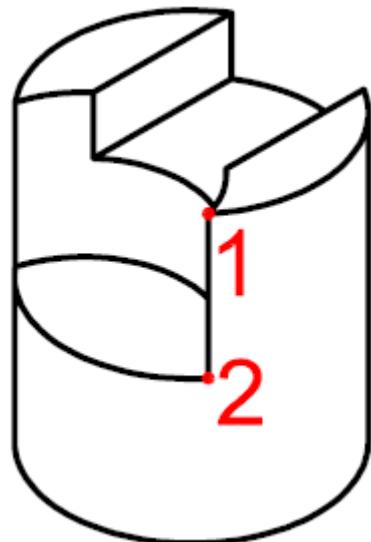
CAD圖

反射線法繪右側視圖例題二 3/6



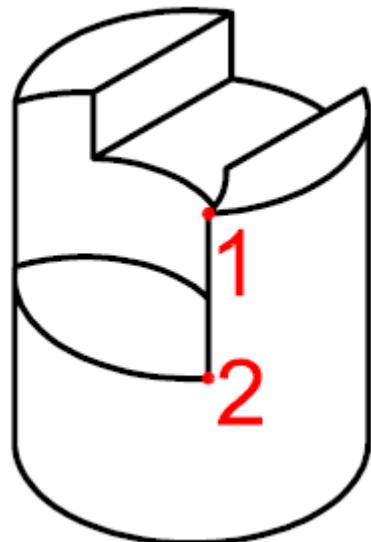
CAD圖

反射線法繪右側視圖例題二 4/6

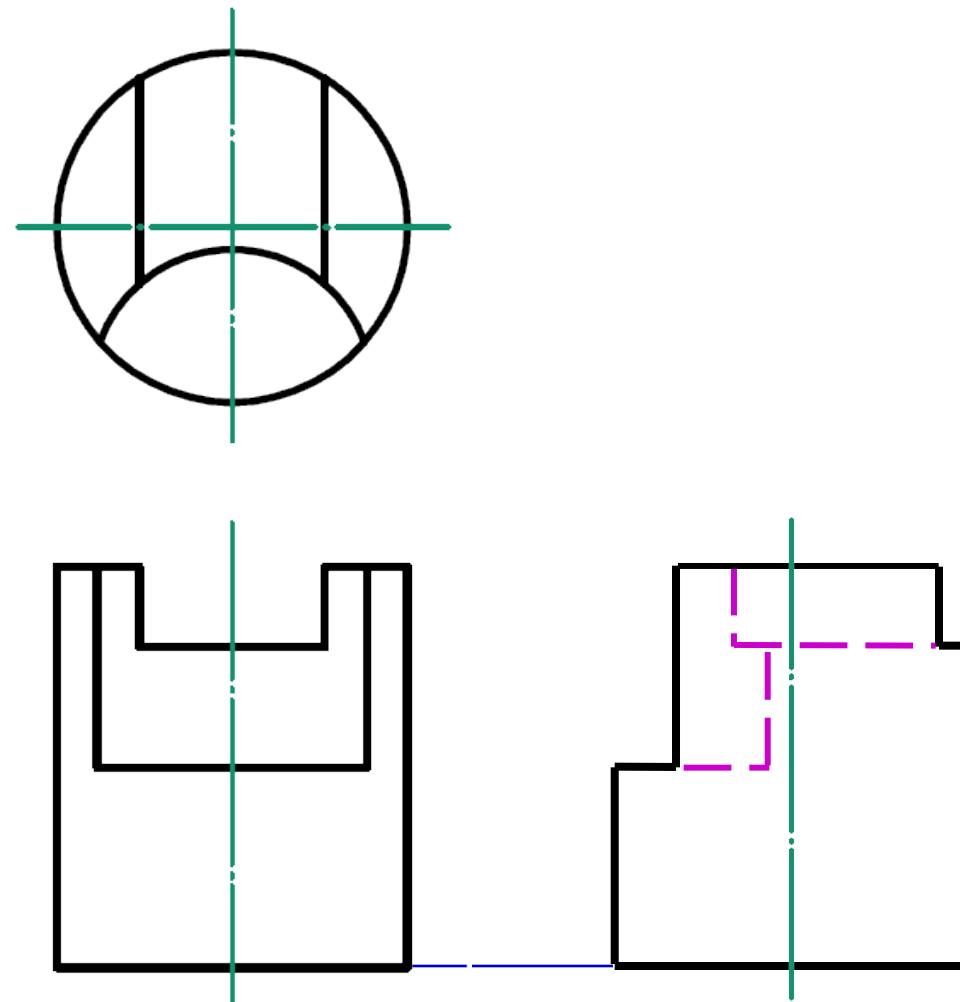


CAD圖

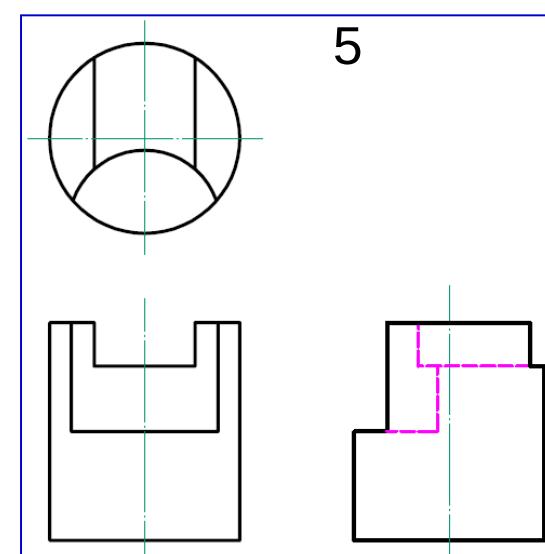
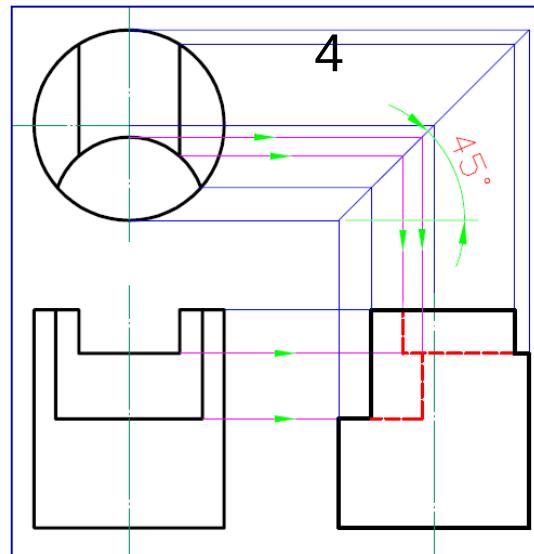
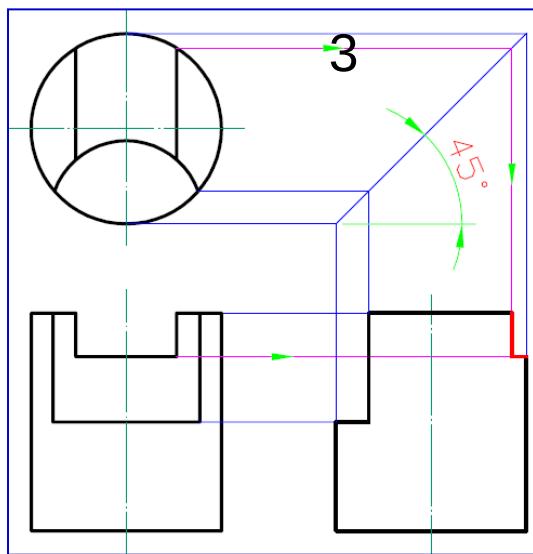
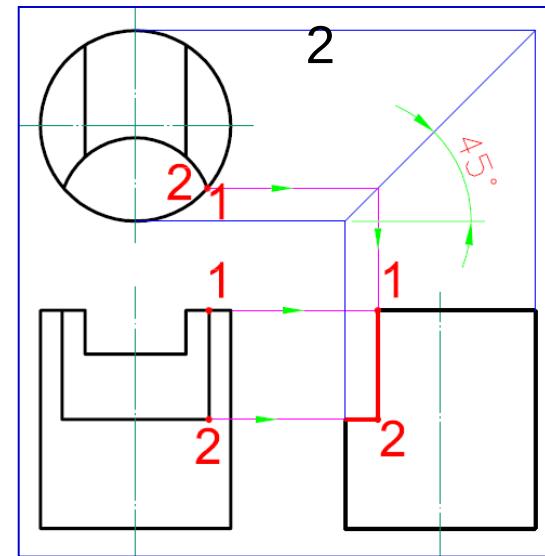
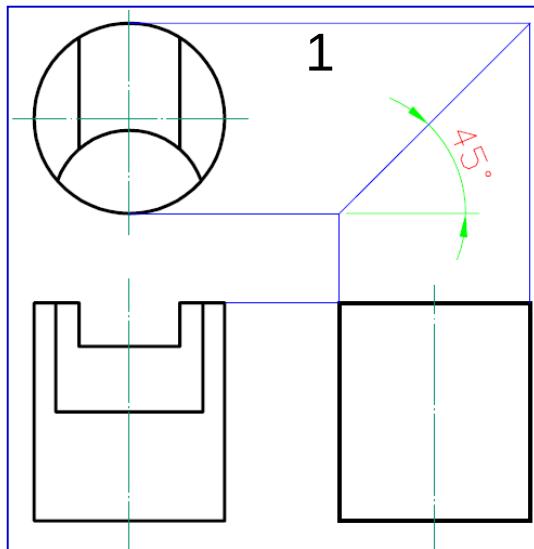
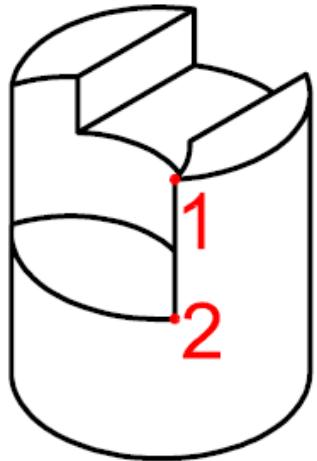
反射線法繪右側視圖例題二 5/6



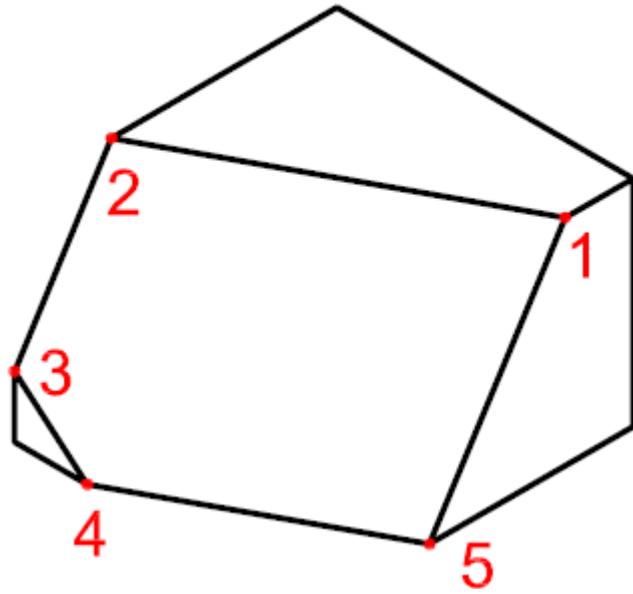
CAD圖



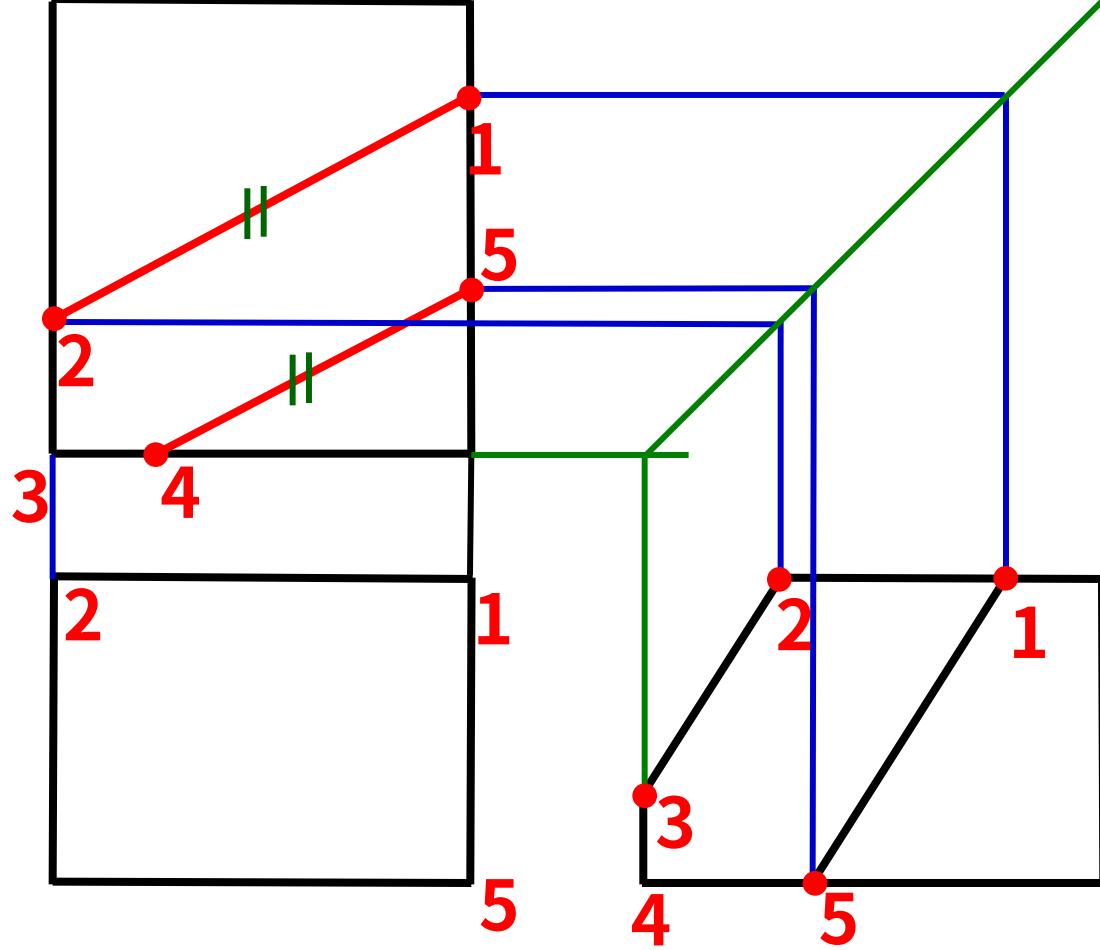
反射線法繪右側視圖例題二 6/6



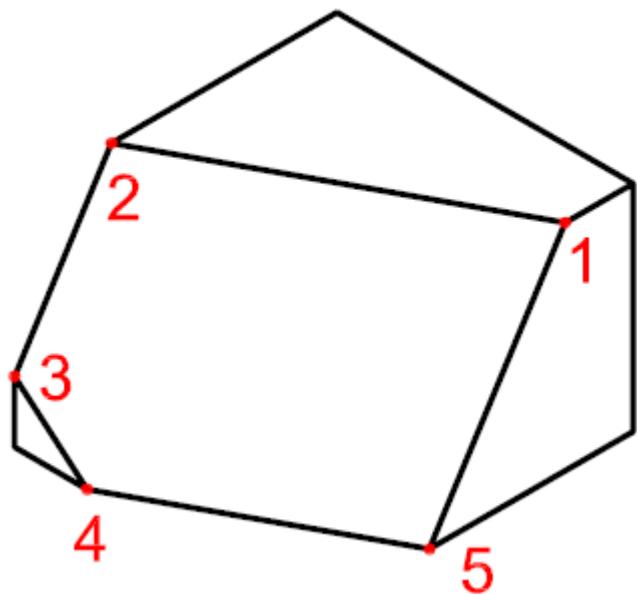
已知兩視圖繪俯視圖例題一 1/4



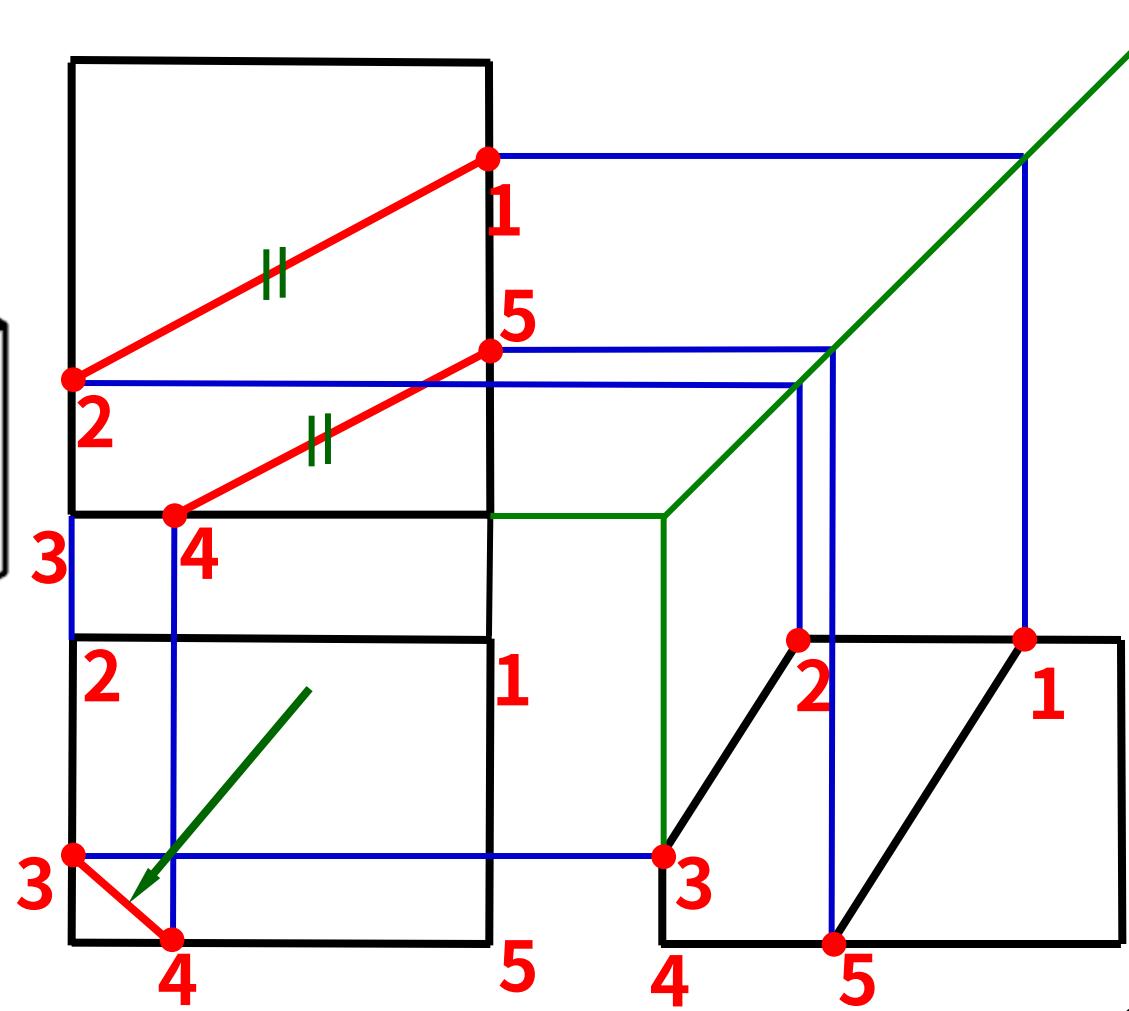
CAD圖



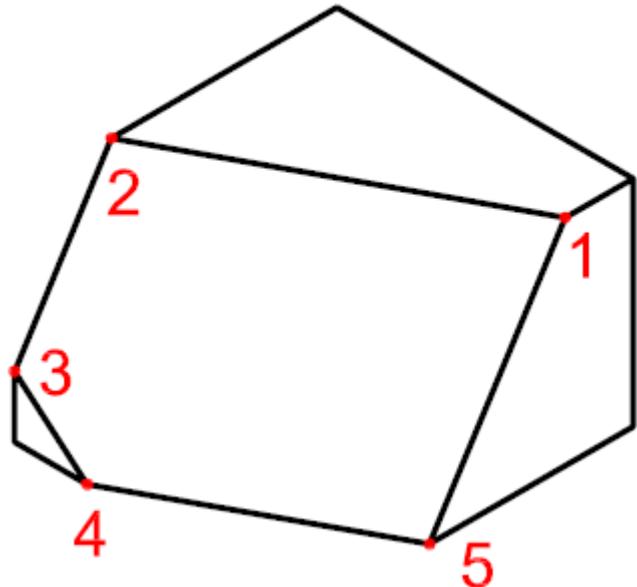
已知兩視圖繪俯視圖例題一 2/4



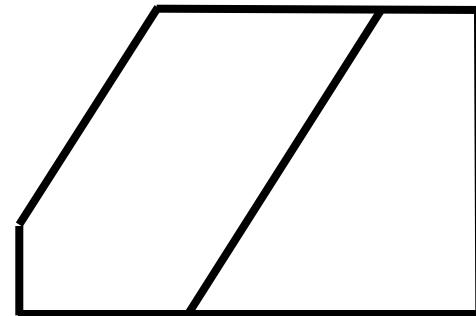
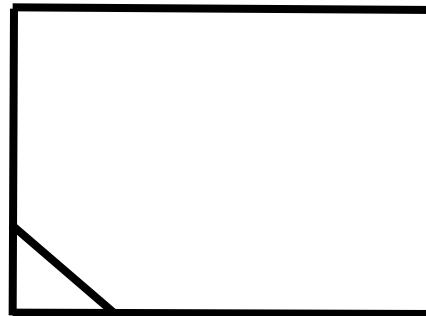
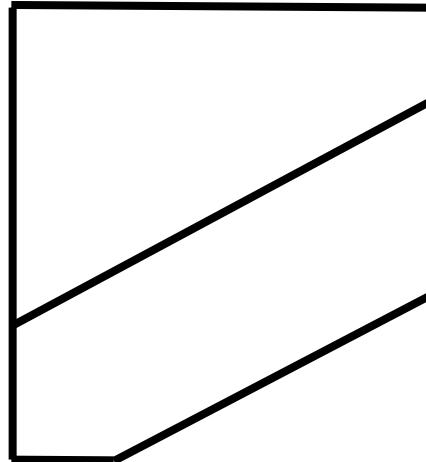
CAD圖



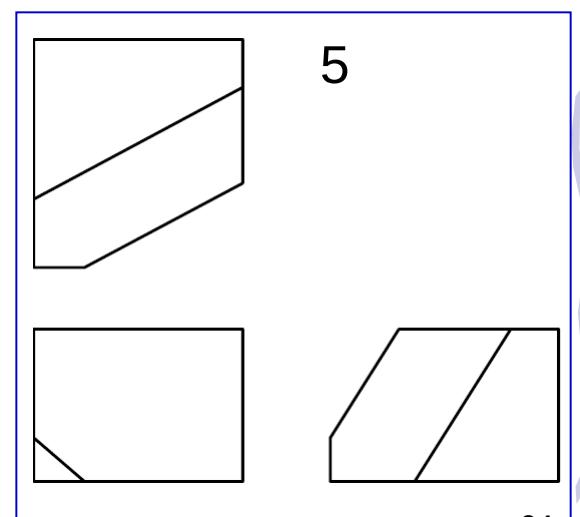
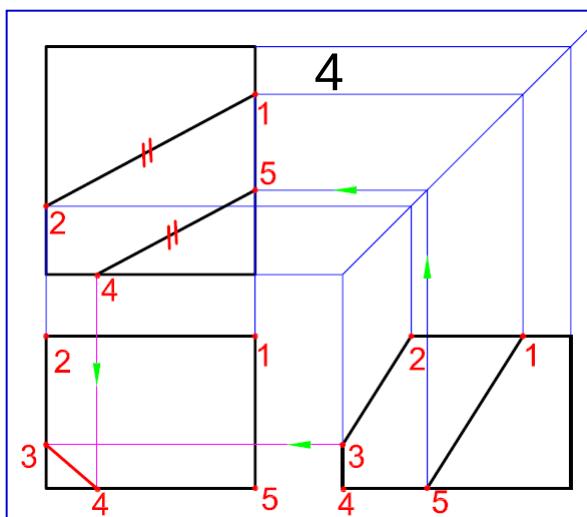
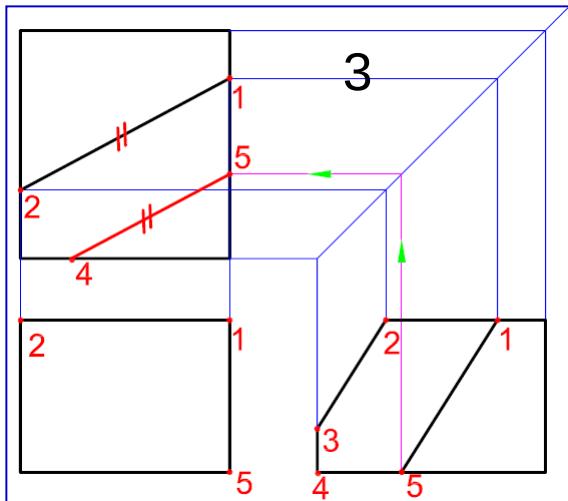
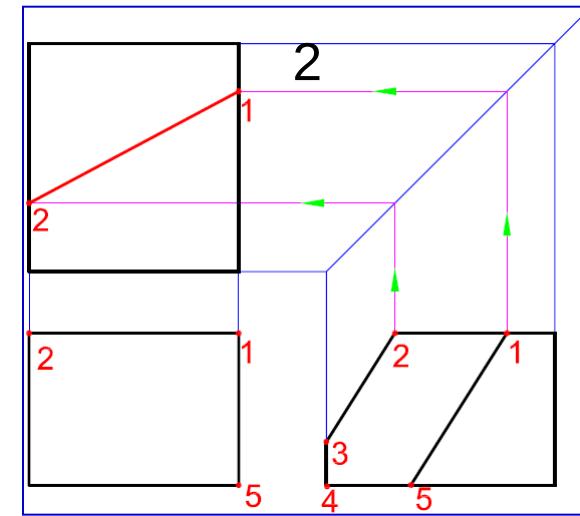
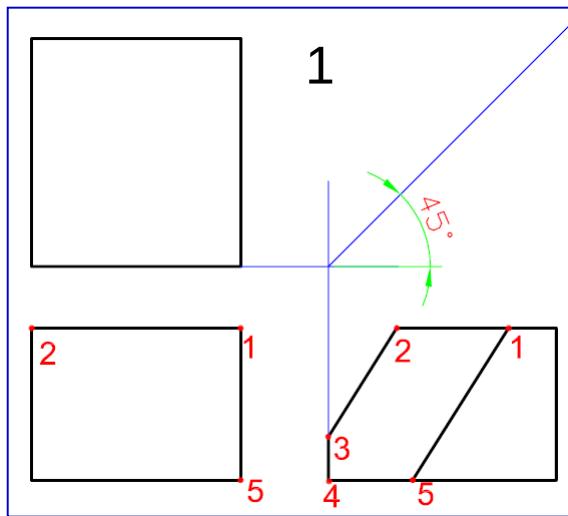
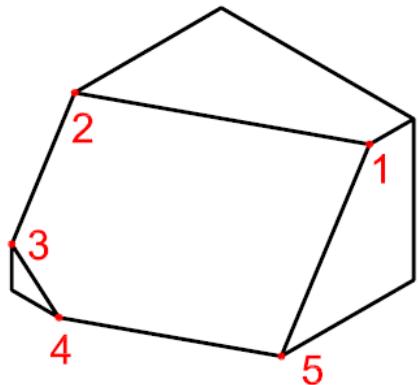
已知兩視圖繪俯視圖例題一 3/4



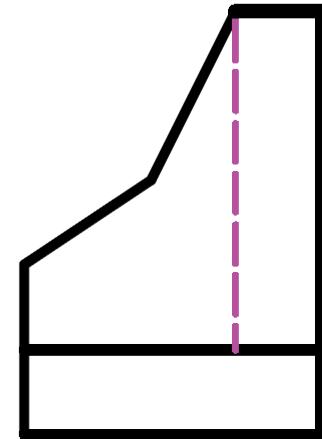
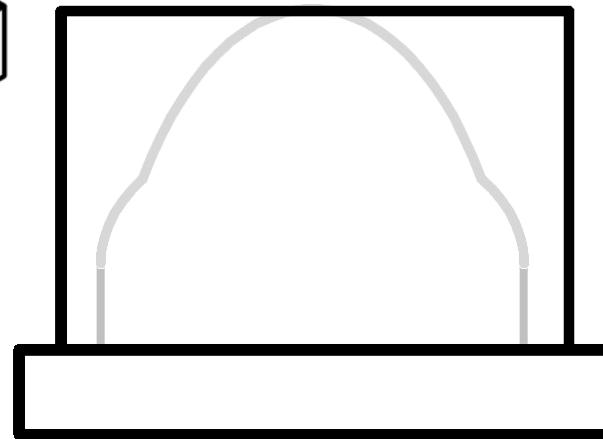
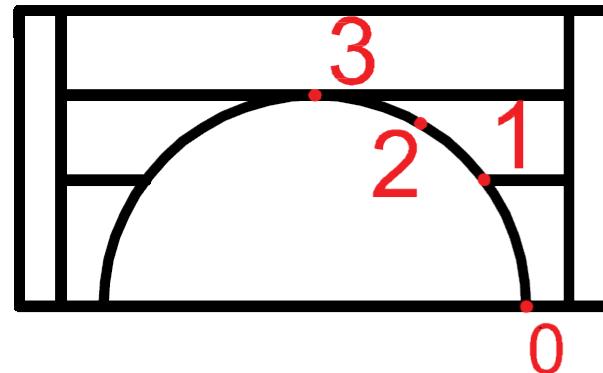
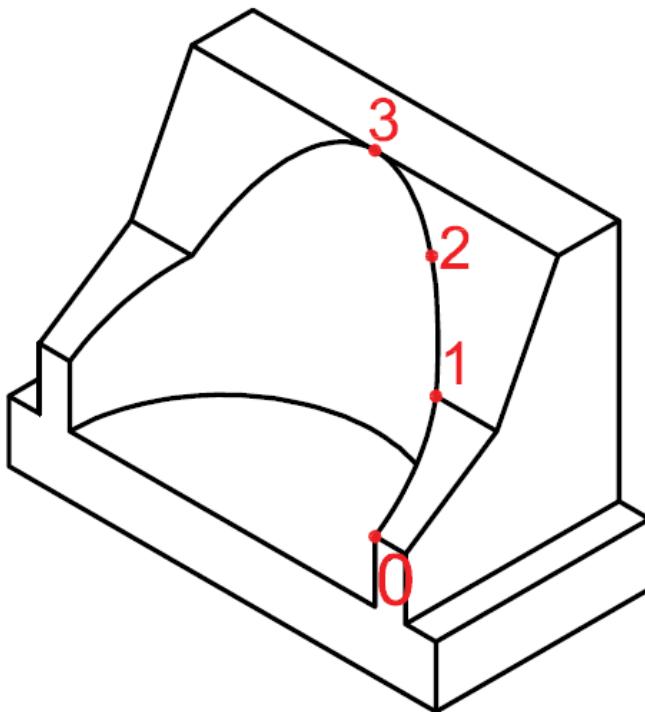
CAD圖



已知兩視圖繪俯視圖例題一 4/4

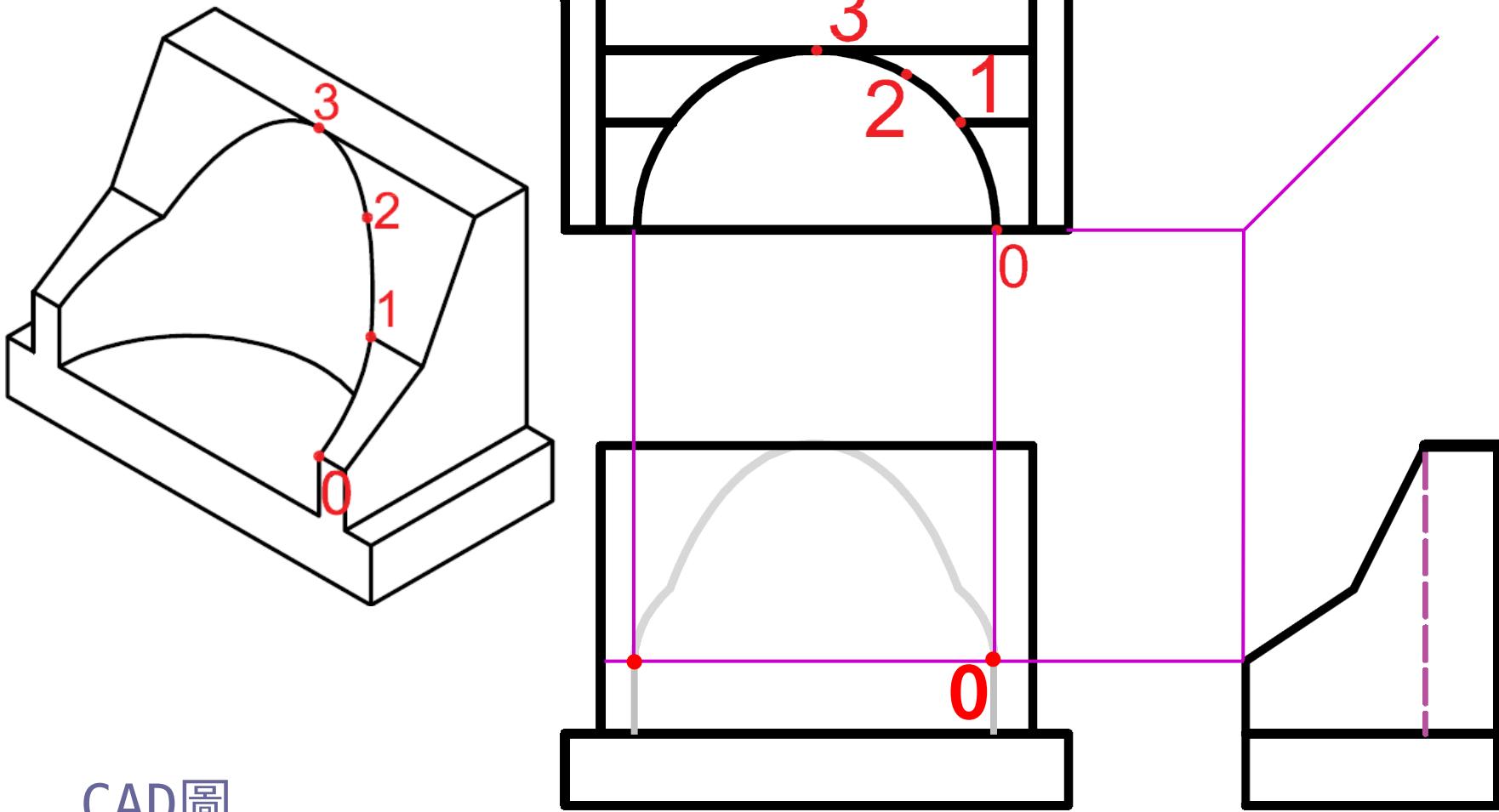


已知兩視圖繪前視圖例題一 1/6

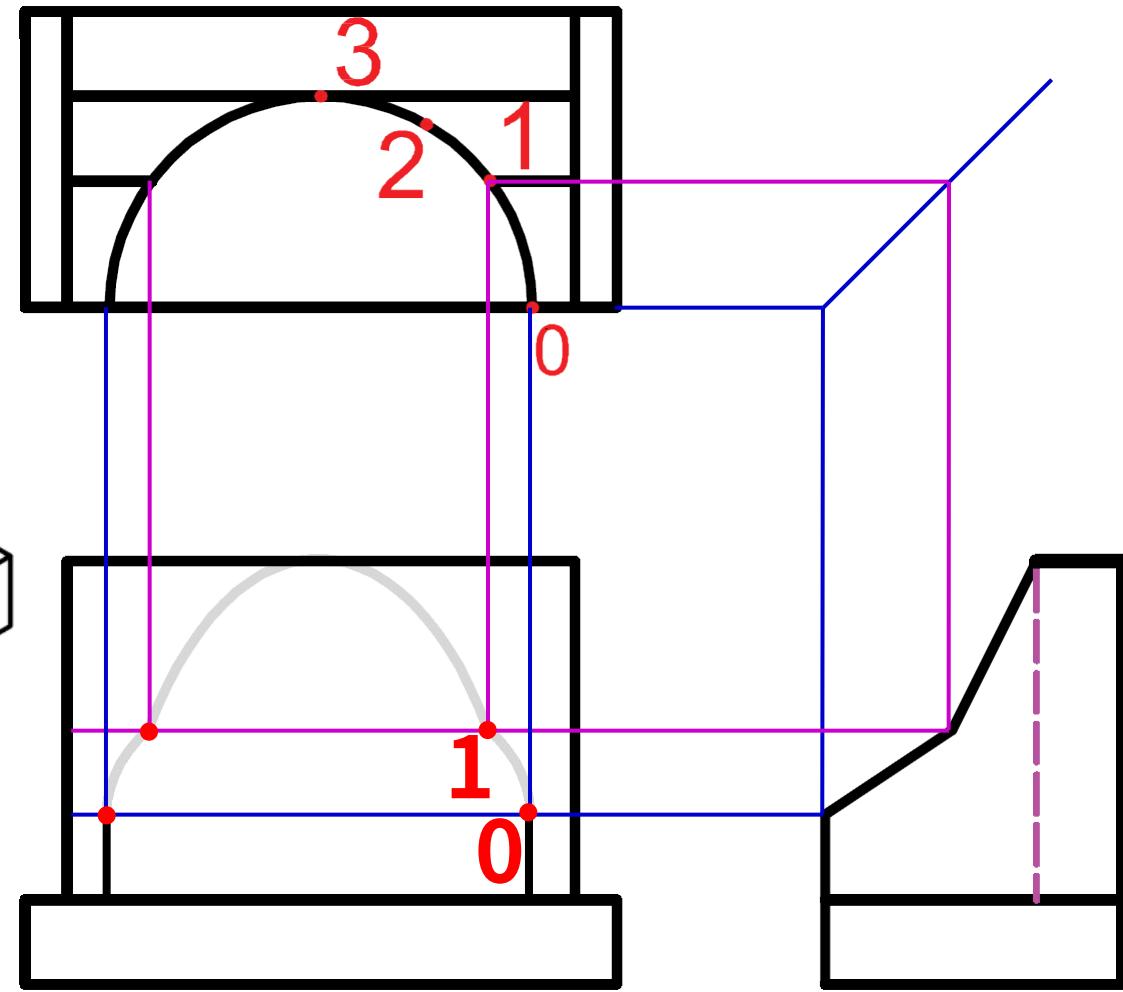
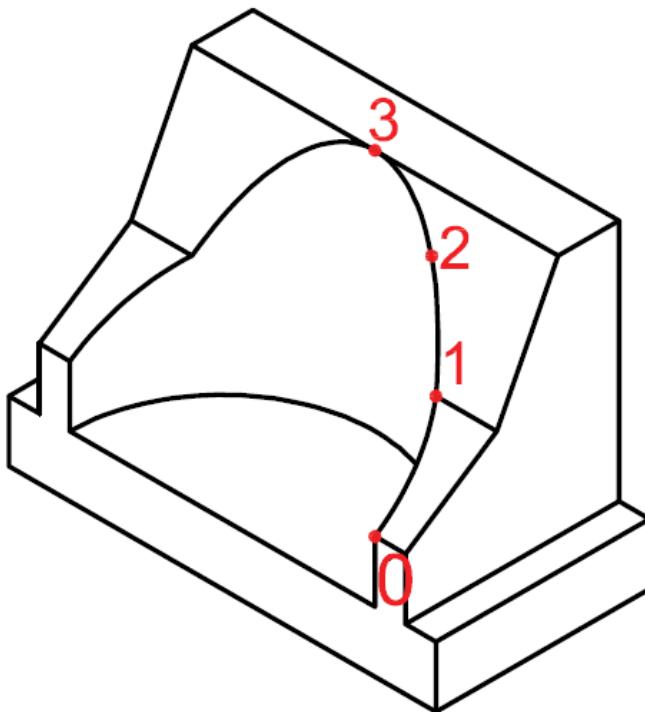


CAD圖

已知兩視圖繪前視圖例題一 2/6

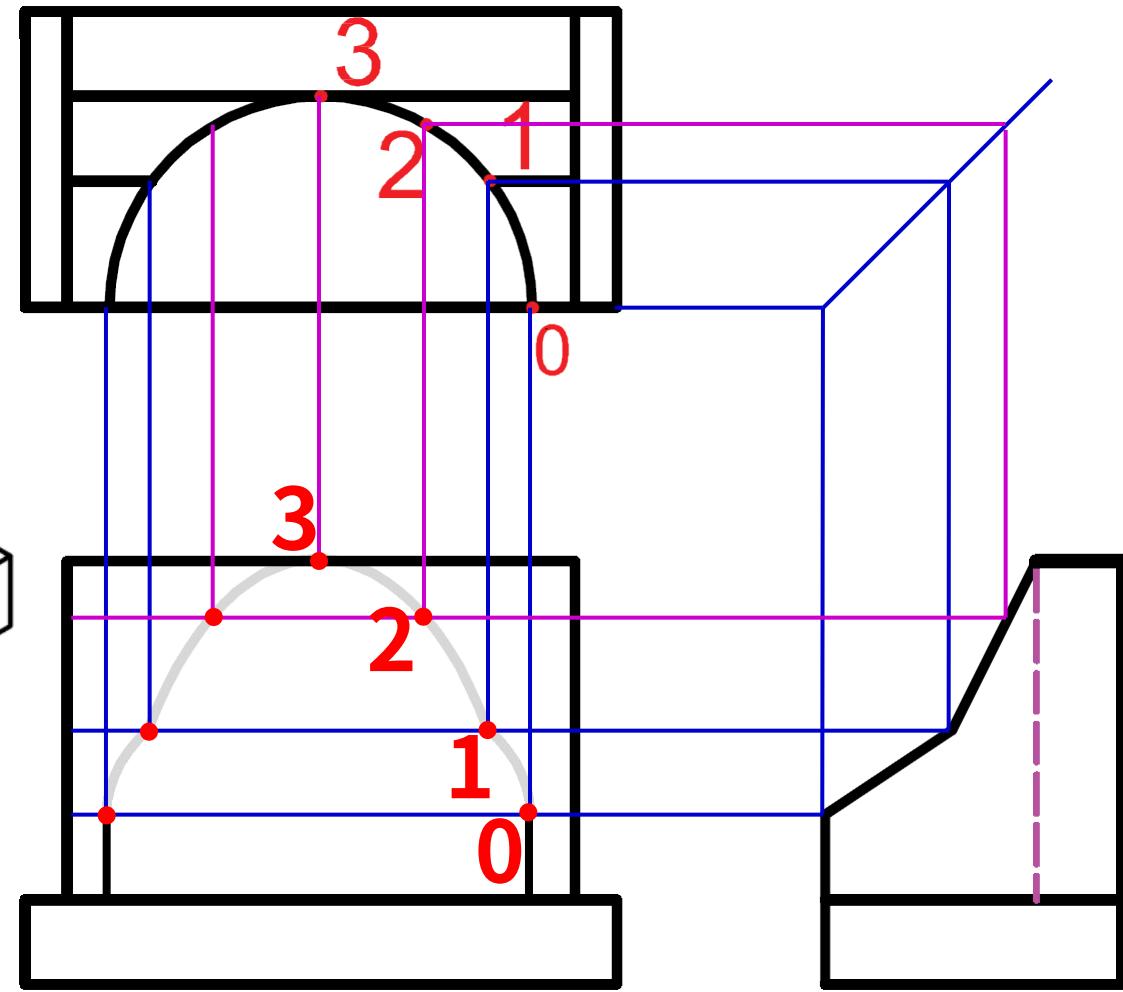
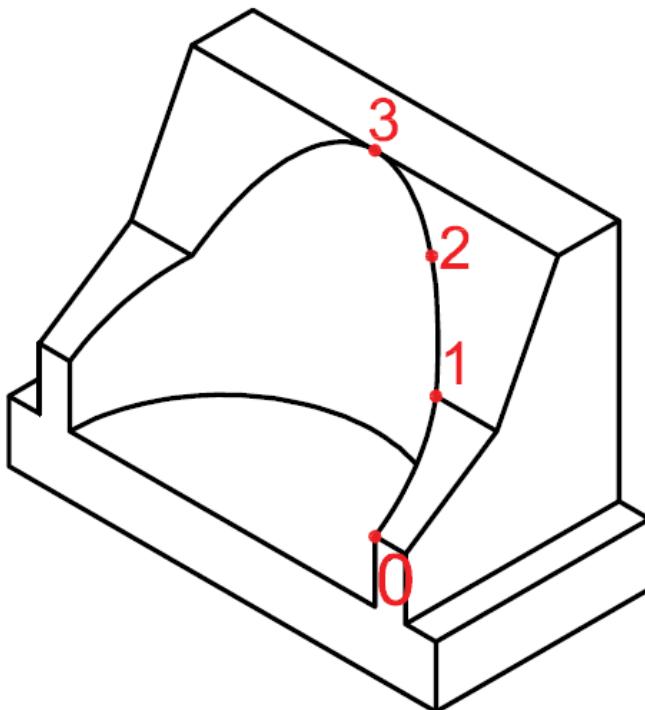


已知兩視圖繪前視圖例題一 3/6



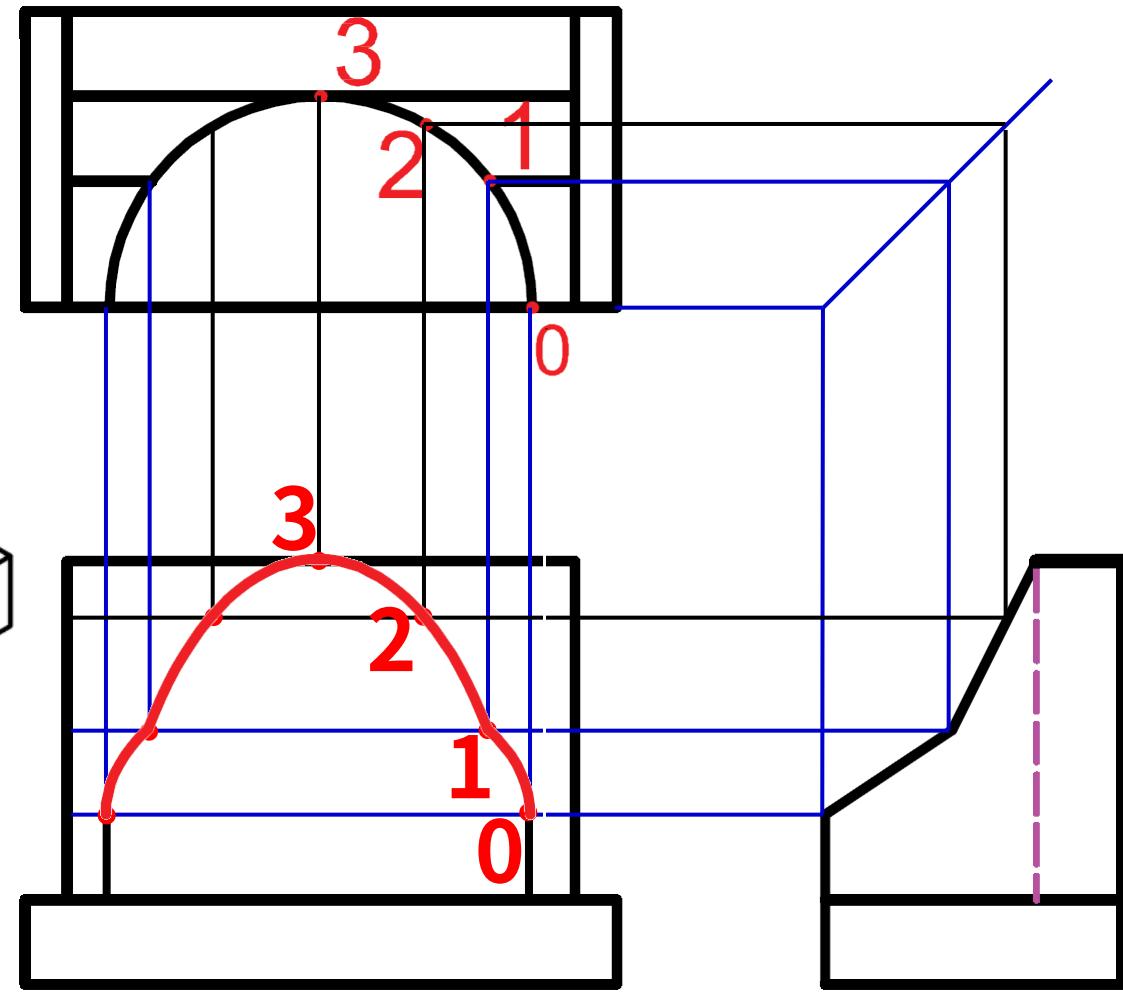
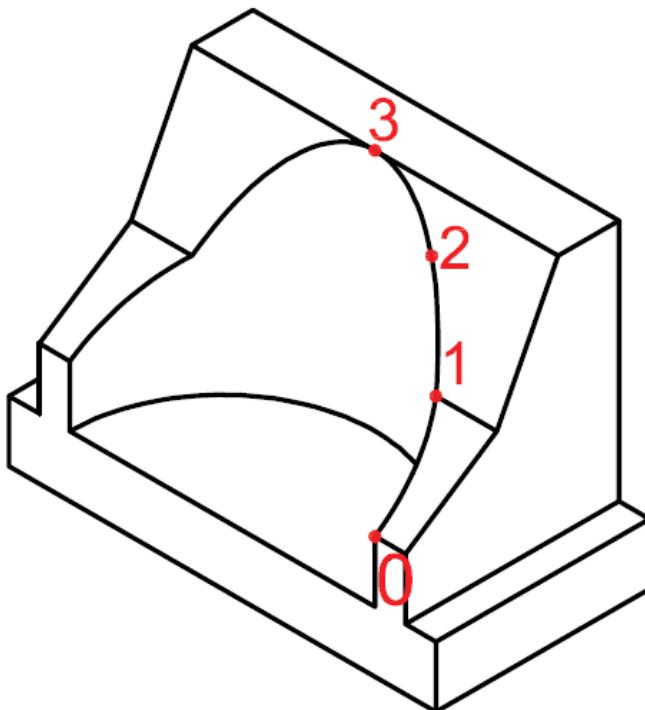
CAD圖

已知兩視圖繪前視圖例題一 4/6



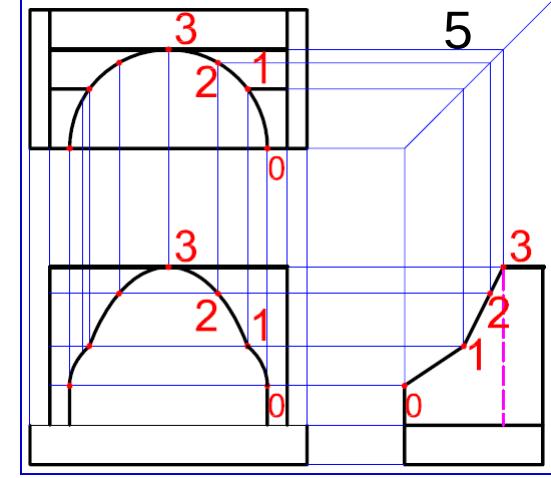
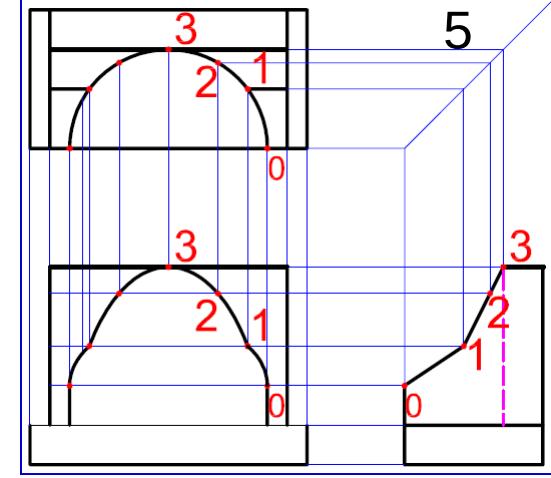
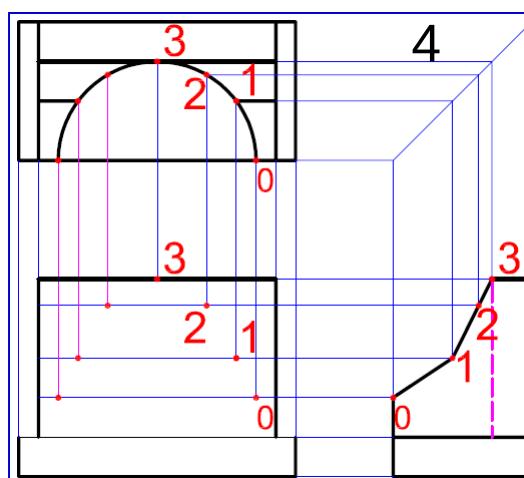
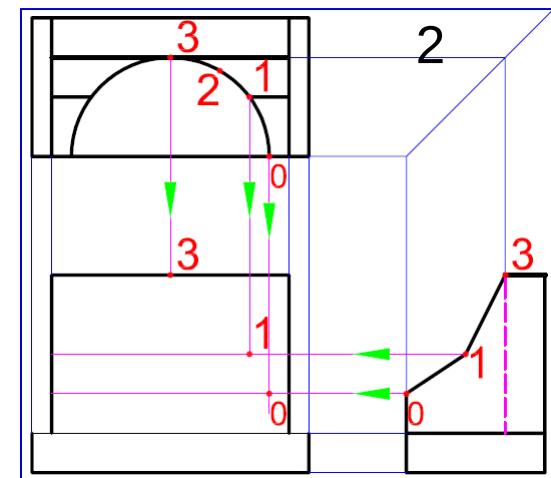
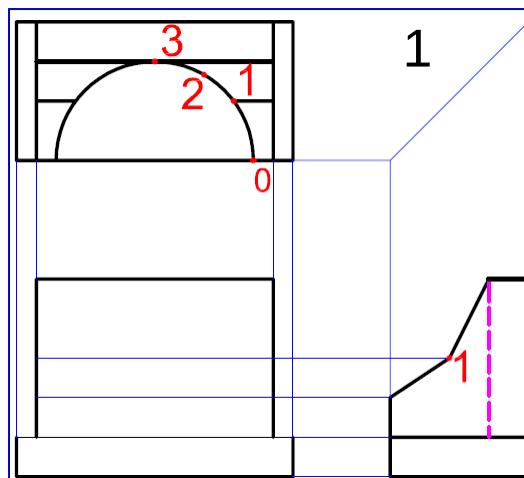
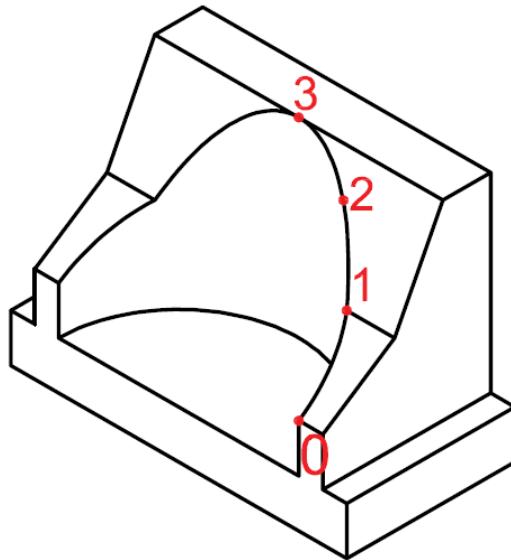
CAD圖

已知兩視圖繪前視圖例題一 5/6

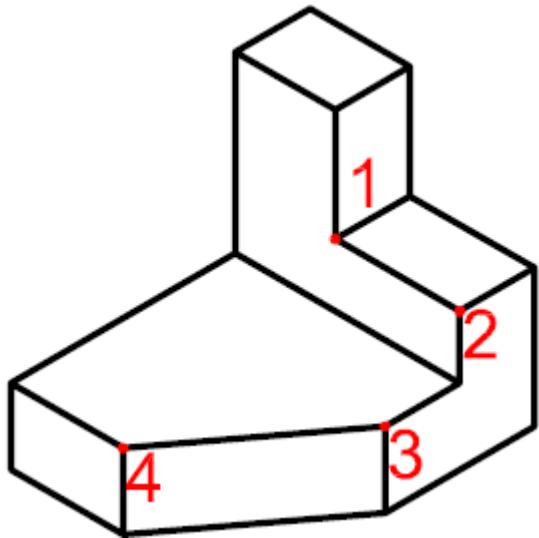


CAD圖

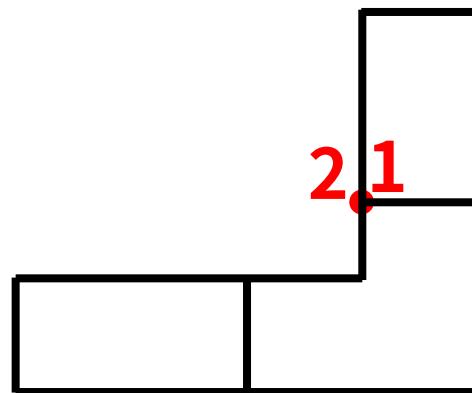
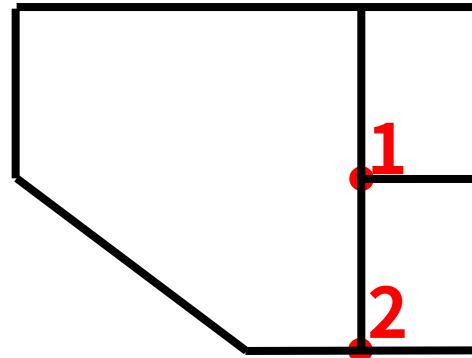
已知兩視圖繪前視圖例題一 6/6



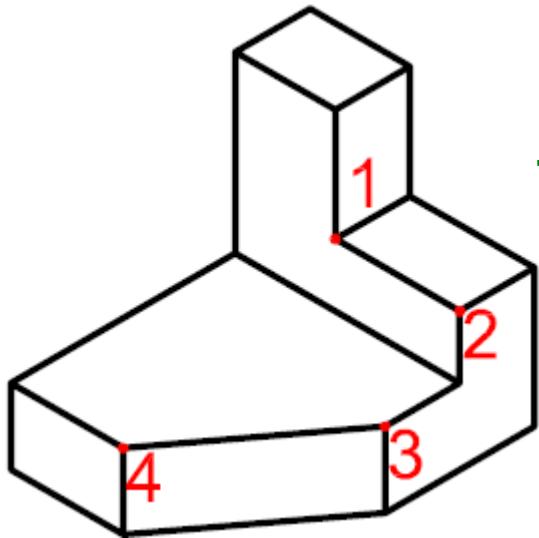
已知兩視圖繪左側視圖 -1/8



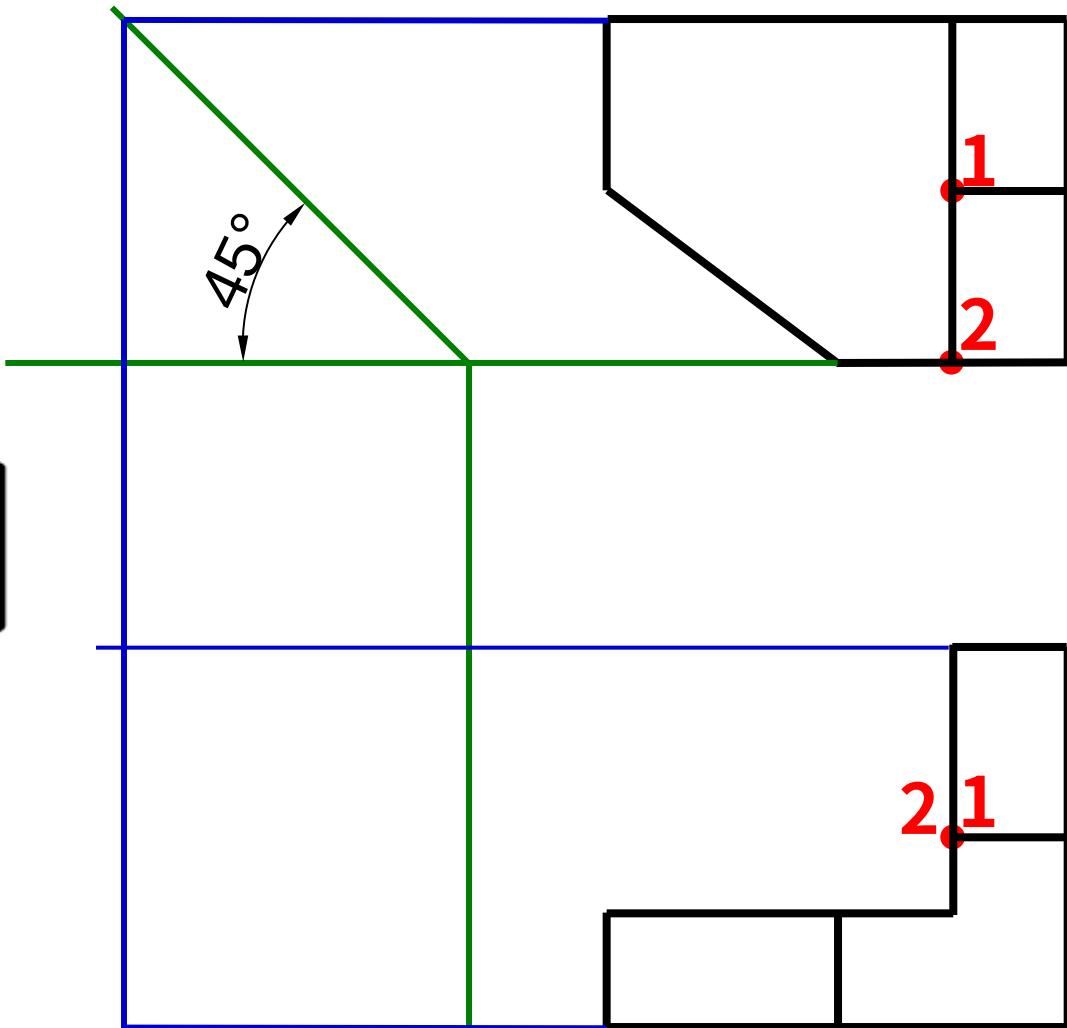
CAD 圖



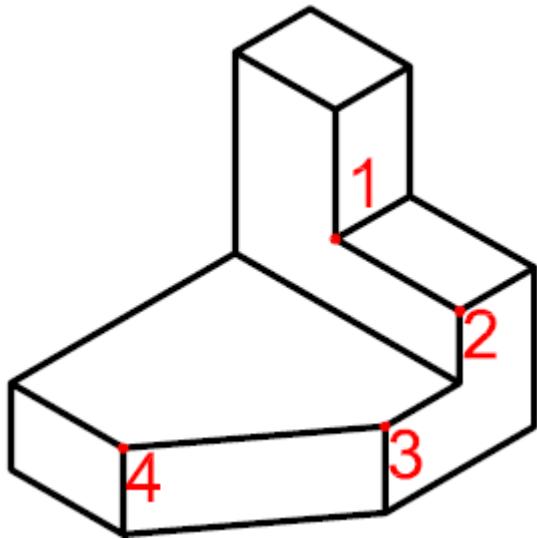
已知兩視圖繪左側視圖 -2/8



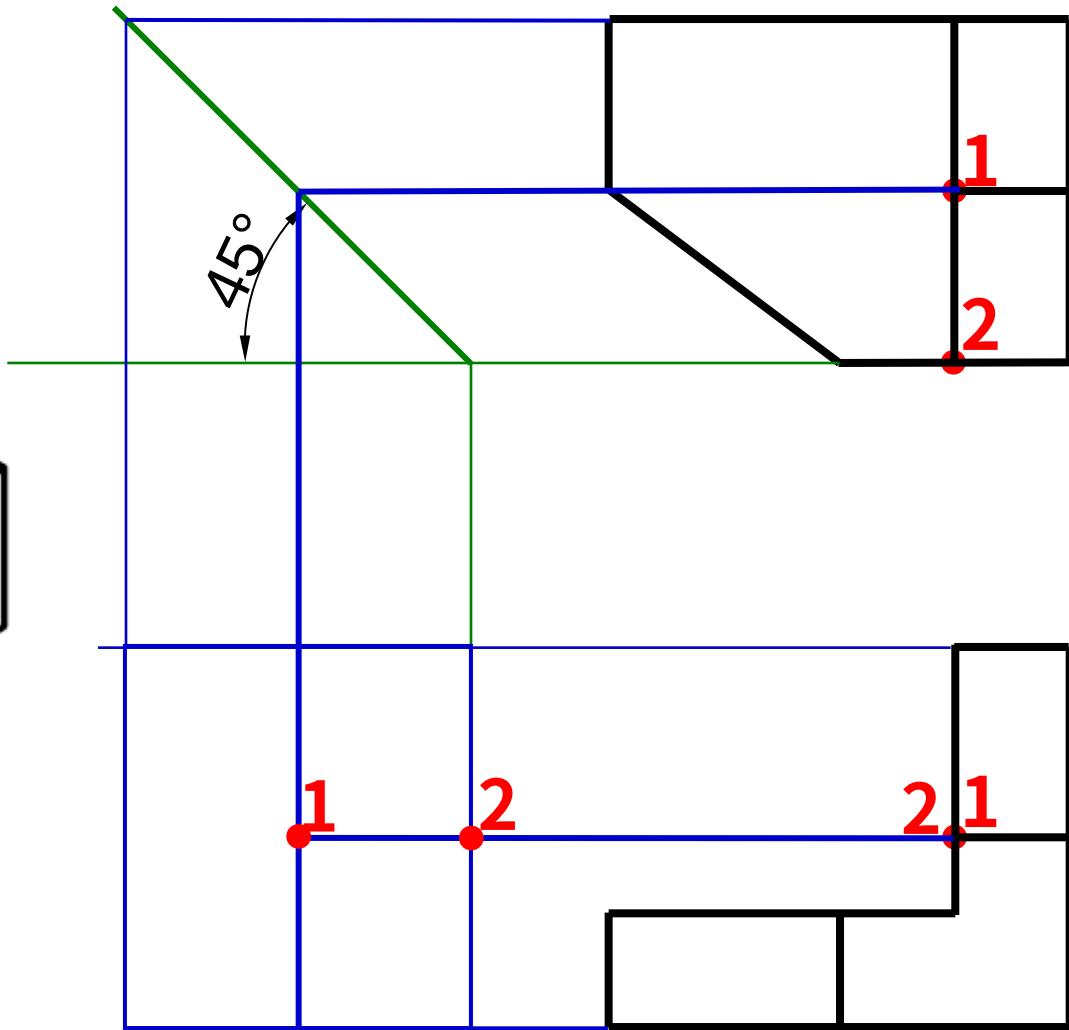
CAD 圖



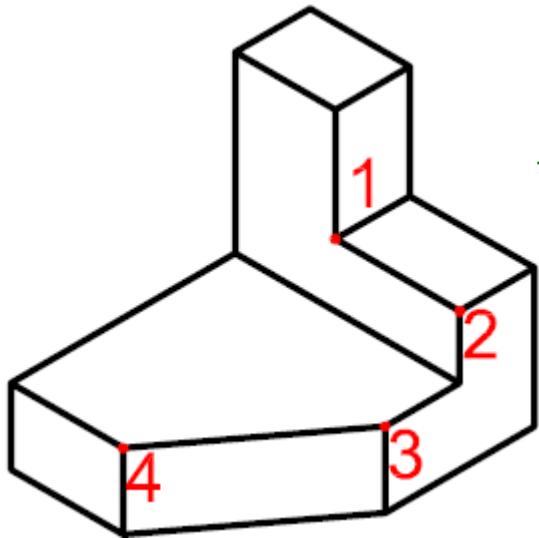
已知兩視圖繪左側視圖 -4/8



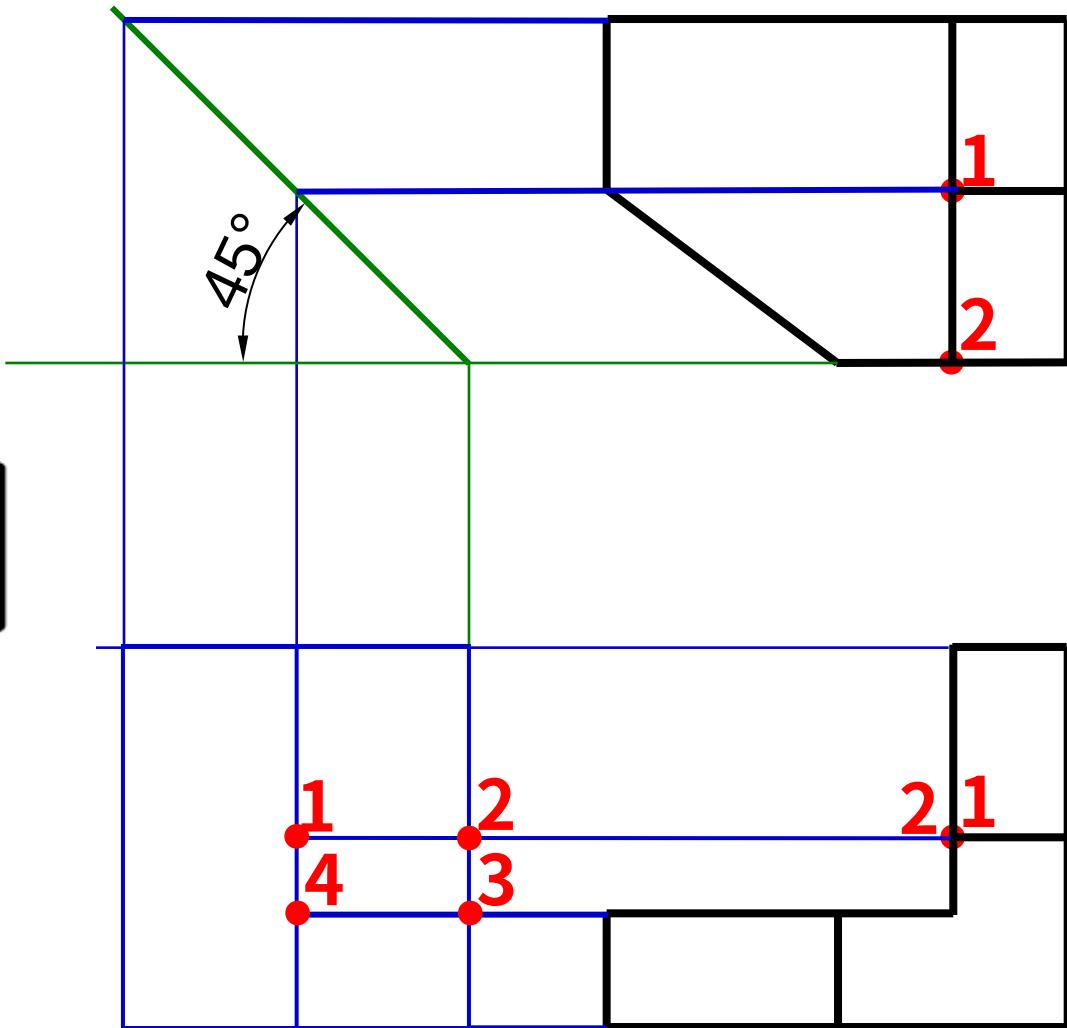
CAD 圖



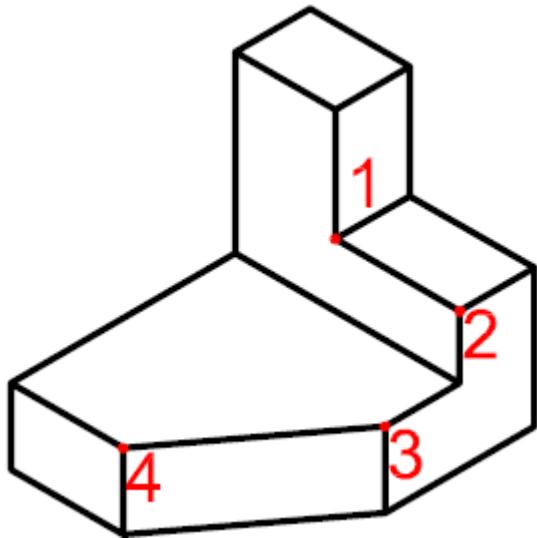
已知兩視圖繪左側視圖 -5/8



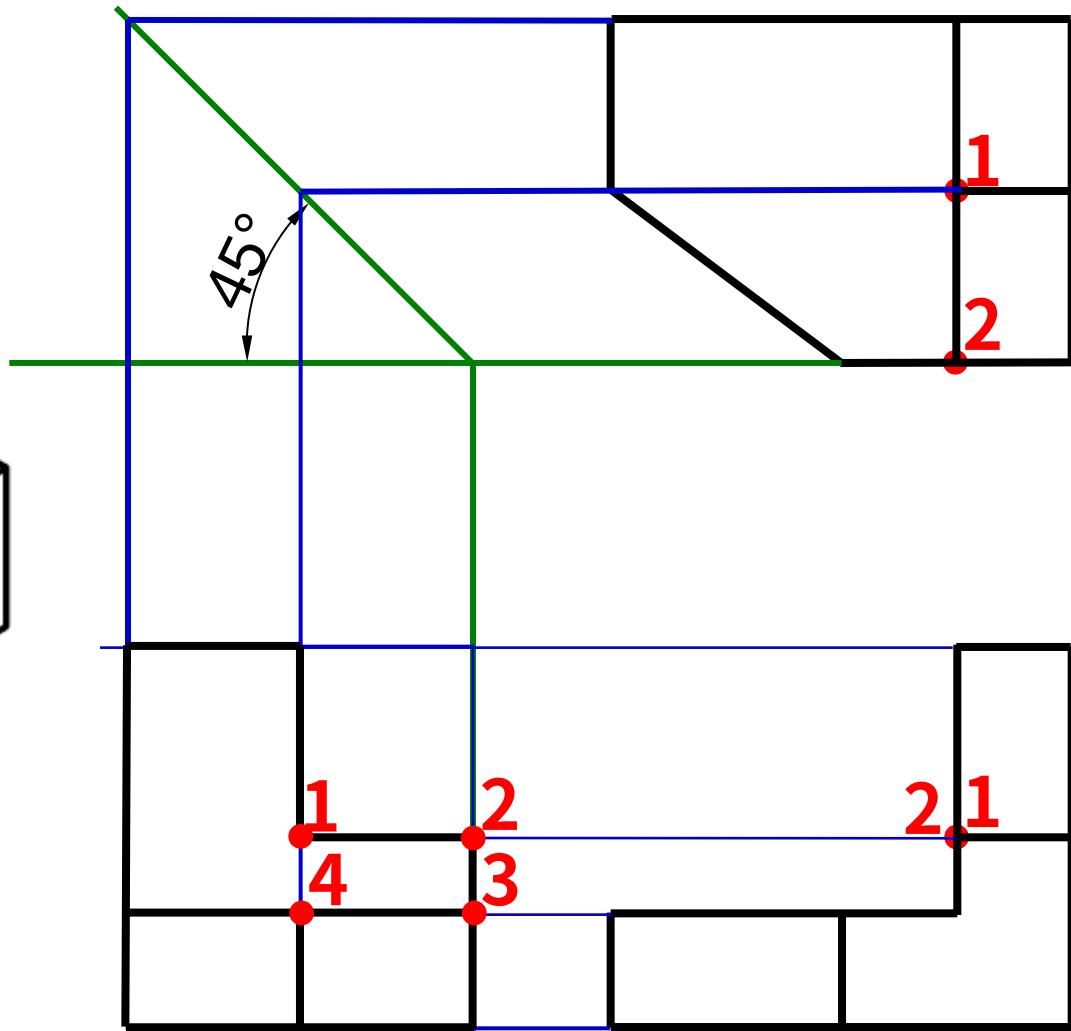
CAD 圖



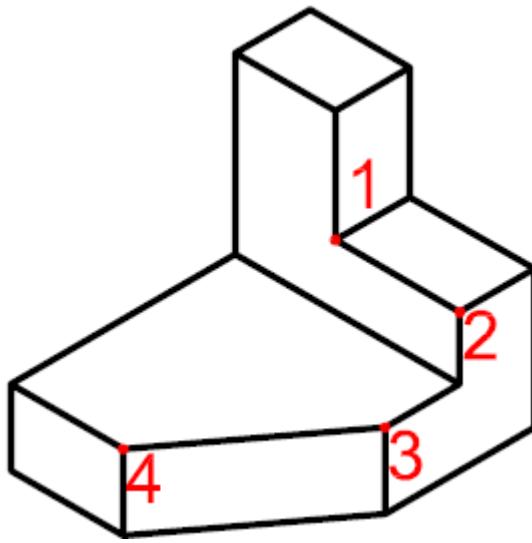
已知兩視圖繪左側視圖 -6/8



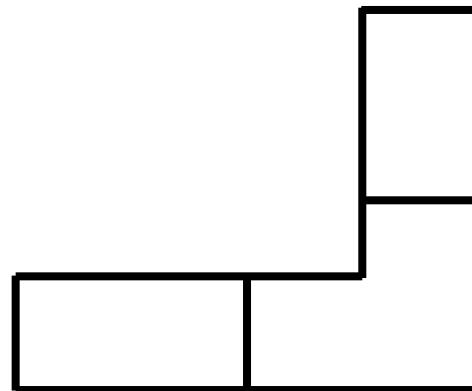
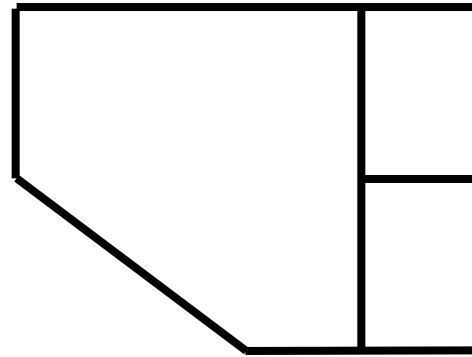
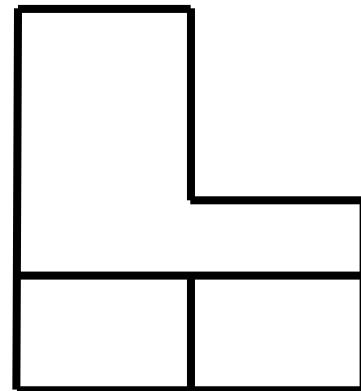
CAD 圖



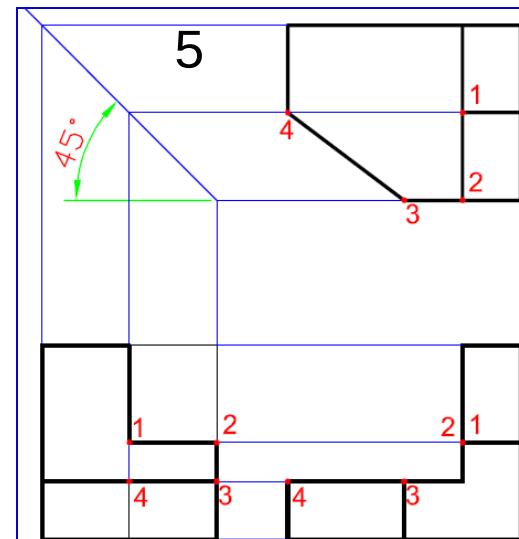
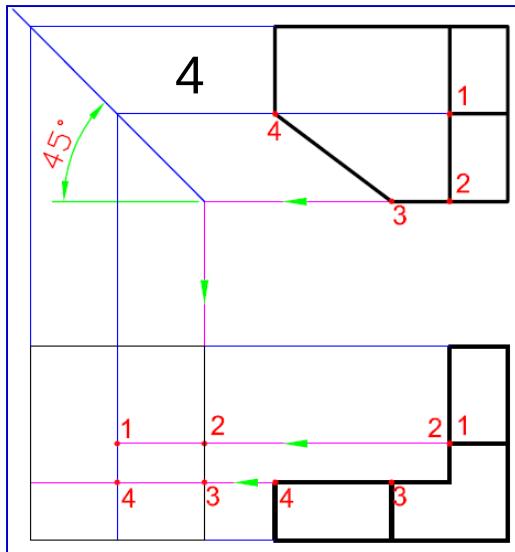
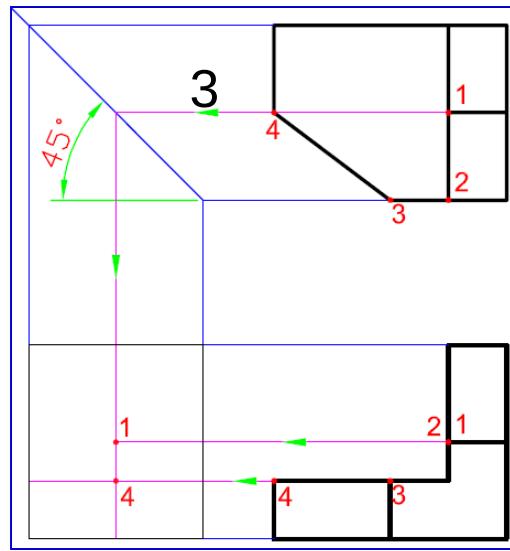
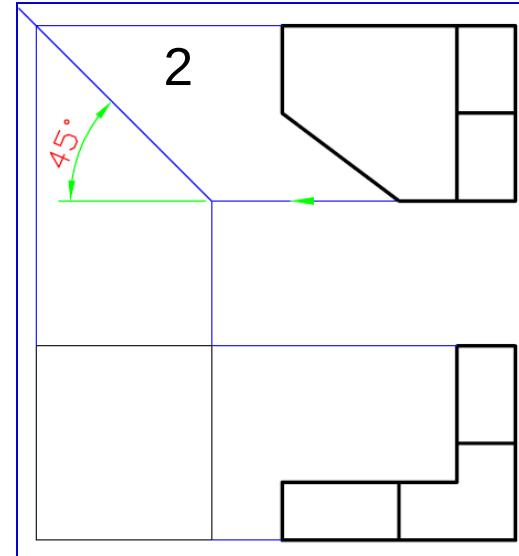
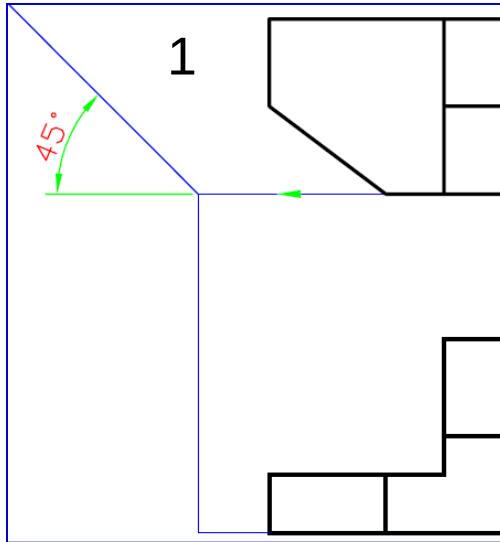
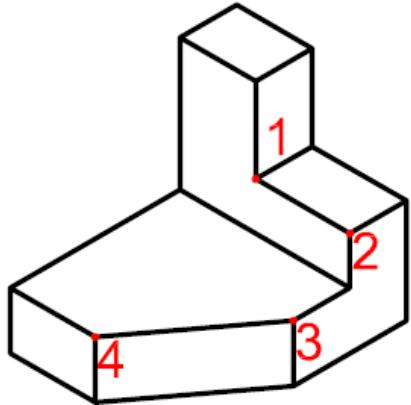
已知兩視圖繪左側視圖 -7/8



CAD 圖



已知兩視圖繪左側視圖 -8/8

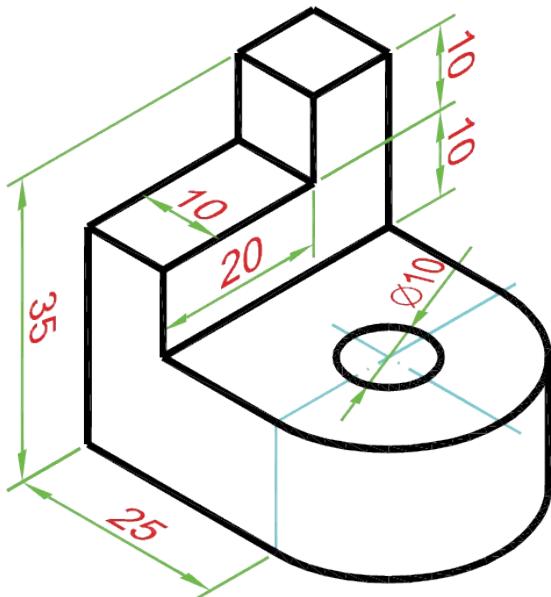


繪圖之步驟

- 工程圖之繪製須按一定之步驟，以提高繪圖的效率，並避免錯誤的產生。
- 以手工繪製時，三個視圖同時繪製較逐一畫各視圖效率高。
- 電腦繪製則逐一畫各視圖效率高
- 手工繪製之步驟如下：

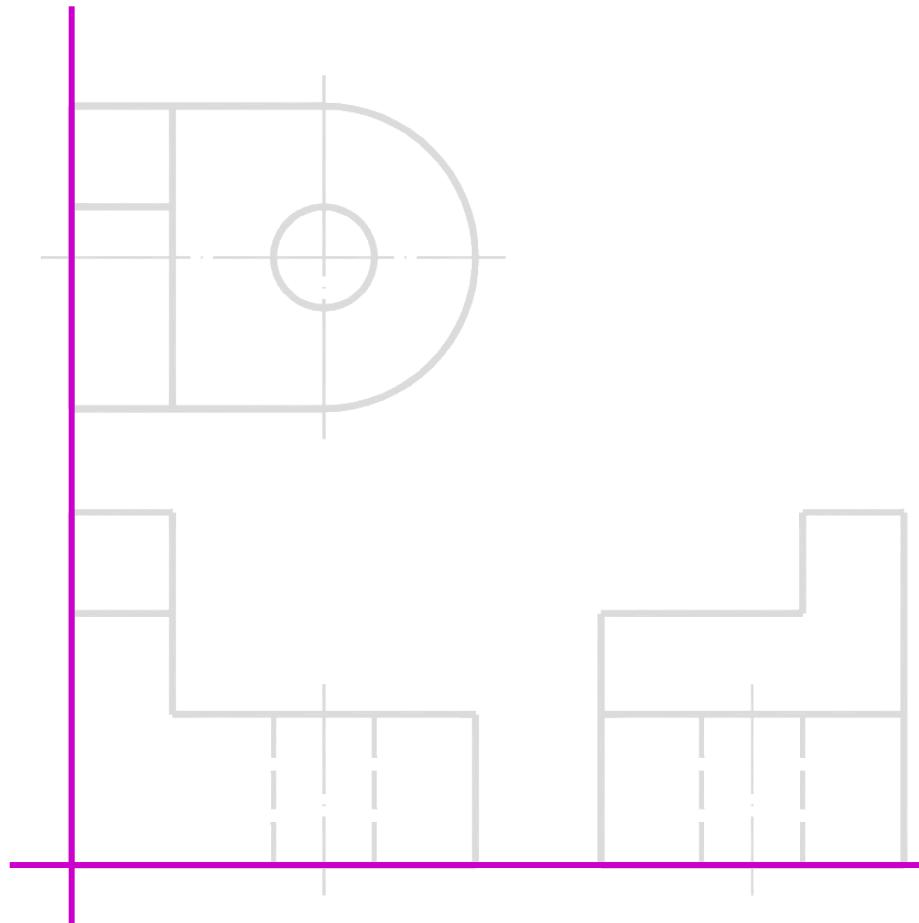
繪圖之步驟 1/7

- 根據物體的特徵，決定採用前視圖的方向與視圖的類別。



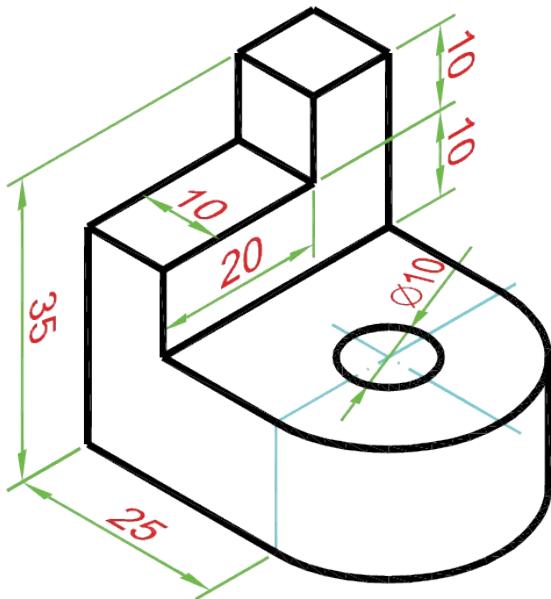
CAD 圖

CAD-AVT

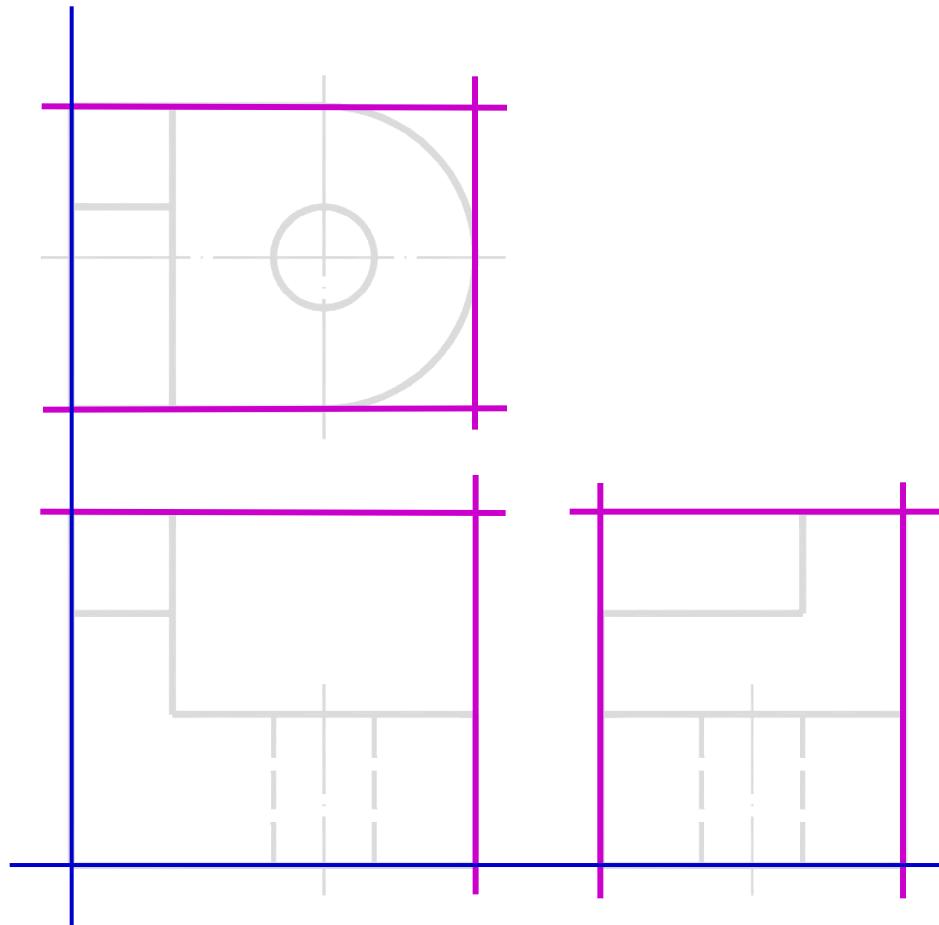


繪圖之步驟 2/7

- 決定視圖的比例大小與佈局。



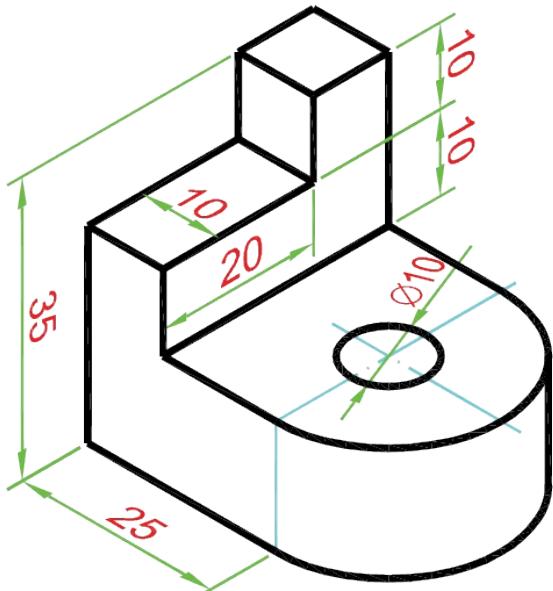
CAD 圖



CAD -
AVT

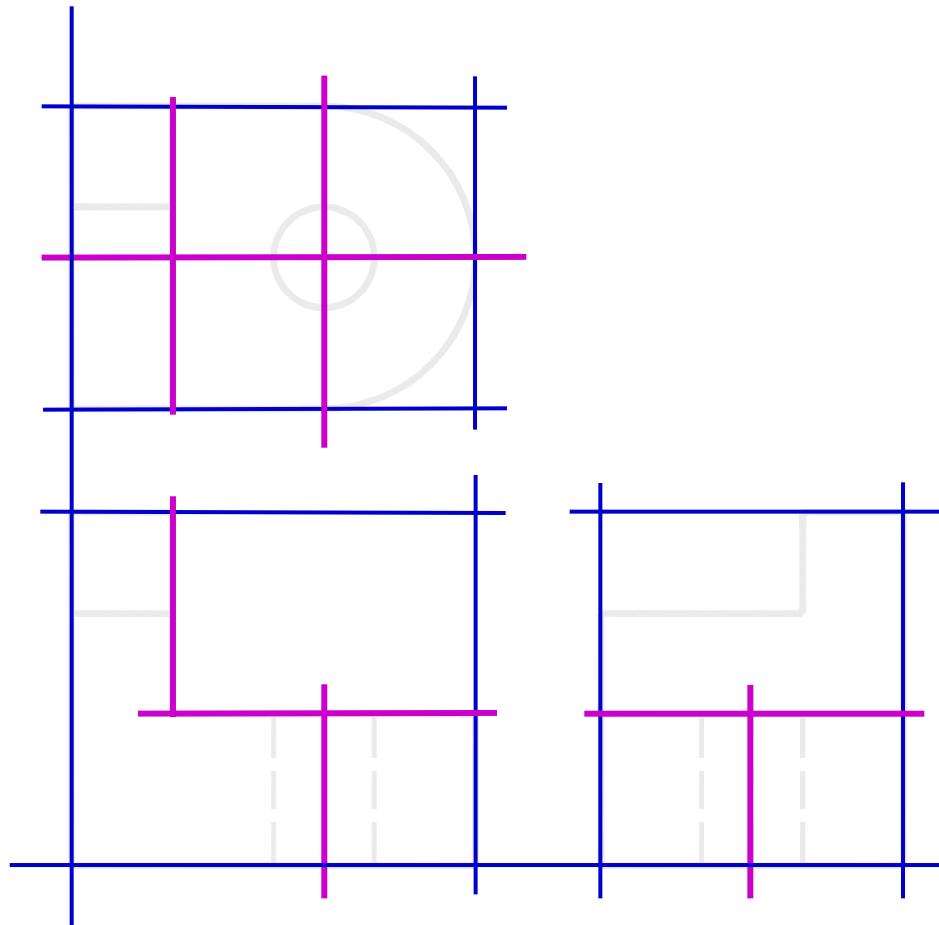
繪圖之步驟 3/7

- 畫各視圖之中心線、基準線等。



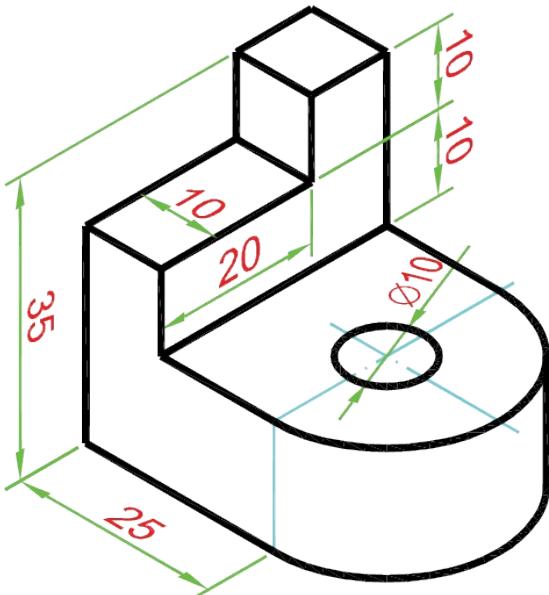
CAD 圖

CAD-AVT



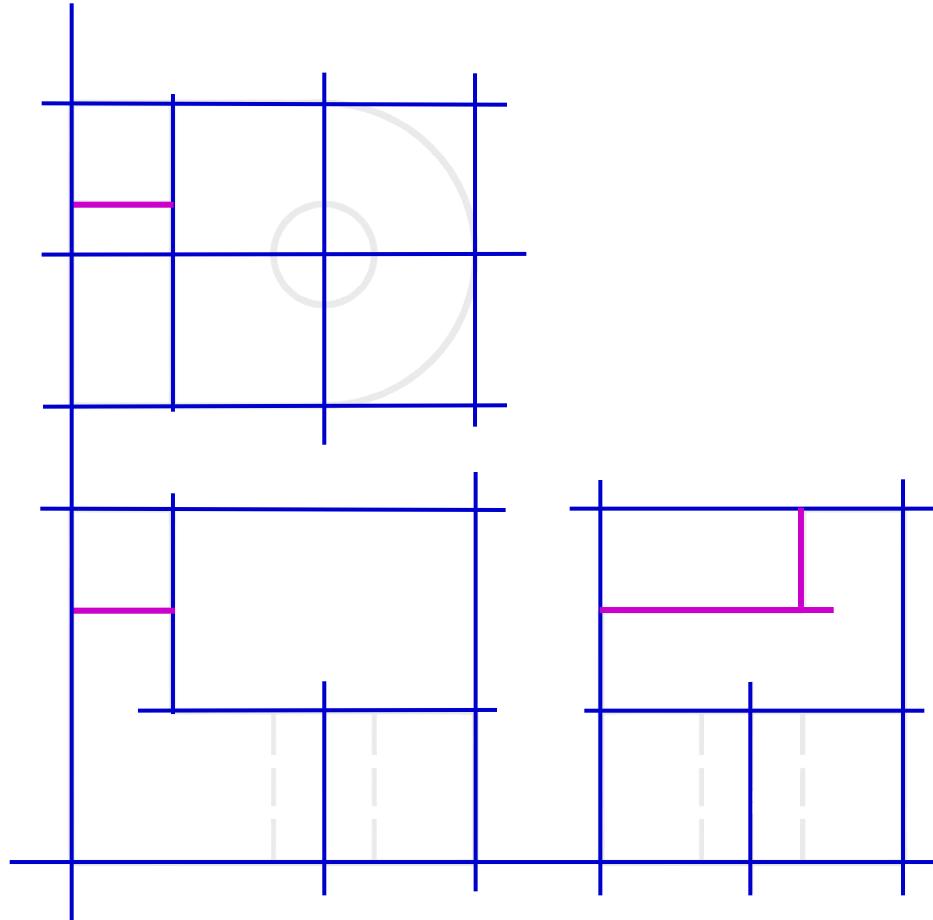
繪圖之步驟 4/7

- 定出主要點、線的位置。



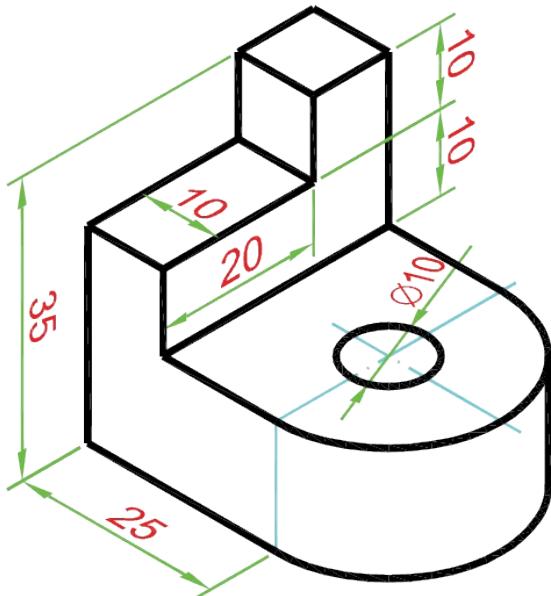
CAD 圖

CAD-AVT

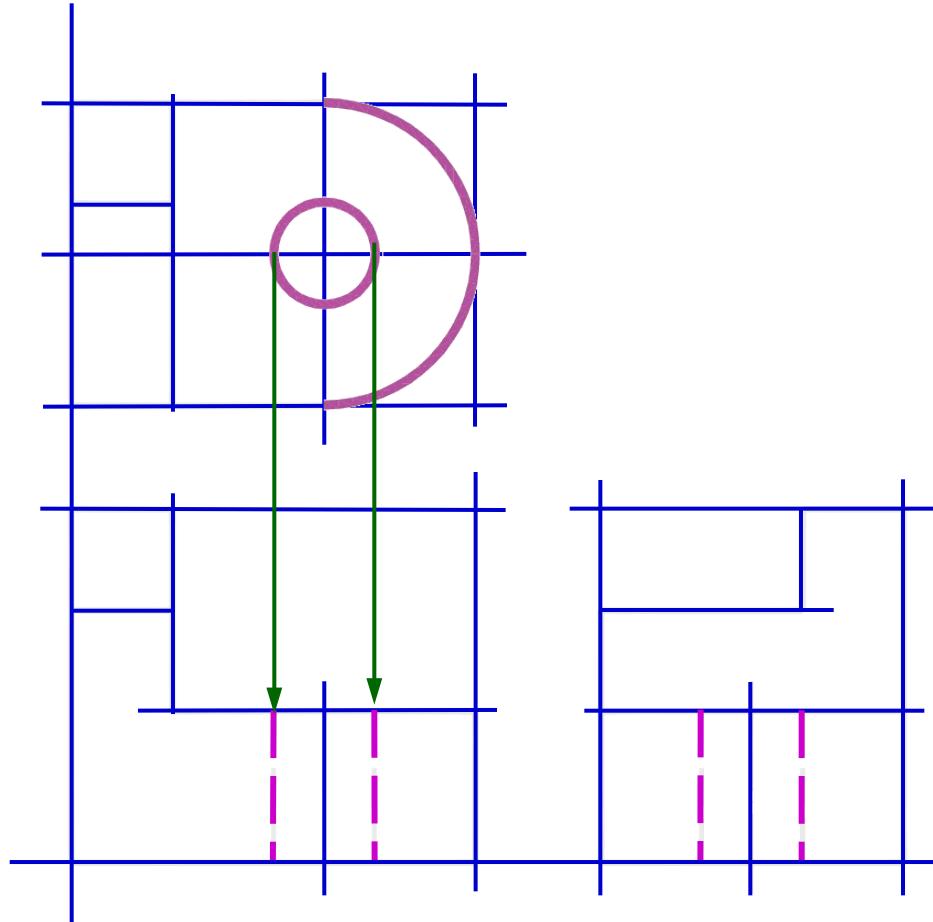


繪圖之步驟 5/7

- 以手工繪製時先繪圓弧再繪直線。



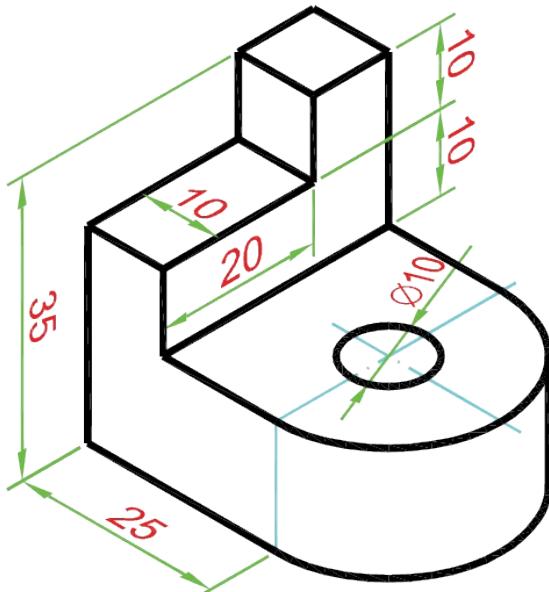
CAD 圖



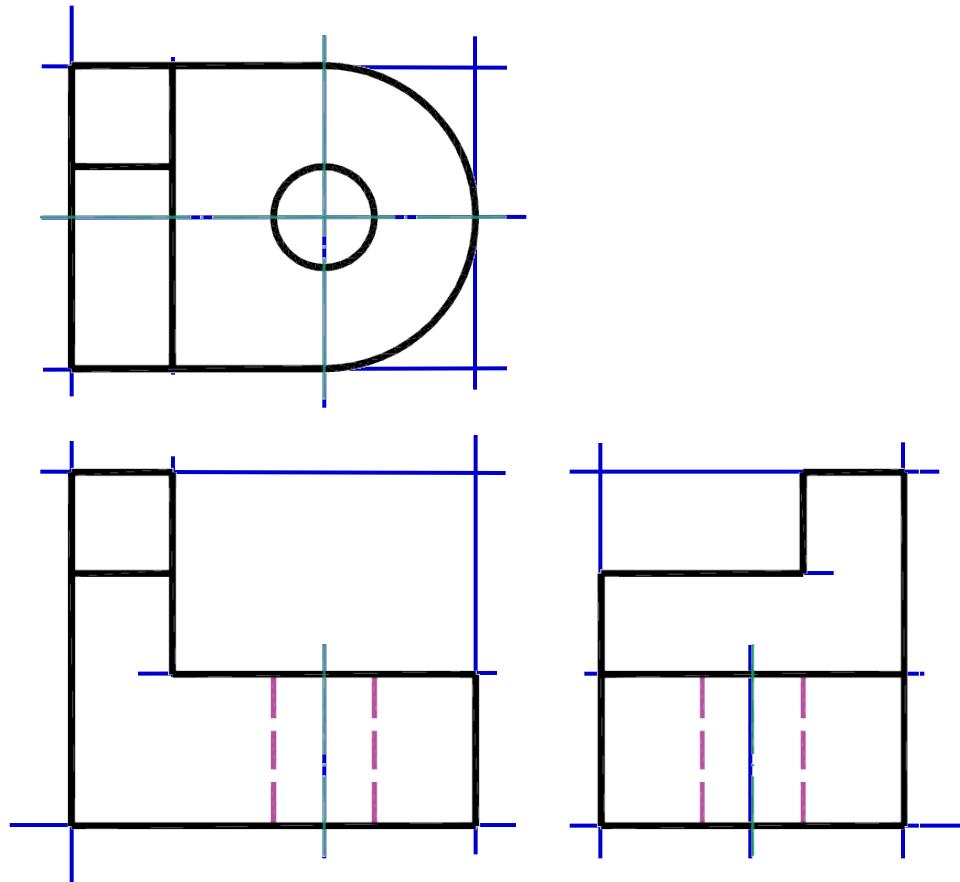
CAD -
AVT

繪圖之步驟 6/7

- 按線條之粗細與類別繪製，擦除不用之製圖線，完成視圖之繪製。



CAD 圖



CAD-
AVT

繪圖之步驟 7/7

