



## Folhas de Desenho e Caligrafía Técnica

*Centro de Engenharias e Ciências Sociais  
Aplicadas (CECS)*  
***BC-1416 Fundamentos de Desenho e Projeto***

# Apresentação do Curso

Prof. Fernando Gasi

# Objetivo da Disciplina

Apresentar:

- conceitos de desenho técnico

# Competências

Ao concluir a disciplina o estudante deverá ser capaz de:

- interpretar vistas e projeções de peças e montagens
- desenhar esboços de peças e montagens
- desenhar peças/montagens utilizando ferramentas Solidworks
- verificar interferência e movimento entre componentes de uma montagem

# Metodologia e Recursos Didáticos Pedagógicos

São quatro (04) horas-aula semanais divididas em:

- 1 hora-aula semanal de apresentação de conceitos teóricos
- 3 horas-aula semanais para desenvolver exercícios em sala de aula.

Os alunos desenvolverão atividades e exercícios extra-classe, individuais e em grupo, inclusive com a utilização da Biblioteca e Laboratório de Informática

Os alunos contarão com apoio de monitores em horários pré-determinados, para resolução de dúvidas

# Conteúdo Programático

## Parte 1 : Desenho técnico

1. Caligrafia técnica
2. Projeções e Interpretação de vistas
3. Perspectivas
4. Cortes e seções
5. Dimensões e cotas
6. Escalas

## Avaliação - Conceito

- **A**: desempenho excepcional, demonstrando excelente compreensão da disciplina
- **B**: bom desempenho, demonstrando capacidade boa de uso dos conceitos da disciplina
- **C**: desempenho adequado, demonstrando capacidade de uso dos conceitos da disciplina e capacidade para seguir em estudos mais avançados
- **D**: aproveitamento mínimo dos conceitos da disciplina, com familiaridade parcial do assunto, mas demonstrando deficiências que exigem trabalho adicional para prosseguir em estudos avançados

## Avaliação - Conceito

- **F**: reprovado. A disciplina deve ser cursada novamente para a obtenção de crédito
- **O**: reprovado por falta. A disciplina deve ser cursada novamente para a obtenção de crédito
- **I**: incompleto. Indica que uma pequena parte dos requerimentos do curso precisa ser completada
- **T**: disciplinas equivalentes cursadas em outras escolas e admitidas pela UFABC



<b>Conceito</b>	<b>Faixas (%)</b>
A	$90 \leq A \leq 100$
B	$80 \leq B < 90$
C	$65 \leq C < 80$
D	$50 < D < 65$
F	$00 \leq F \leq 50$
O	Reprovado por falta, deve cursar novamente a disciplina
I	Incompleto

## **Avaliação – Composição do Conceito Final**

- Exercícios em sala de aula – 20% da nota
- Prova teórica – 40% da nota
- Projeto final – 30% da nota
- Avaliação de exercícios extra aula – 10%

# Prova Substitutiva

Poderá fazer a prova substitutiva quem:

- Faltou na prova, caso em que o aluno deverá apresentar um atestado.

# Bibliografia

## Bibliografia Básica:

- Riascos, L.A.M.; Marques, D.; Ribeiro C.L.; Gaspar, R.; Fundamentos de Desenho e Projeto, São Paulo, Ed. Plêiade, 2008. CAEX (Rua Oratório, 517, Bangu - Santo André - tel - 4996-3691).

## Bibliografia Complementar:

- Giesecke, F.E. et al., *Comunicação Gráfica Moderna*. Porto Alegre: Ed. Bookman, 2002.
- SolidWorks, *SolidWorks Essencial: Modelagem Básica*. 2007.

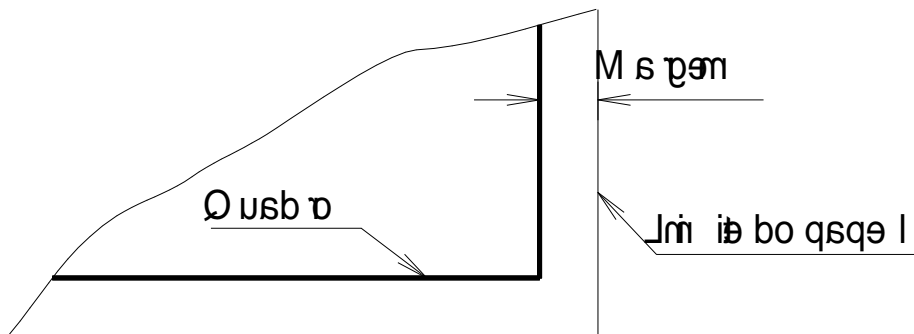
## Página da disciplina:

<http://pgene.ufabc.edu.br/conteudo/ensino/disciplinas/Desenho/Desenho.html>

- ◆ NBR 10068 – 10/1987:
  - Folha de desenho – lay out e dimensões.
- ◆ NBR 8403 – 03/1984:
  - Aplicação de linhas em desenhos – Tipos de linhas – Largura das linhas.
- ◆ NBR 8402 – 03/1994:
  - Execução de caracteres para escrita em desenho técnico.



## Margem e Quadro








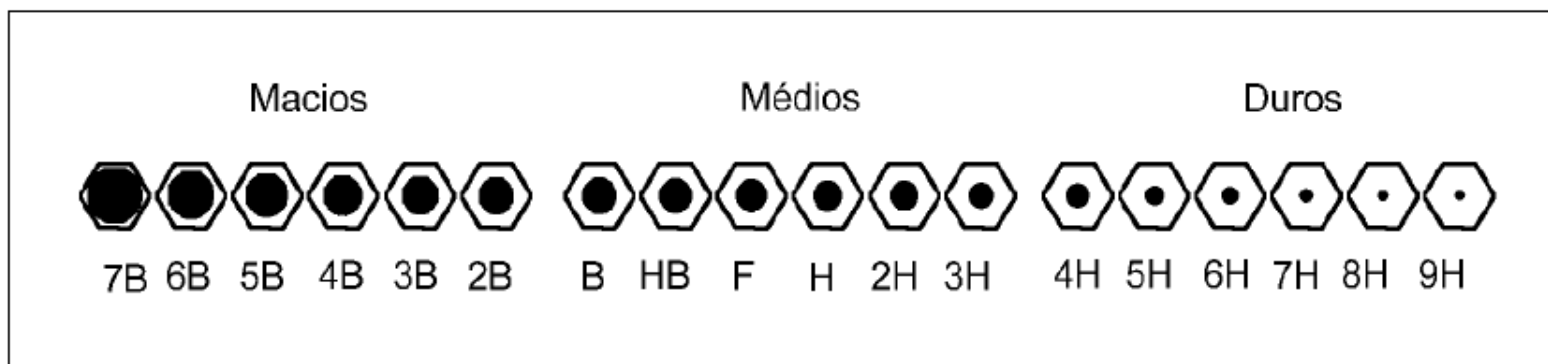
Formato	Margem		Esp. Linha
	Esq.	Dir.	
A0	25	10	1,4
A1	25	10	1,0
A2	25	7	0,7
A3	25	7	0,5
A4	25	7	0,5





- ◆ Relação entre linhas de espessura larga e estreita não deve ser inferior a 2.
- ◆ Espessuras de linhas escolhidas conforme tipo, dimensão e escala do desenho:  
0,13 – 0,18 – 0,25 –  
0,35 – 0,50 – 0,70 –  
1,00 – 1,40 – 2,00 mm.

Linha	Denominação	Aplicação Geral
	Contínua larga	Contornos e arestas visíveis
	Contínua estreita	Linhas de cota e chamada, hachuras
	Contínua estreita à mão livre	Cortes parciais e rupturas
	Tracejada estreita	Contornos e arestas não visíveis
	Traço e ponto estreita	Linhas de centro e simetria



Traço macio e escuro



6B



5B



4B



3B



2B



B



HB



F



H



2H

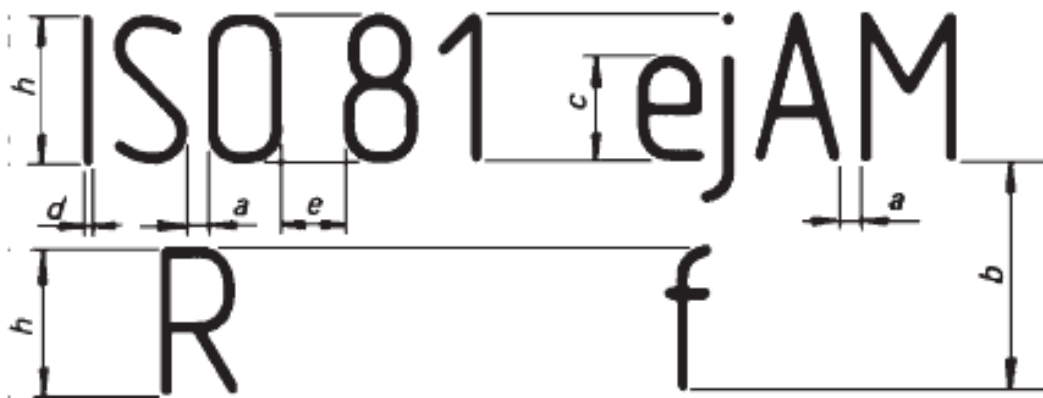
Traço fino e claro

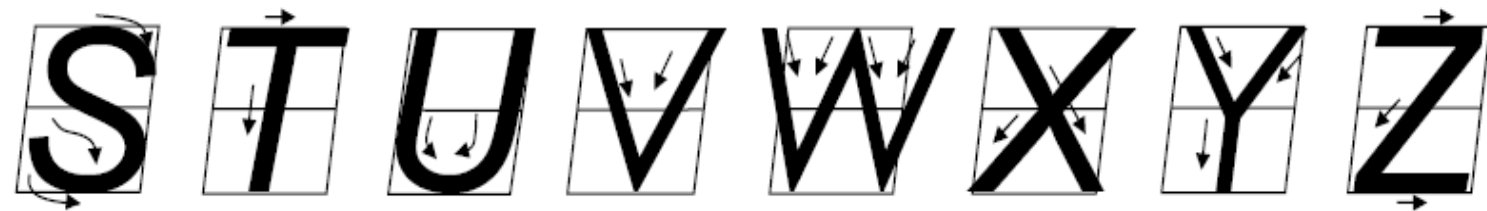
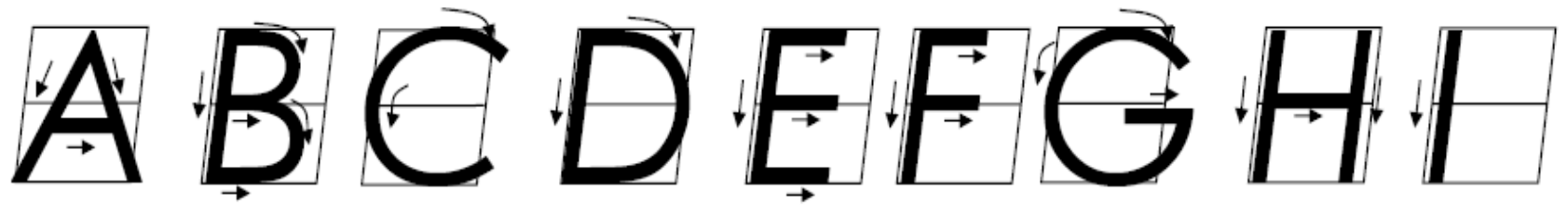
# Caligrafia técnica NBR 8402

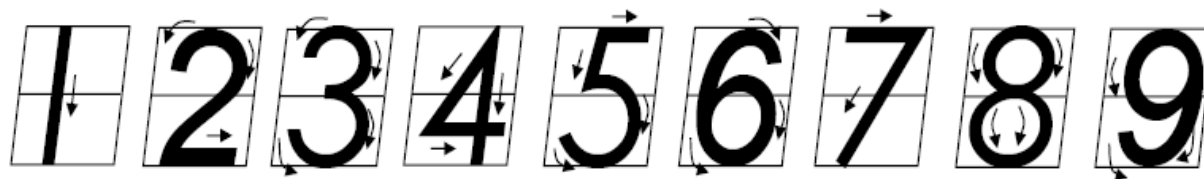
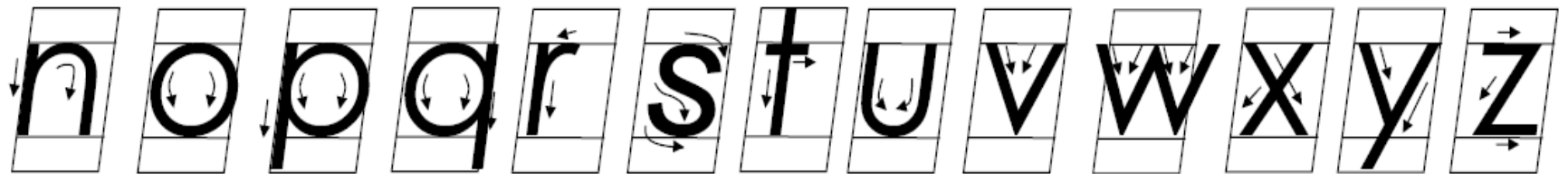
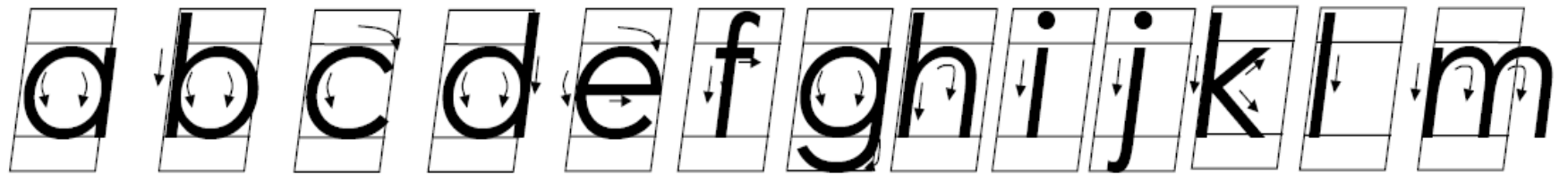
- Uniformidade, legibilidade e adequação a processos de reprodução.
- **Proporcionalidade:** retângulo altura = 1,5xbase,
- **Altura:** Recomenda-se fazer 2 linhas guias horizontais
- **Espaçamento:** espaçamento entre caracteres 20% da altura da letra, e para o espaçamento entre palavras recomenda-se 60% da altura.
- **Inclinação:** letras verticais e letras inclinadas 15° para a direita em relação à vertical

# PROPORÇÕES

Características	Relação	Dimensões						
		2,5	3,5	5	7	10	14	20
Altura das letras maiúsculas (h)	(10/10) h	2,5	3,5	5	7	10	14	20
Altura das letras minúsculas (c)	(7/10) h	-	2,5	3,5	5	7	10	14
Distância mín. entre caracteres (a)	(2/10) h	0,5	0,7	1	1,4	2	2,8	4
Distância mín. entre linhas de base (b)	(14/10) h	3,5	5	7	10	14	20	28
Distância mín. entre palavras (e)	(6/10) h	1,5	2,1	3	4,2	6	8,4	12
Largura da linha (d)	(1/10) h	0,25	0,35	0,5	0,7	1	1,4	2







A B C D E F G H I a b c d e f g h i j k l m

J K L M N O P Q R n o p q r s t u v w x y z

S T U V W X Y Z

1 2 3 4 5 6 7 8 9

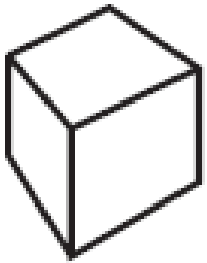
Altura 5mm, interlineado 8mm  
ABCDEFGHIJKLMNOPQRSTUVWXYZ  
abcdefghijklmnopqrstuvwxyz  
0123456789 -+°ø@\$%&()



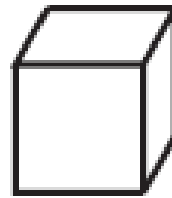


**Perspectiva Isométrica**

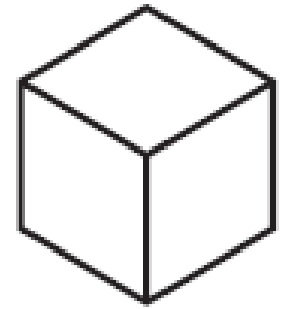
# Diferentes tipos de perspectivas



perspectiva cônica



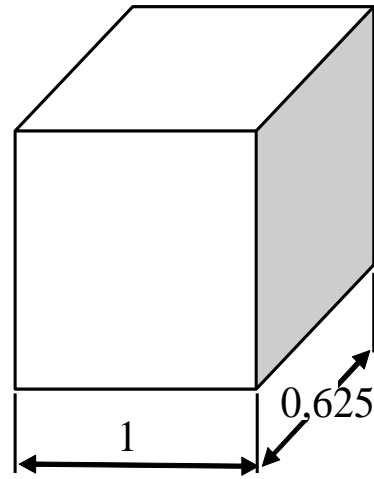
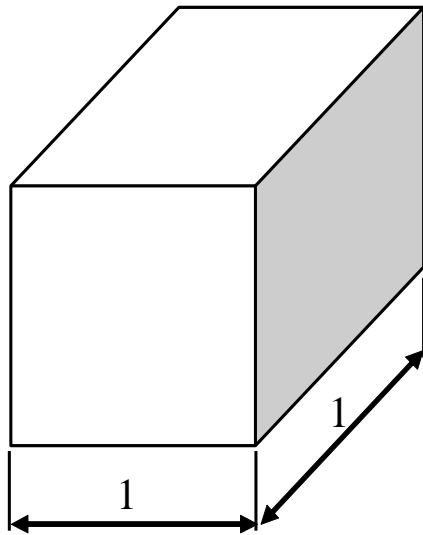
perspectiva cavaleira



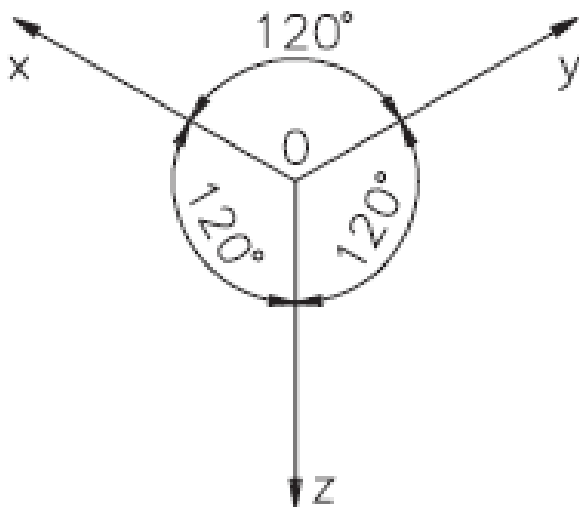
perspectiva isométrica

Podemos notar que a perspectiva isométrica é a representação que mostra o objeto menos deformado.

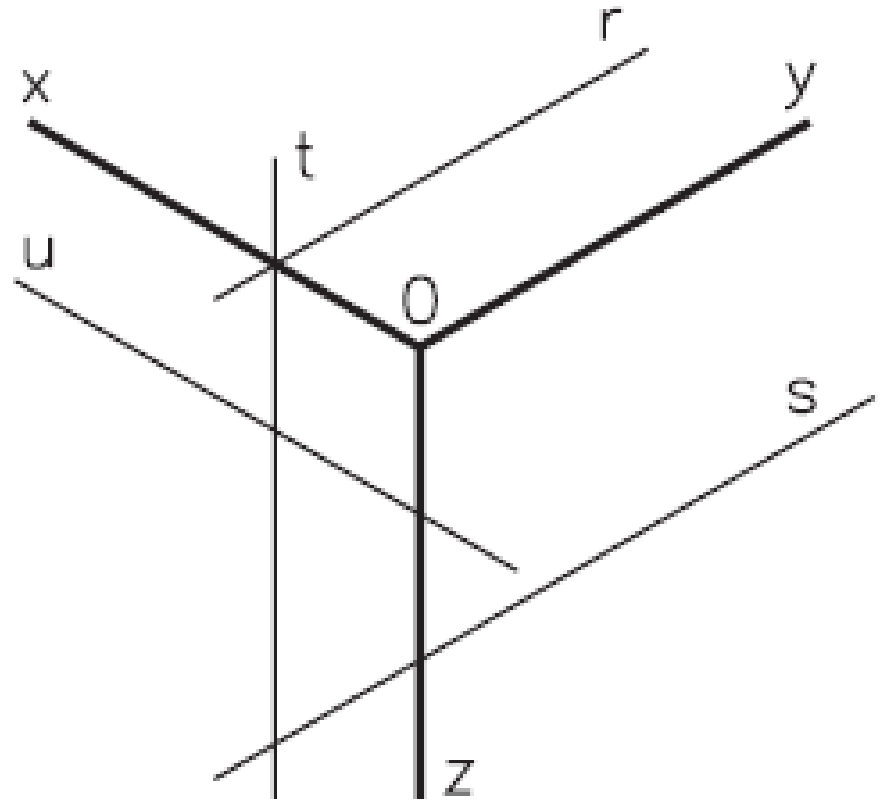
# Relação proporção/dimensão em perspectiva cavaleira



# Linhas Isométricas

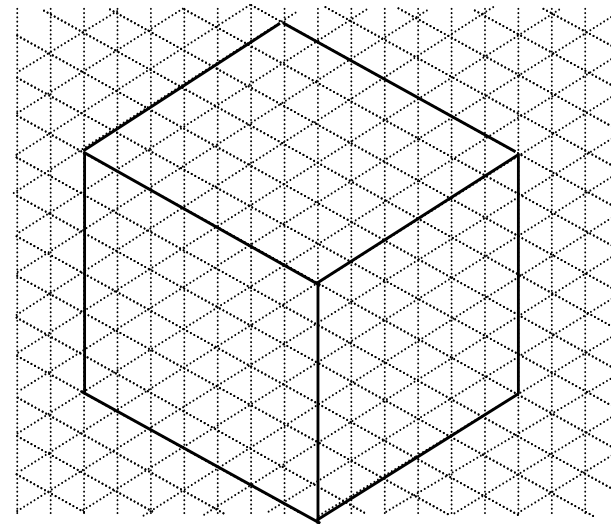
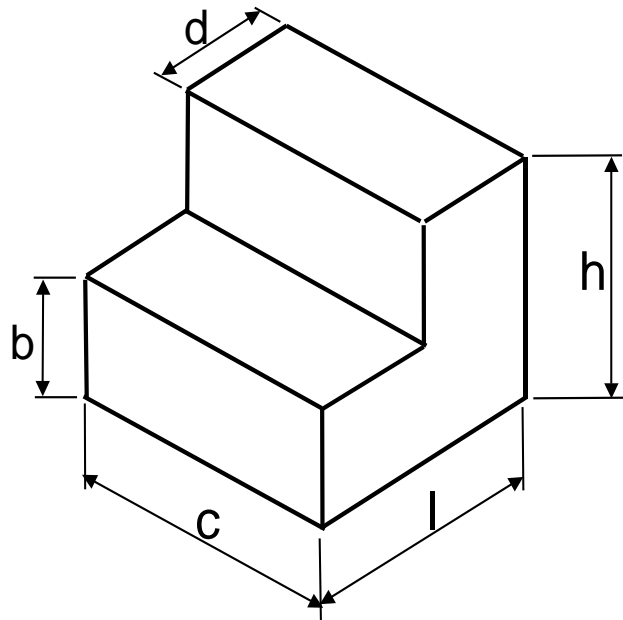


Eixos Isométricos

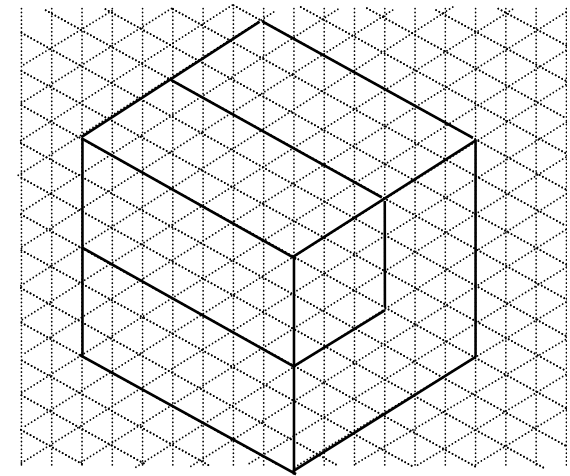
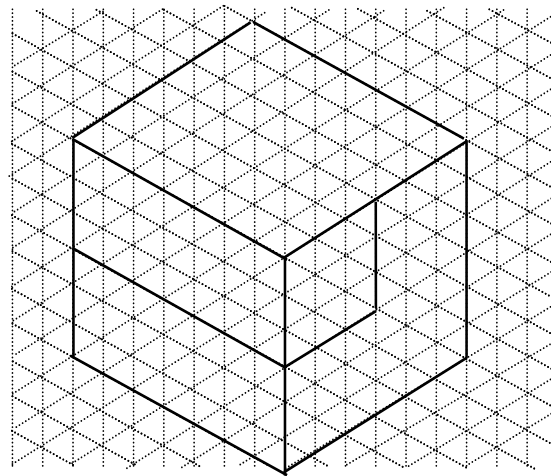
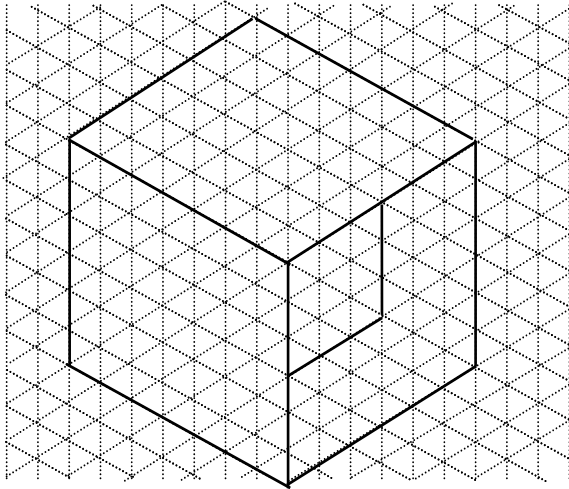


Qualquer reta paralela a um eixo isométrico é uma linha isométrica.

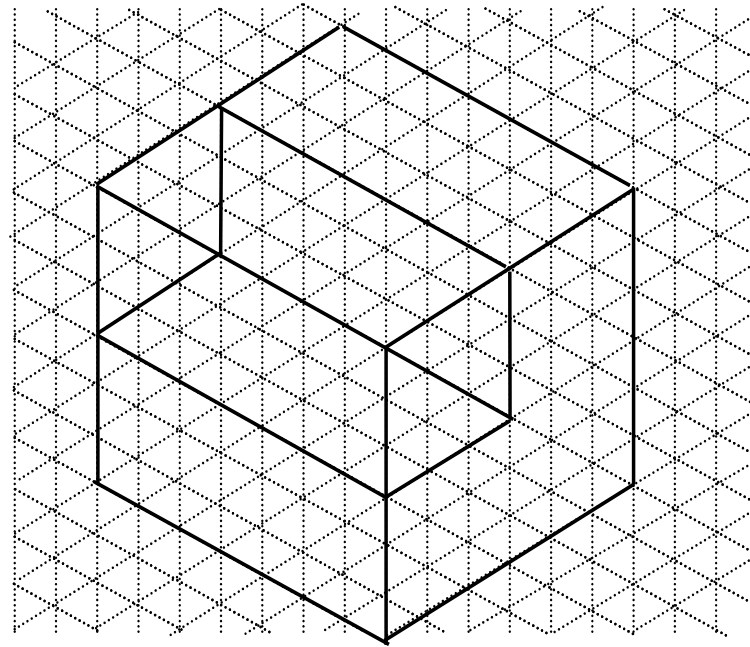
# Esboço da perspectiva



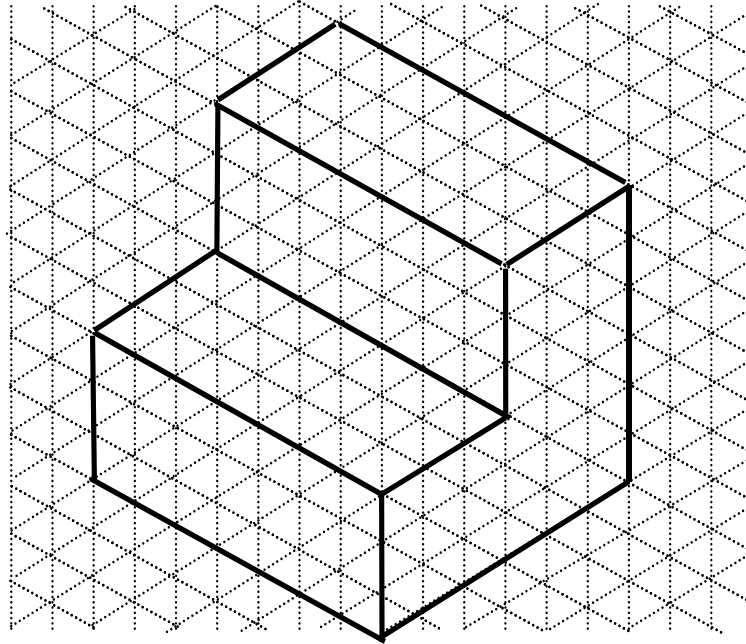
# Esboço da perspectiva



# Esboço da perspectiva

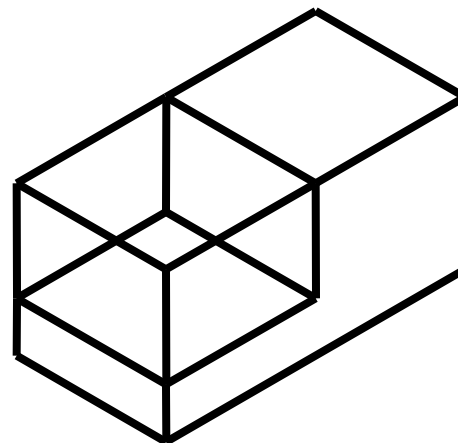
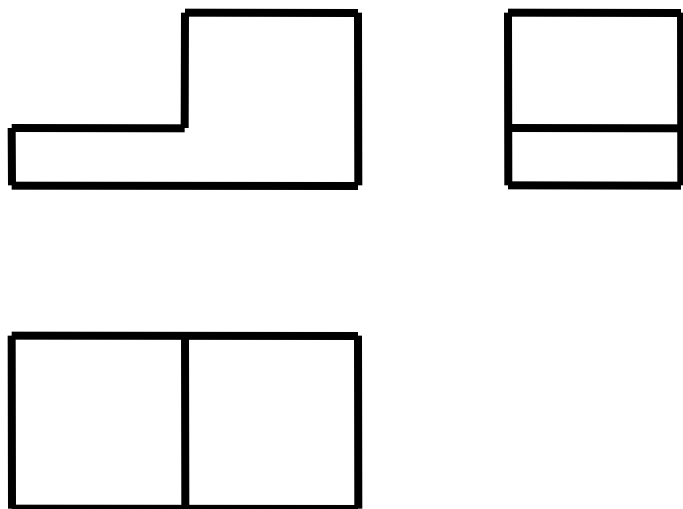


# Esboço da perspectiva

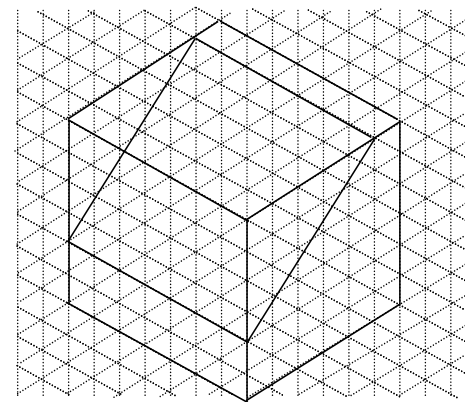
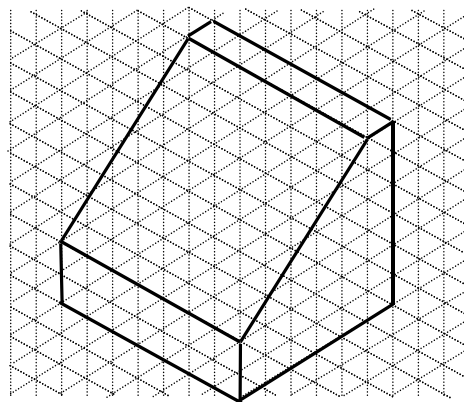
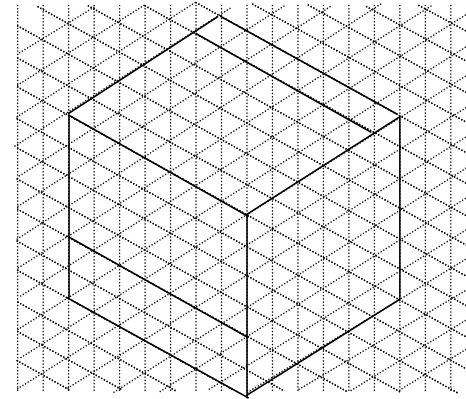
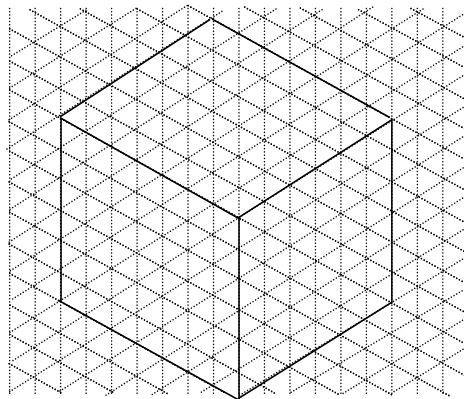
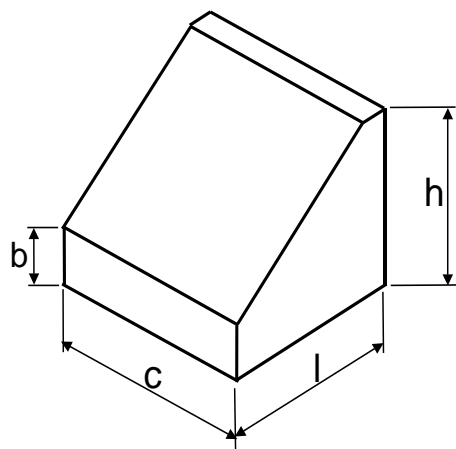




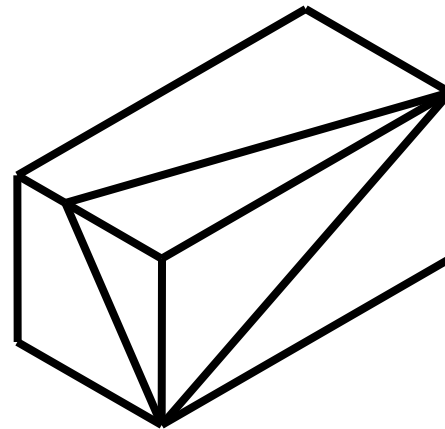
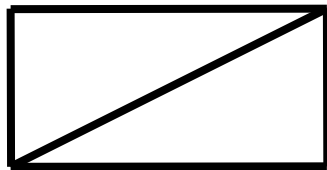
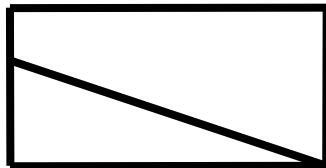
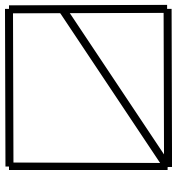
# Traçado da perspectiva a partir das projeções



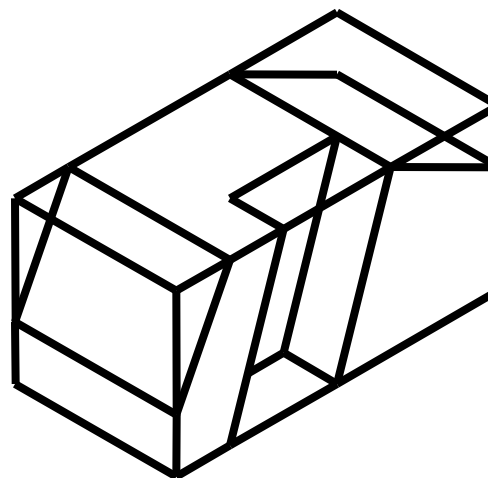
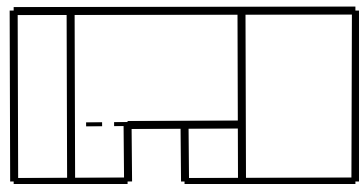
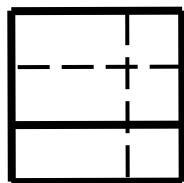
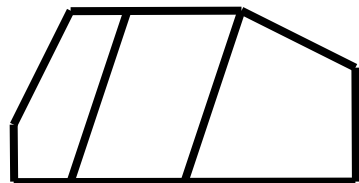
# Traçado de planos oblíquos



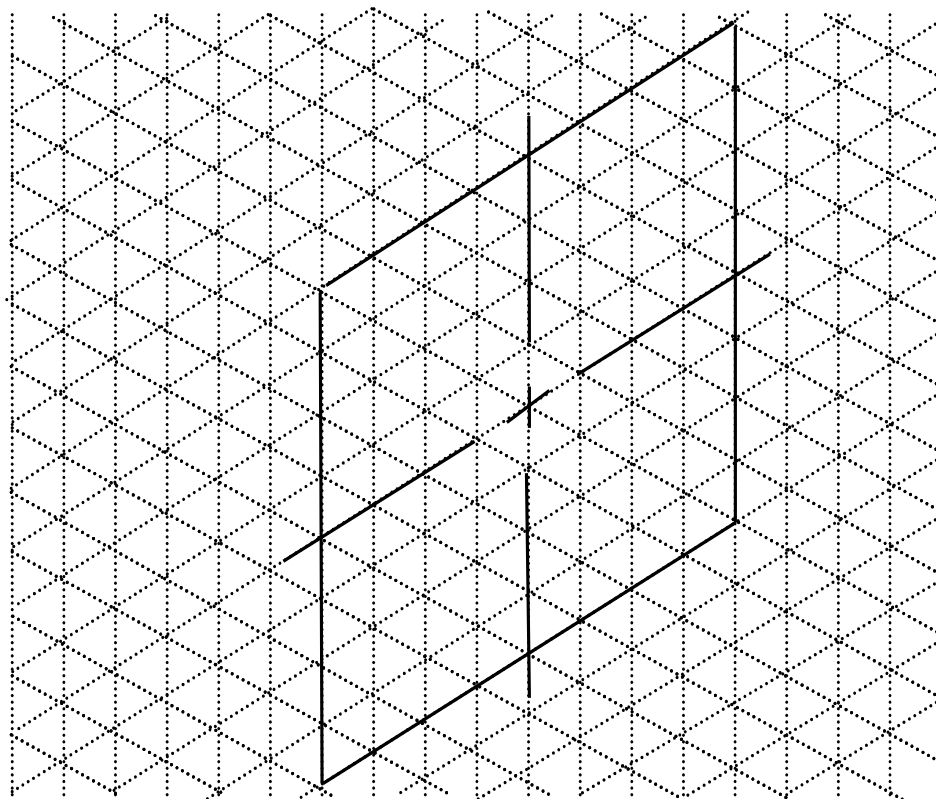
# Perspectiva Isométrica: Faces Oblíquas



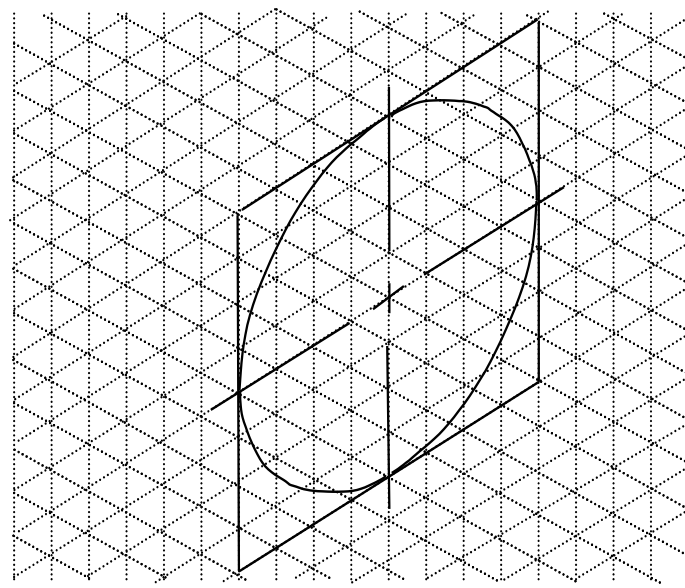
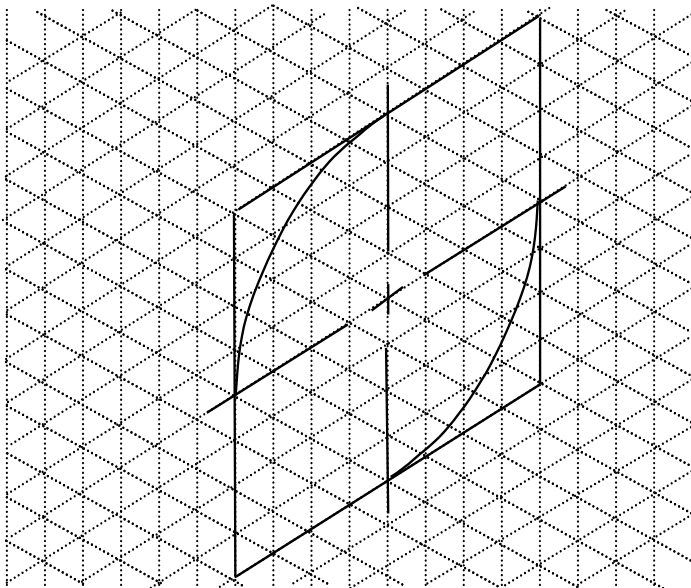
# Exercício: Exemplo



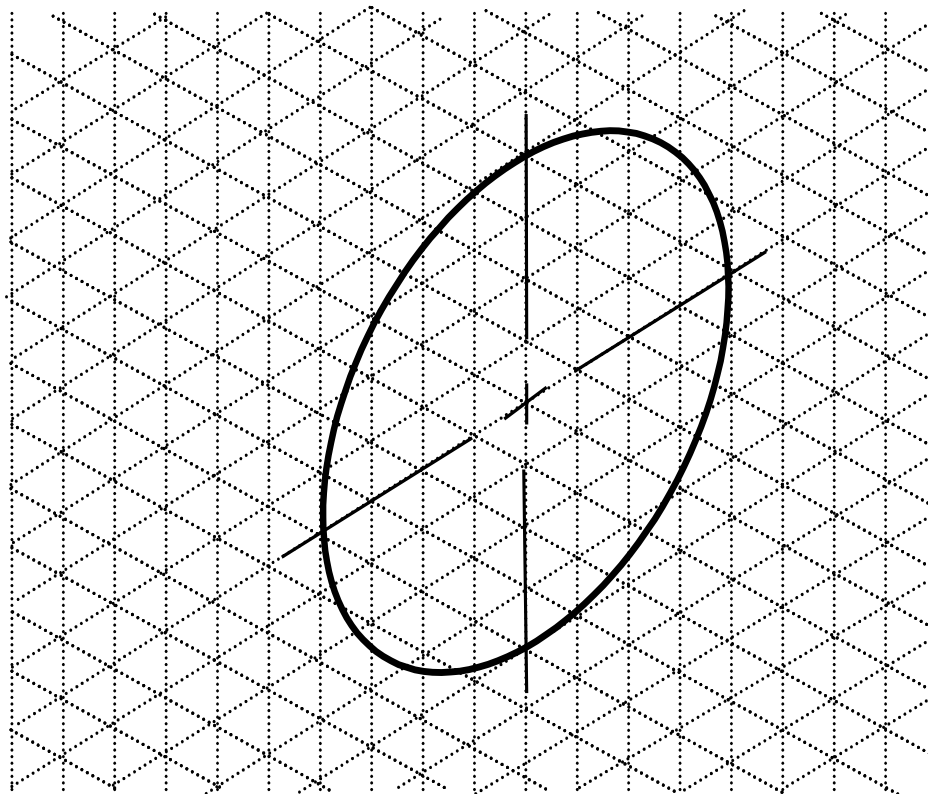
# Perspectiva isométrica de círculos



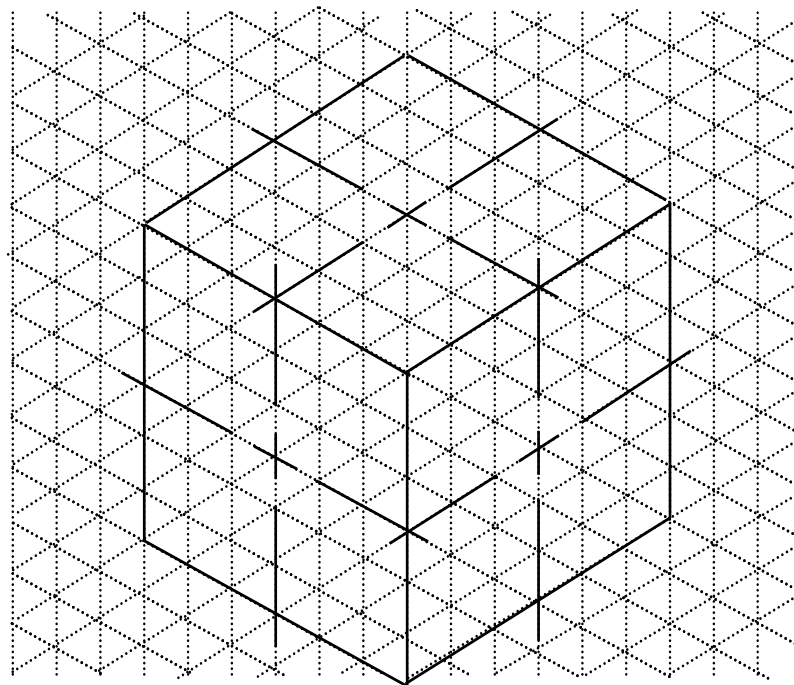
# Perspectiva isométrica de círculos



# Perspectiva isométrica de círculos



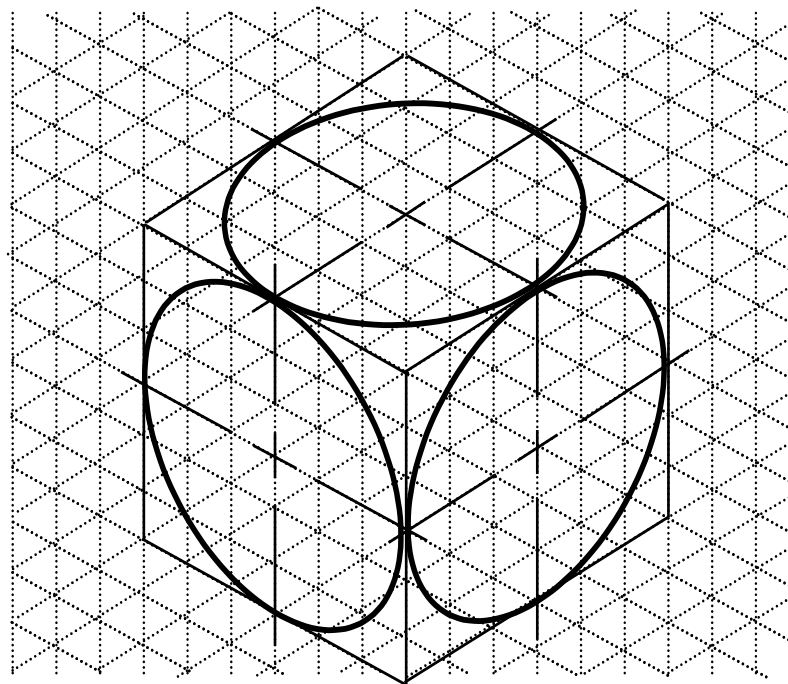
# Perspectiva isométrica de círculos





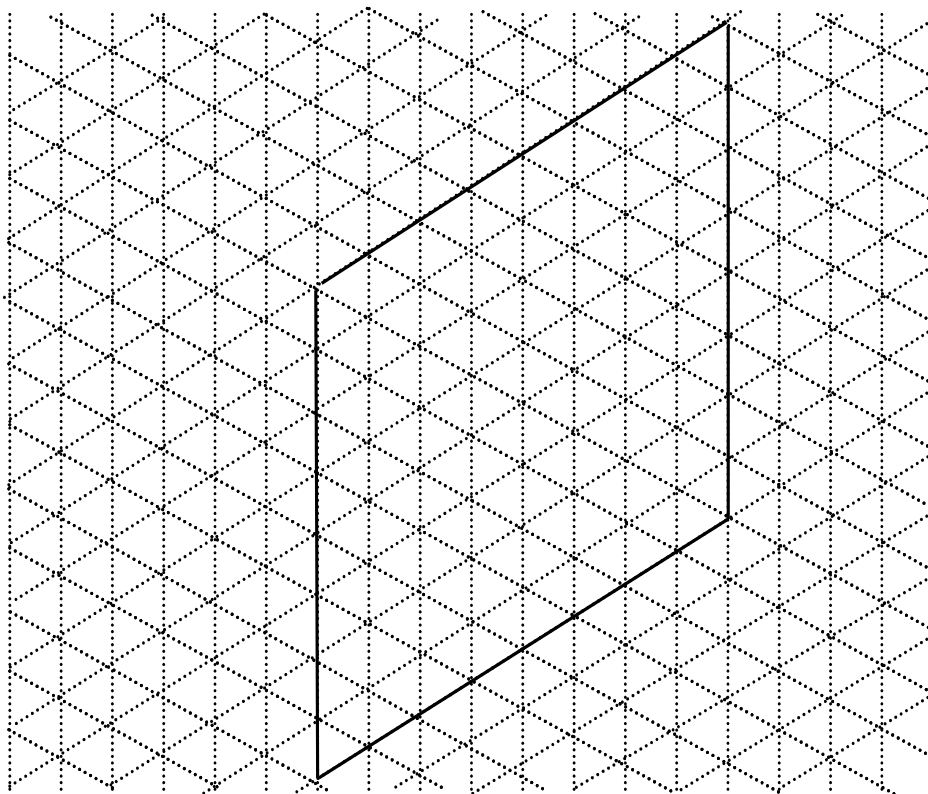
# Perspectiva isométrica de círculos

COMO FAZER ?

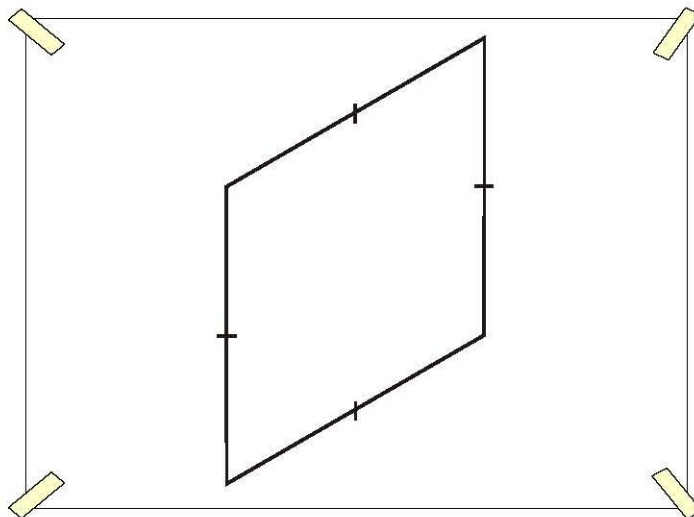


# Perspectiva isométrica de círculos

**1** . Construir em isométrica os lados do paralelogramo

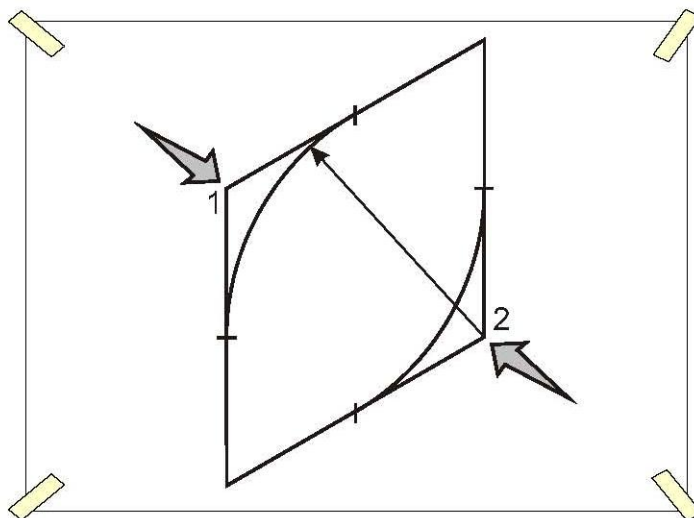


2



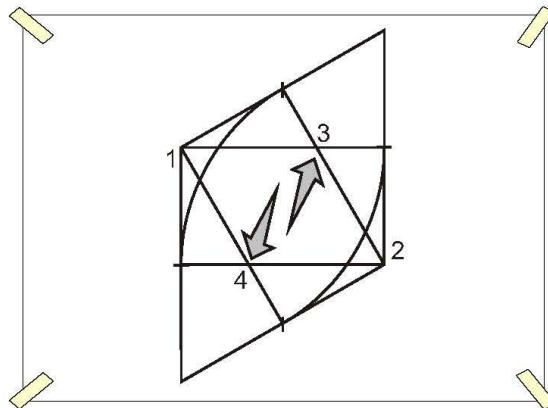
Determinar o ponto médio dos segmentos de reta que são os lados do quadrado perspectivado

3



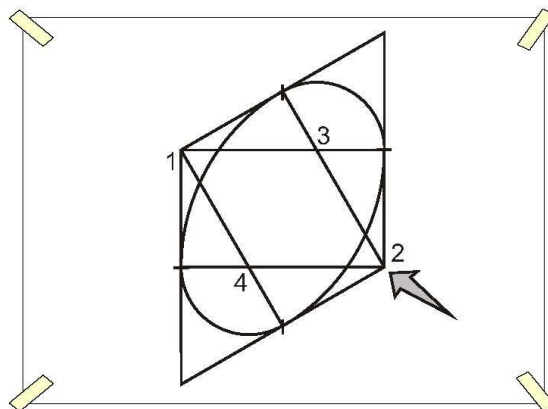
Determina - se nos vértices do quadrado que possuem a menor diagonal os centros 1 e 2 traçando os arcos até o pontos médios dos lados

4



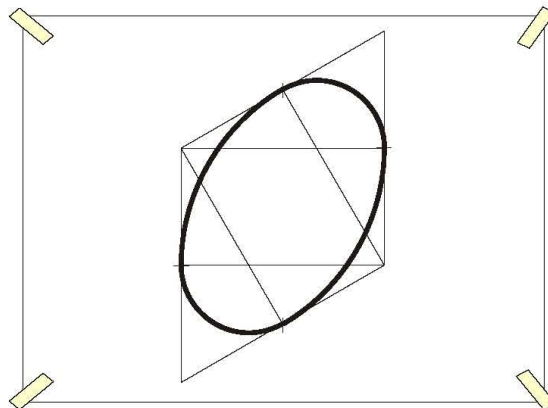
Os centros 3 e 4  
estarão nos  
cruzamentos dos  
segmentos de reta que  
unem os centros 1 e 2  
aos pontos medios dos  
lados opostos

5



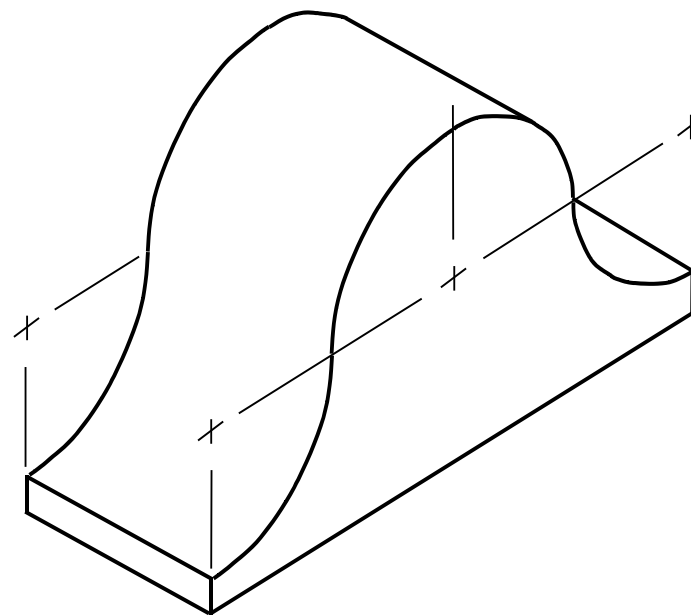
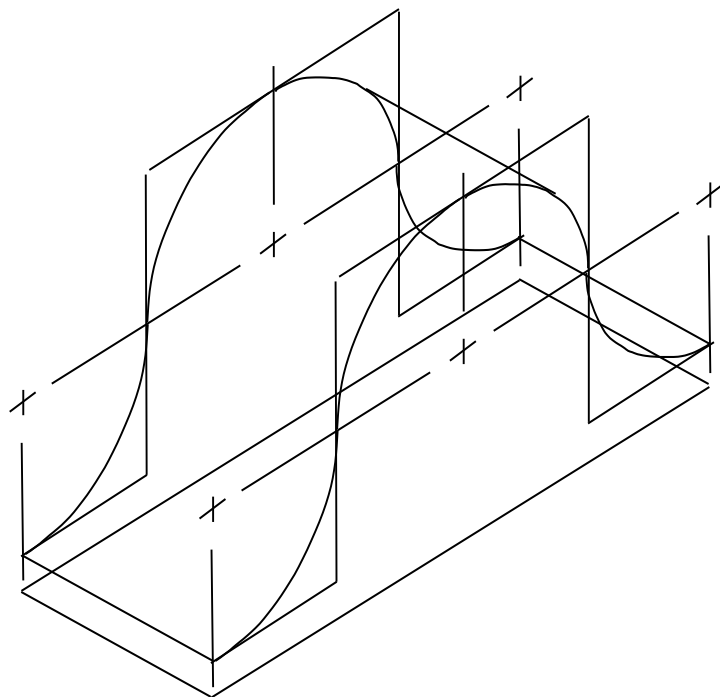
Nos centros 3 e 4  
traçar arcos  
concordantes com os  
arcos traçados  
anteriormente

6

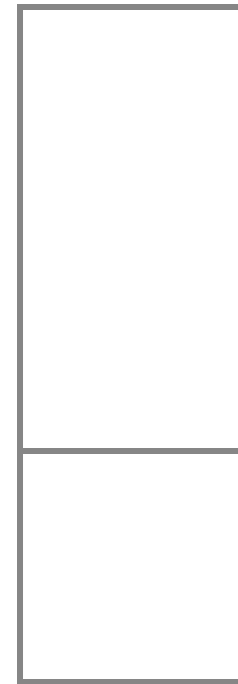
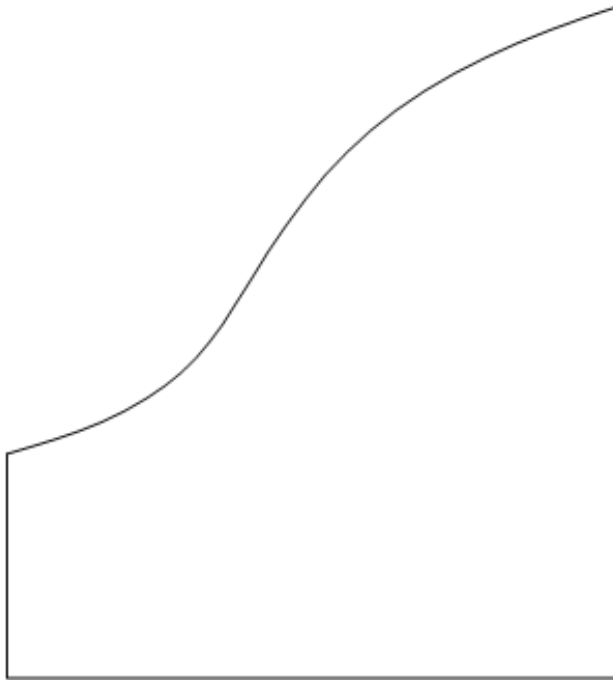


Reforçar os arcos de  
circunferência de  
forma que as linhas  
construtivas fiquem em  
segundo plano

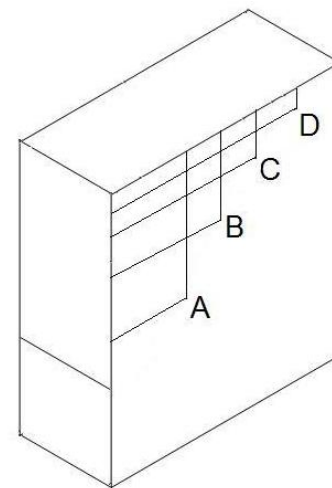
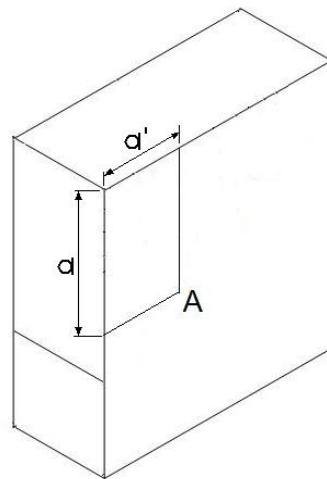
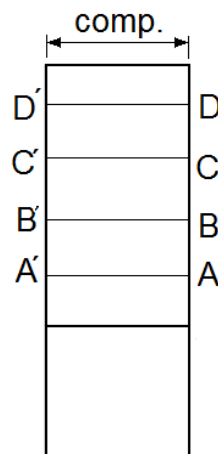
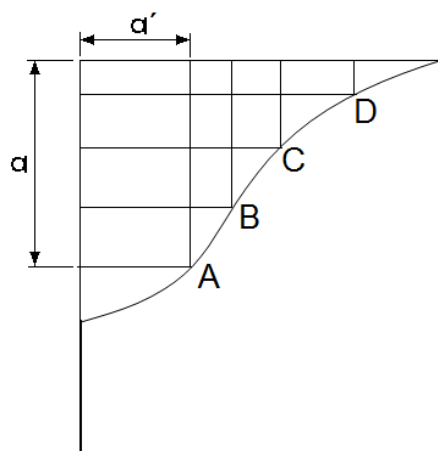
# Perspectiva isométrica de arcos



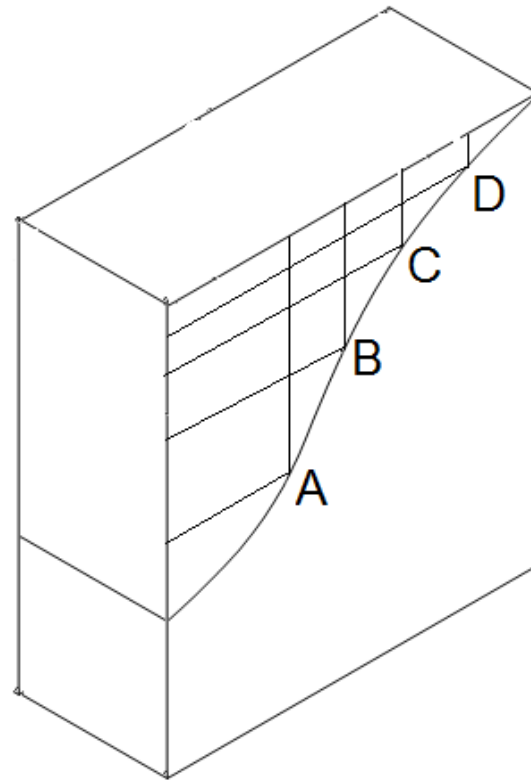
# Perspectiva isométrica de curvas irregulares



# Perspectiva isométrica de curvas irregulares

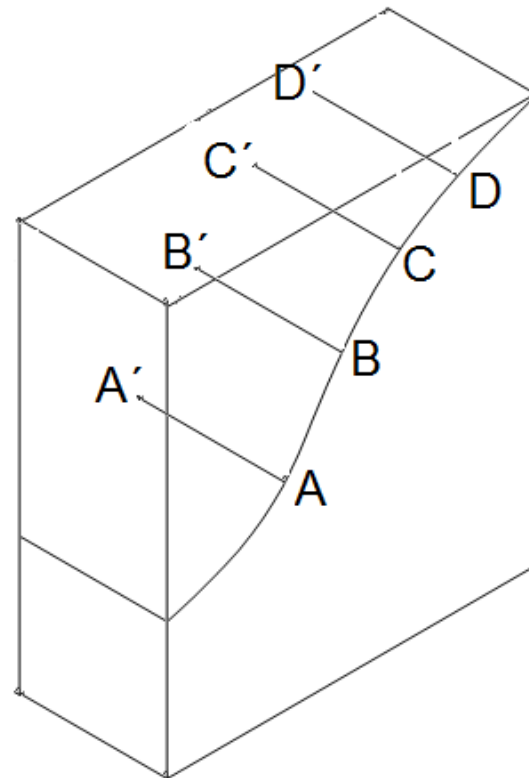


# Perspectiva isométrica de curvas irregulares

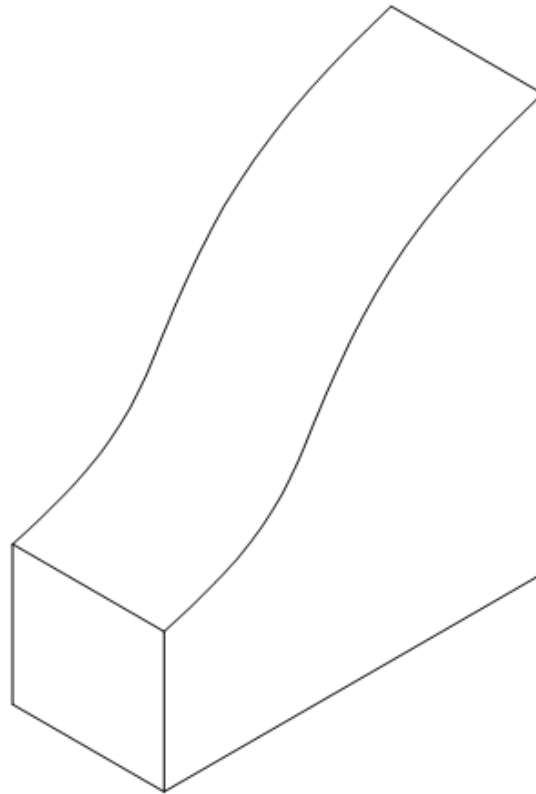




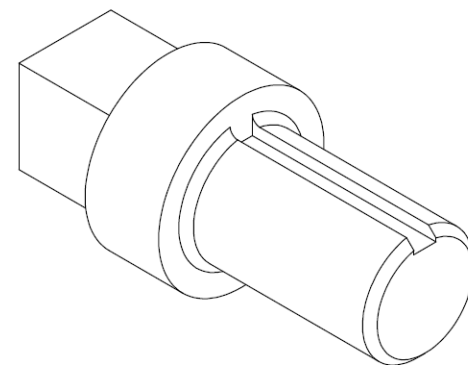
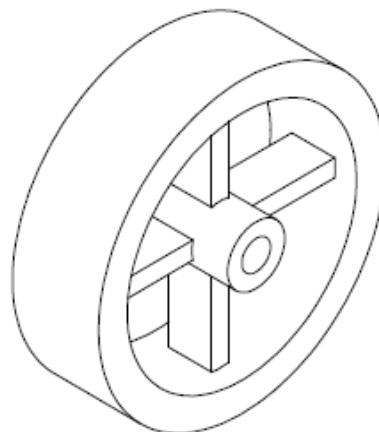
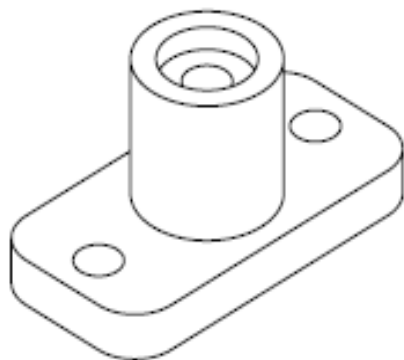
# Perspectiva isométrica de curvas irregulares



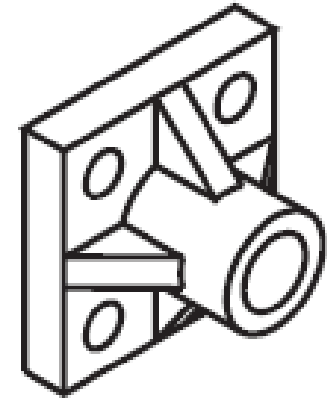
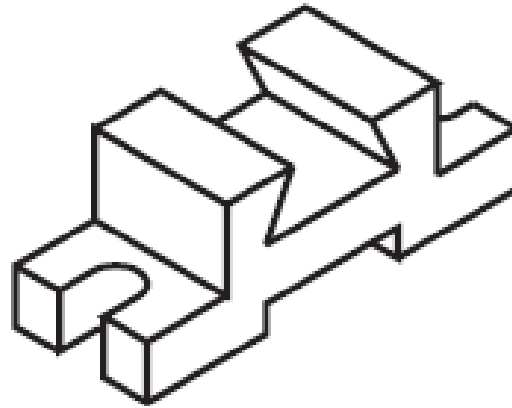
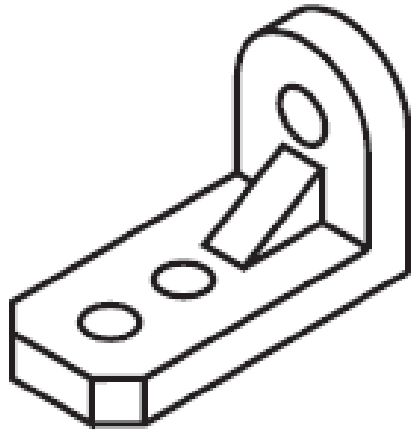
# Perspectiva isométrica de curvas irregulares



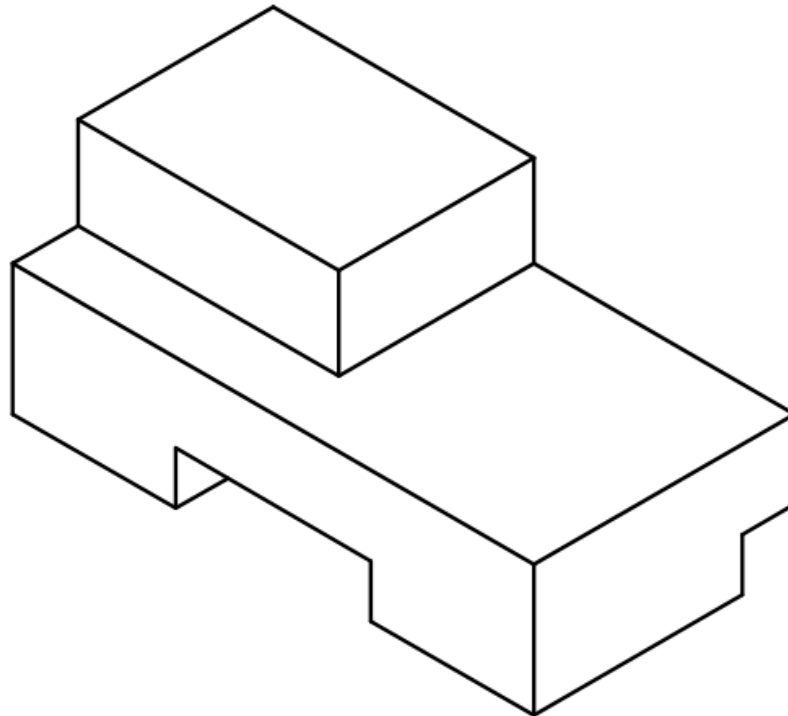
# Exemplos: chanfros, furos e rasgos



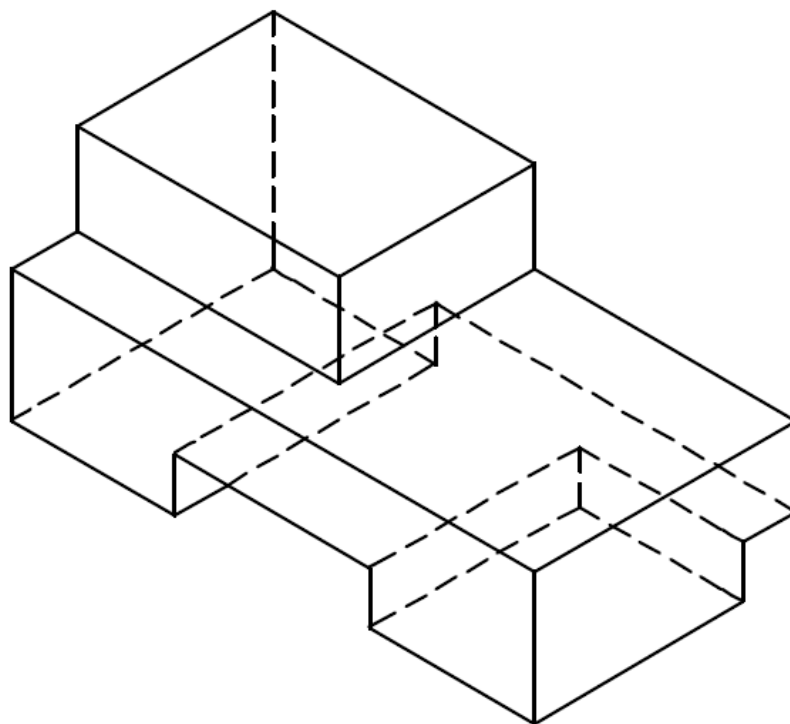
# Exemplos: chanfros, furos e rasgos



# Linhas de contornos invisíveis



# Linhas de contornos invisíveis





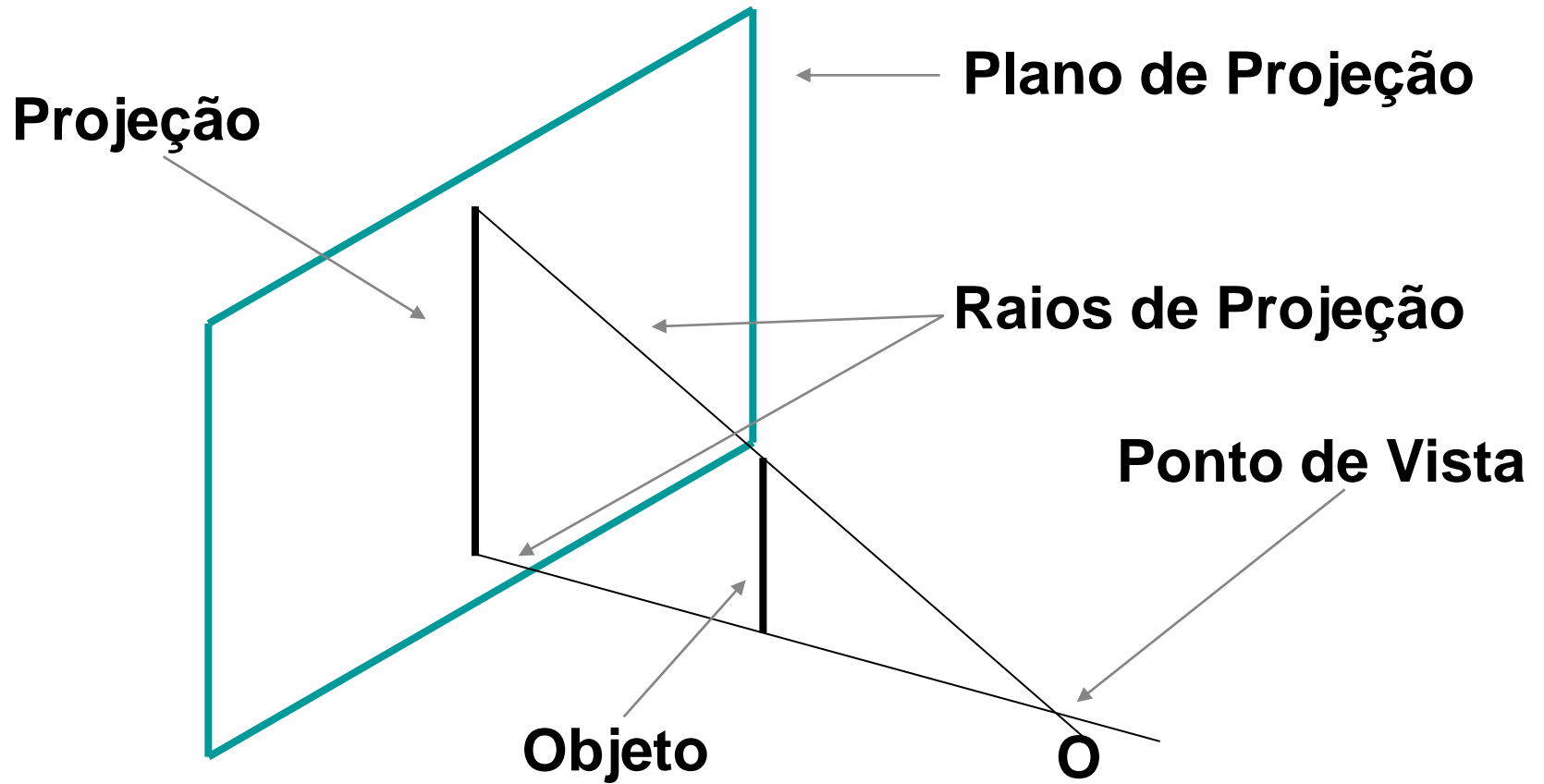
Sistemas de Projeção e  
Projeção Ortogonal

# Sistemas de Projeção

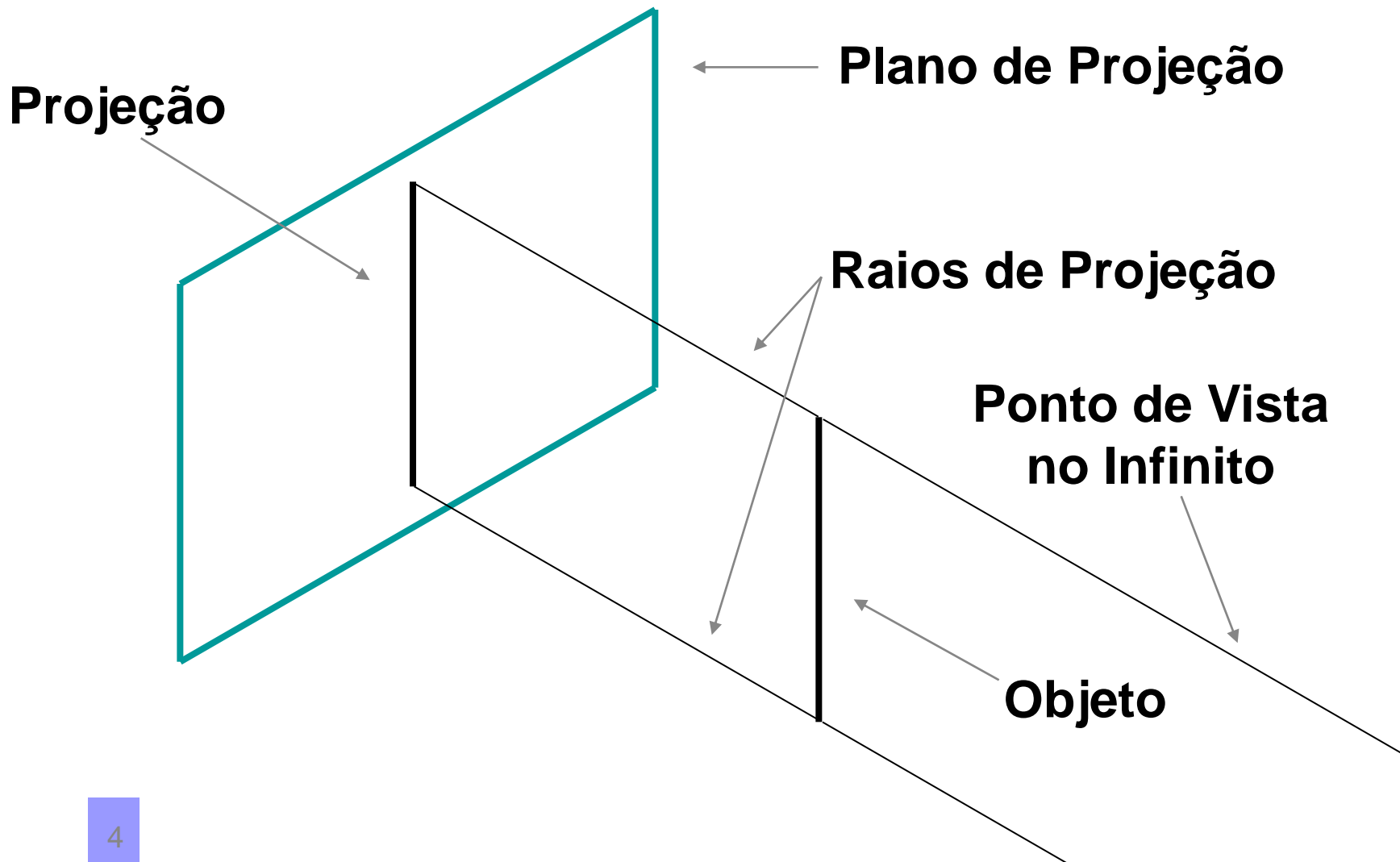
- ◆ Definição:
  - Representação gráfica de um objeto no plano de projeção.
- ◆ Elementos:
  - Observador ou ponto de vista.
  - Objeto a ser projetado.
  - Plano de projeção.
  - Raios de projeção.
- ◆ Tipos:
  - Cônica.
  - Cilíndrica.



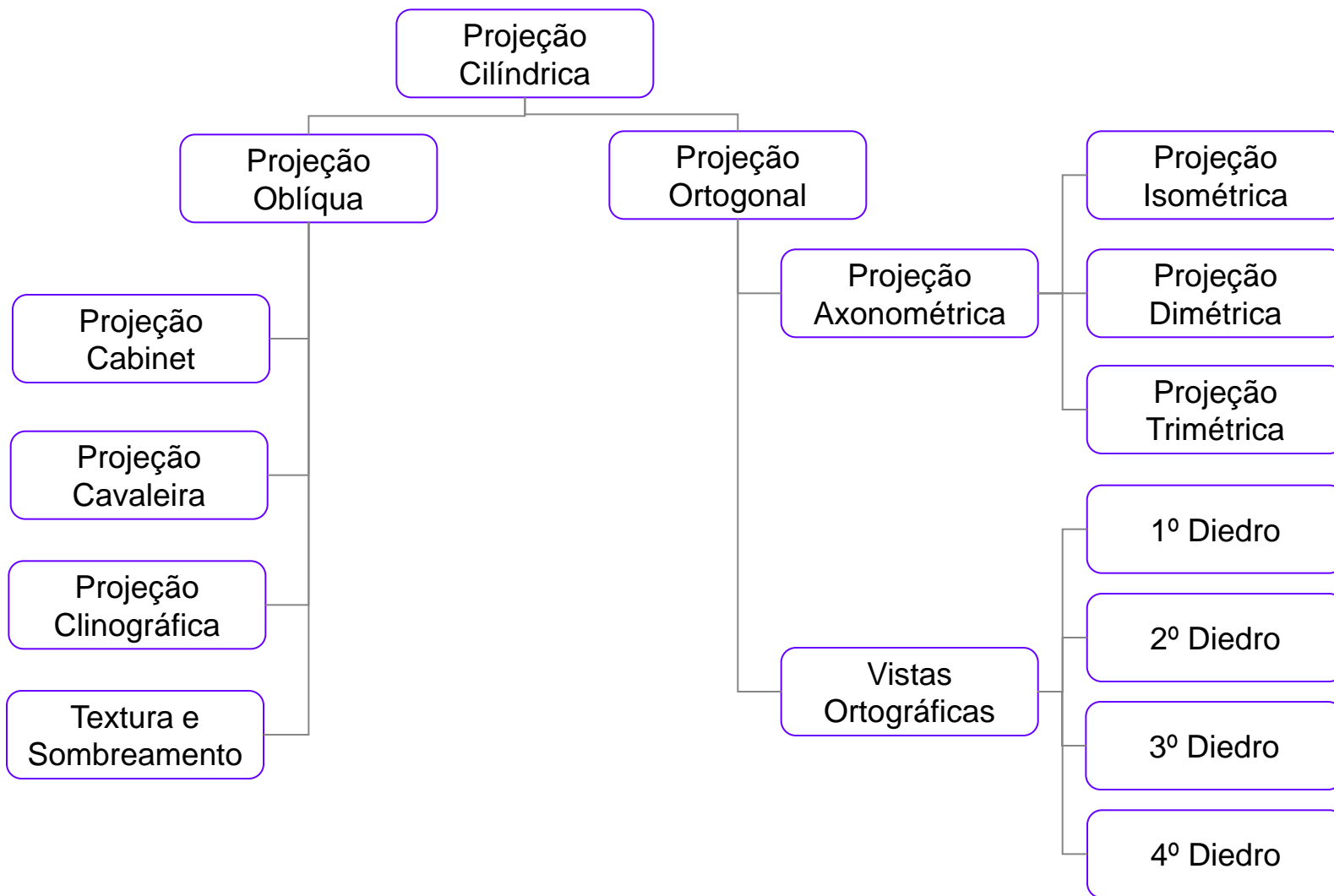
# Projeção Cônica



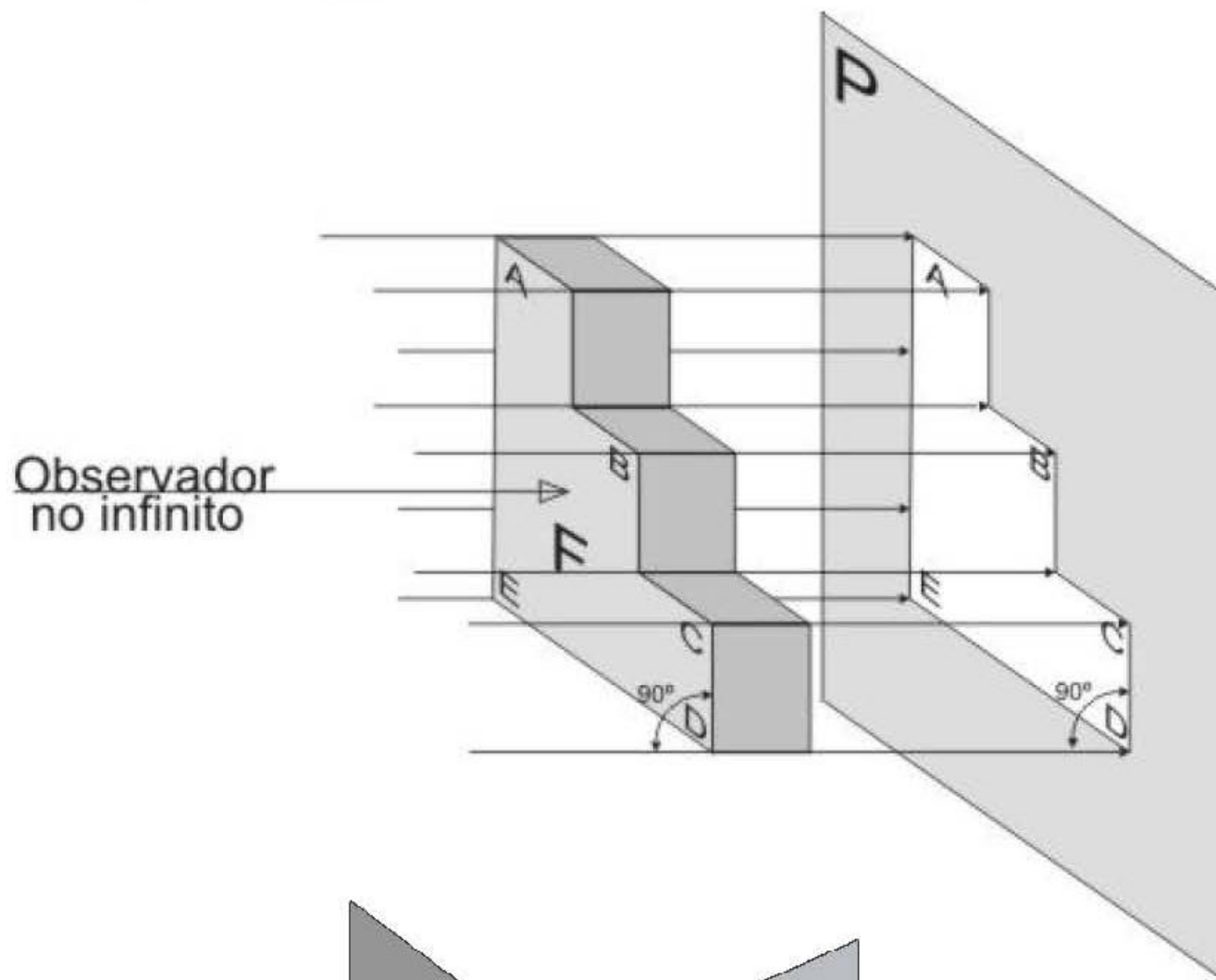
# Projeção Cilíndrica



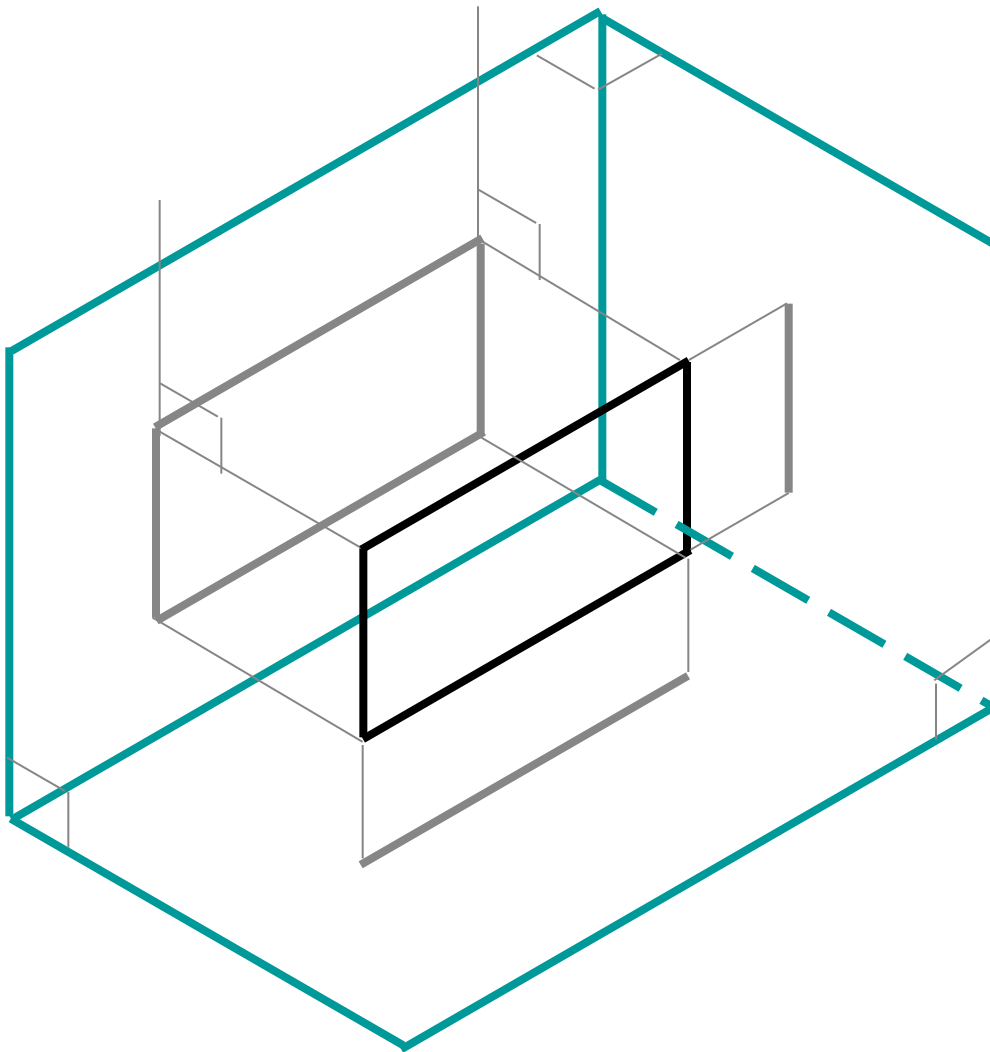
# Projeção Cilíndrica



# PROJEÇÃO ORTOGONAL

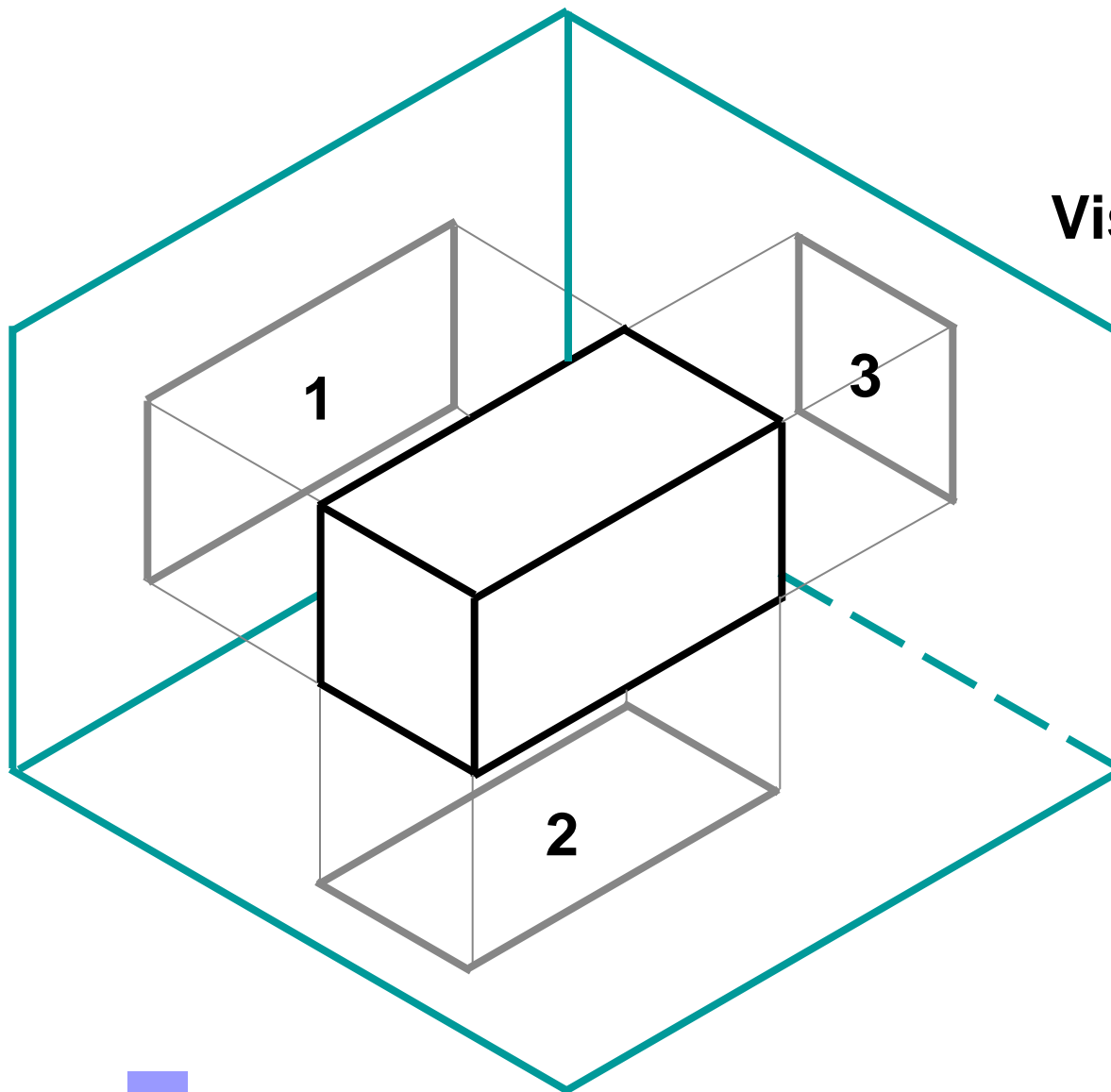


# Projeção Ortogonal



- ◆ Grego:
  - Ortho=Reto
  - Gonal=Ângulo
- ◆ Raios de projeção paralelos e perpendiculares ao plano de projeção.
- ◆ Projeção representa a forma e verdadeira grandeza do objeto.

# Projeção de Sólidos



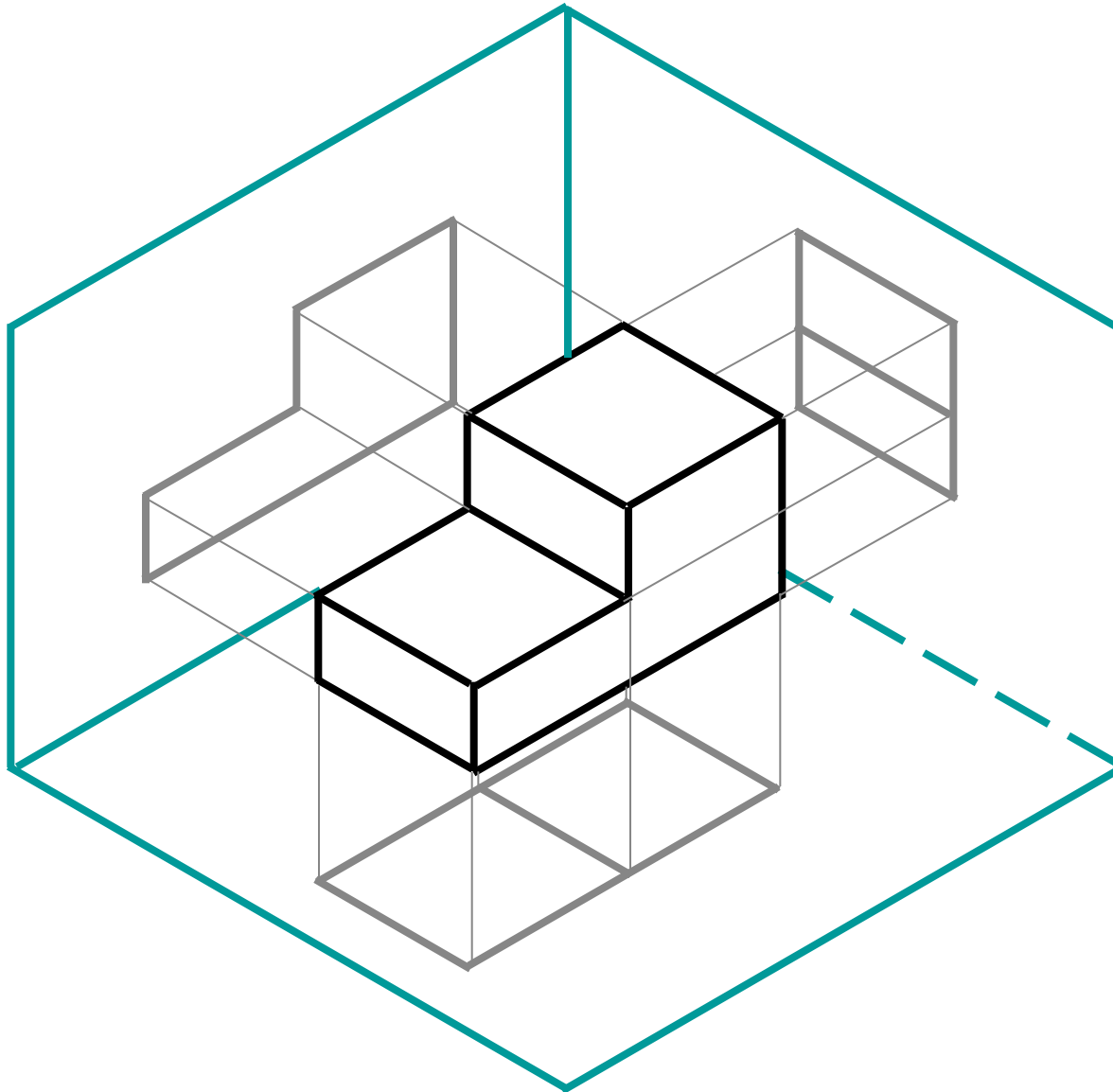
**Vistas Ortográficas:**

**1 – Frontal**

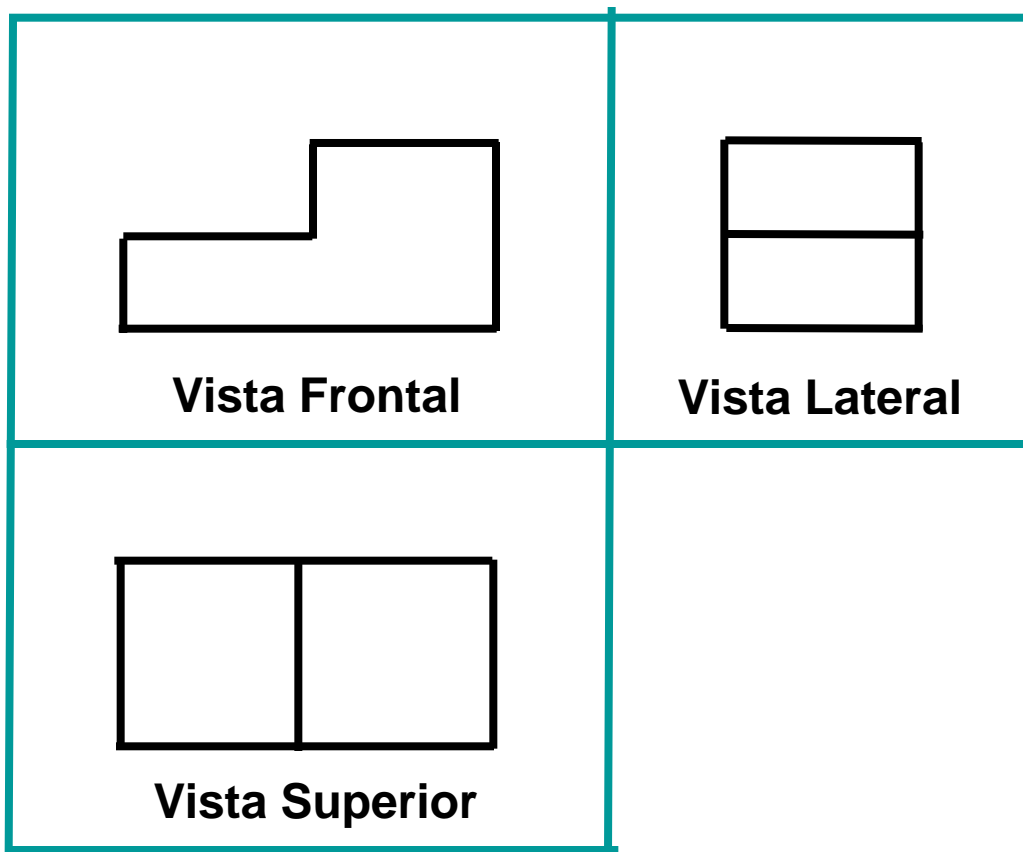
**2 – Superior**

**3 – Lateral  
Esquerda**

# Exercício 2



# Vistas Ortográficas



**Rebatimento  
dos planos  
horizontal e lateral**



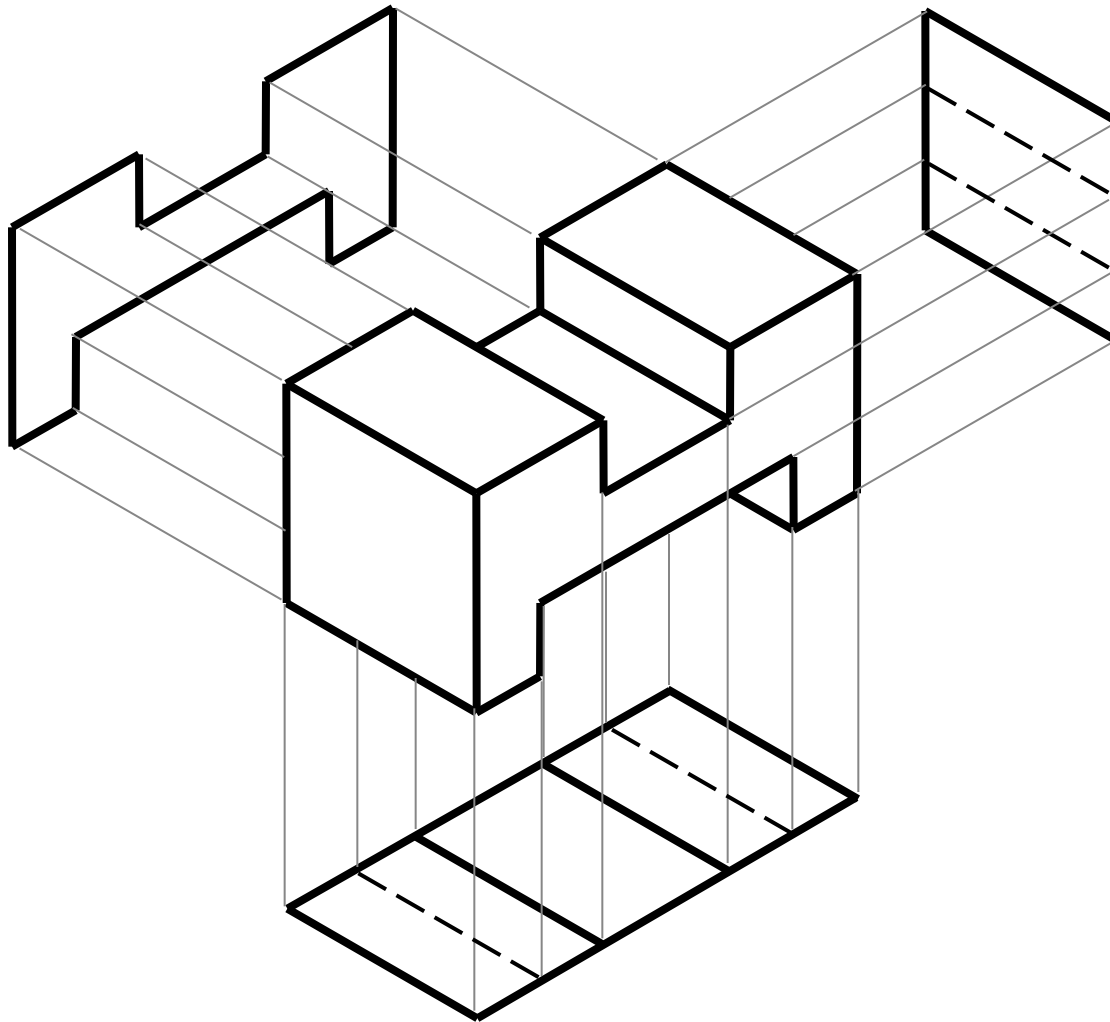
**Único plano**



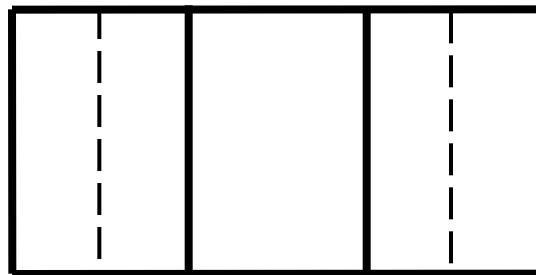
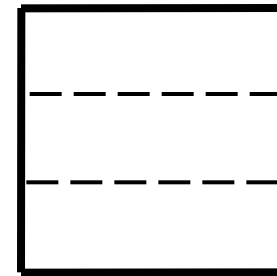
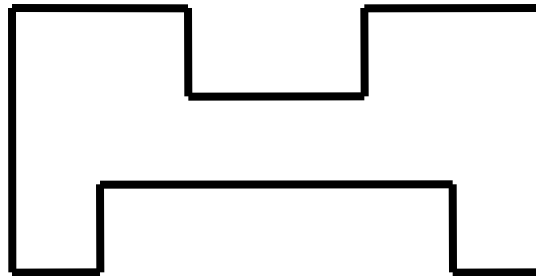
**Posição Vertical**



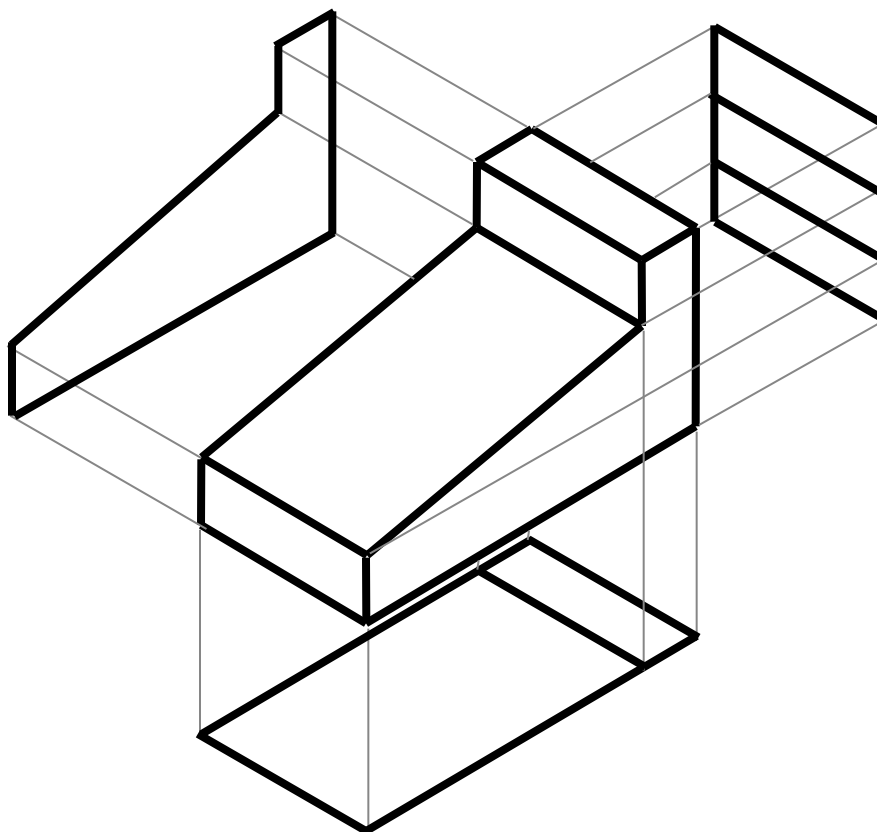
# Linhas Ocultas



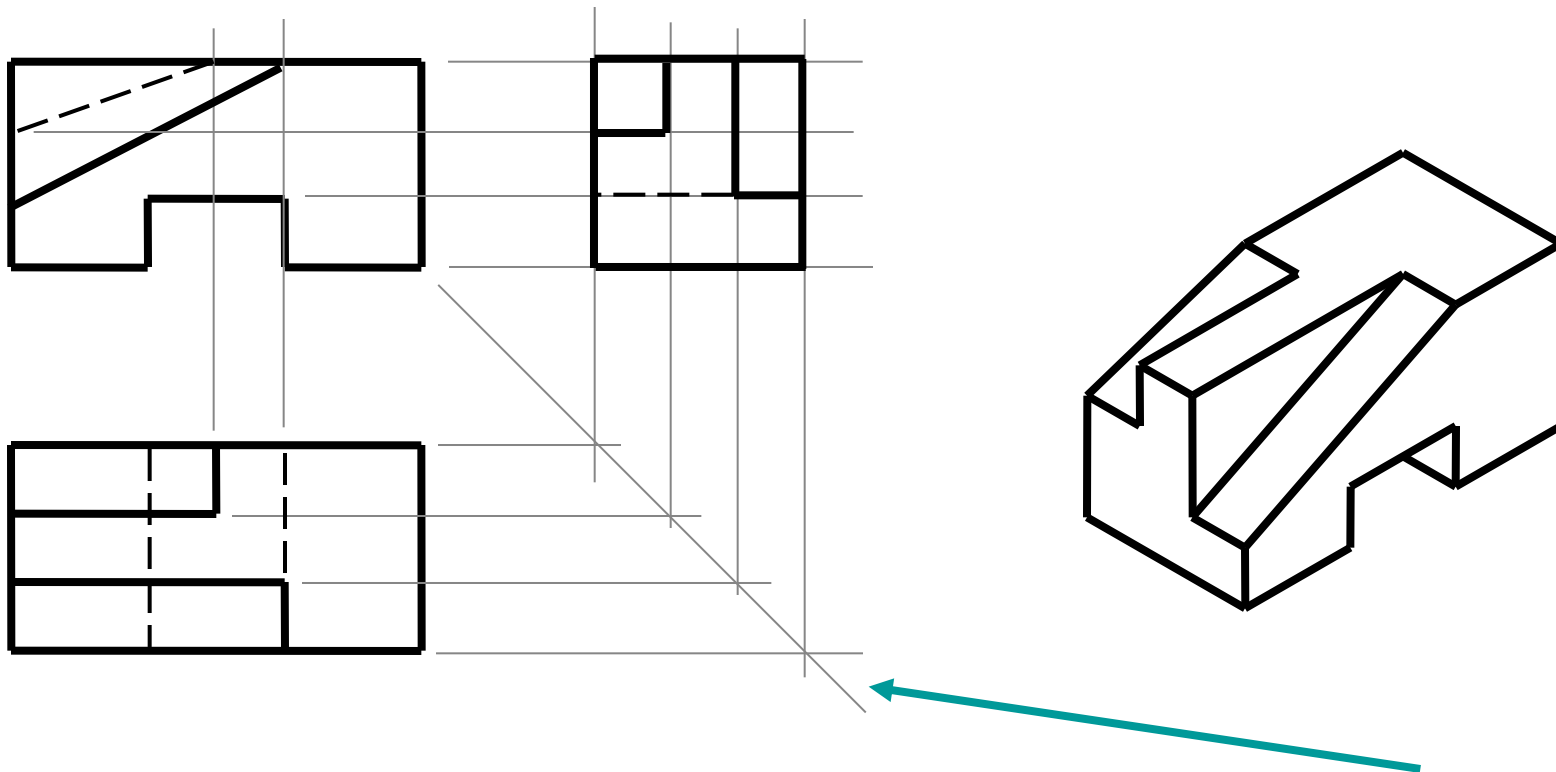
# Exercício 4



# Faces Inclinadas

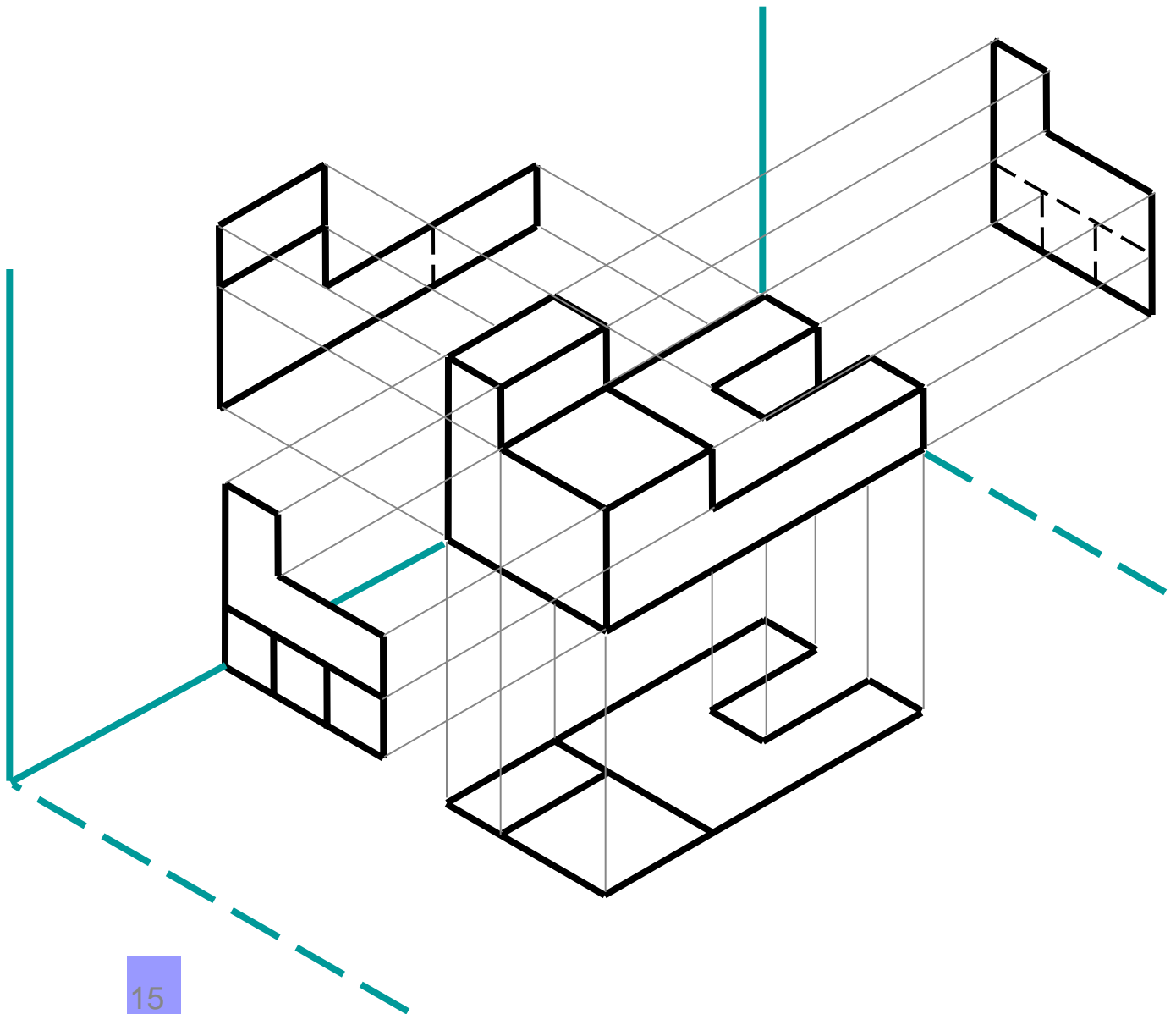


# Exercício 6

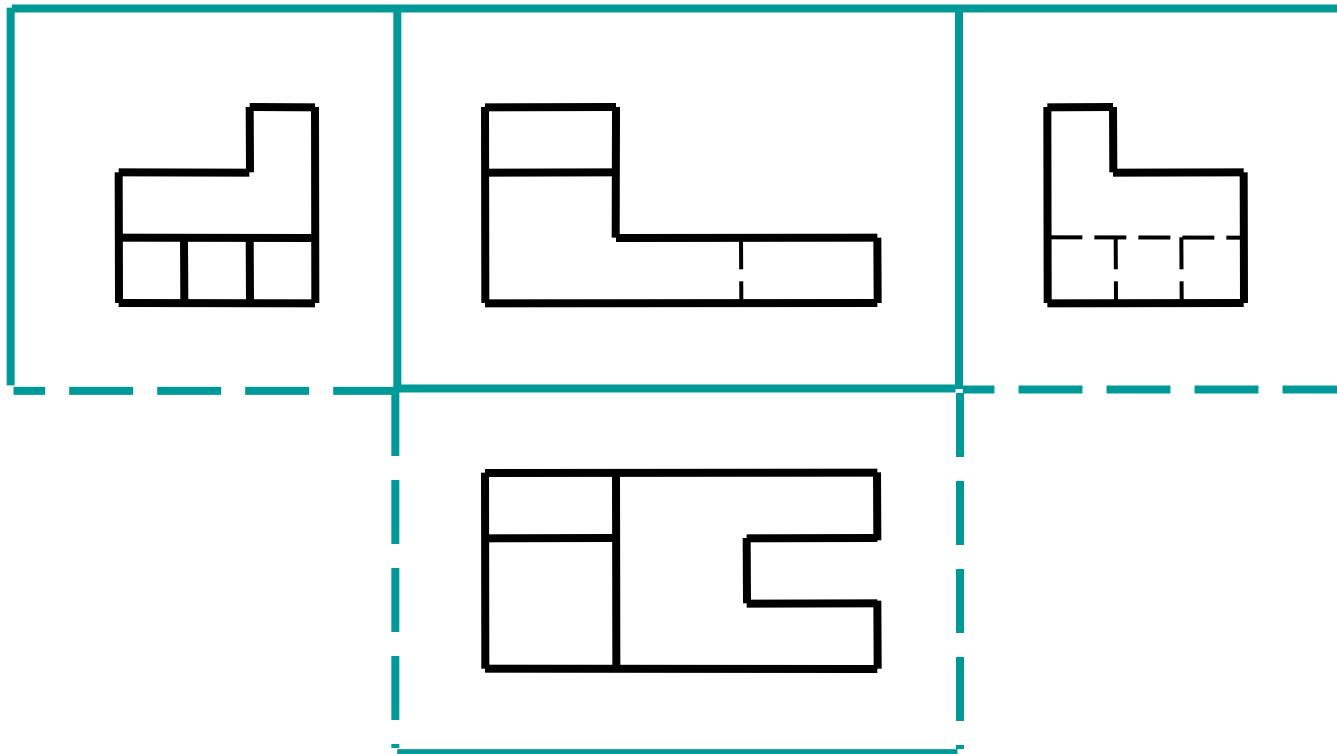


Transferência de medidas através de uma linha de rebatimento a 45°.

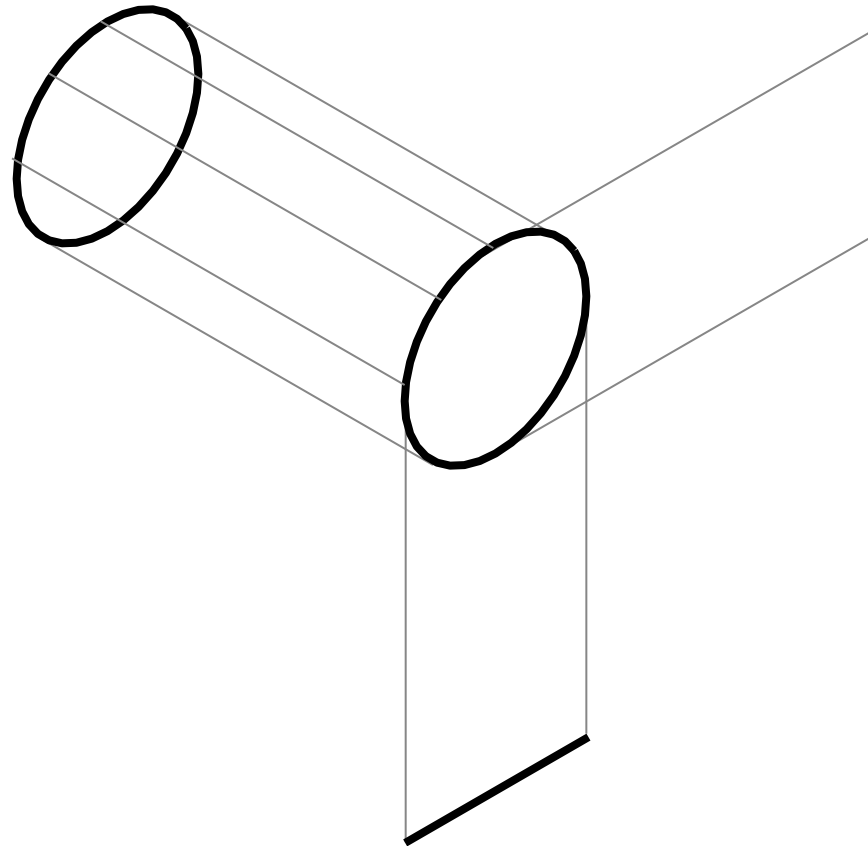
# Lateral Direita



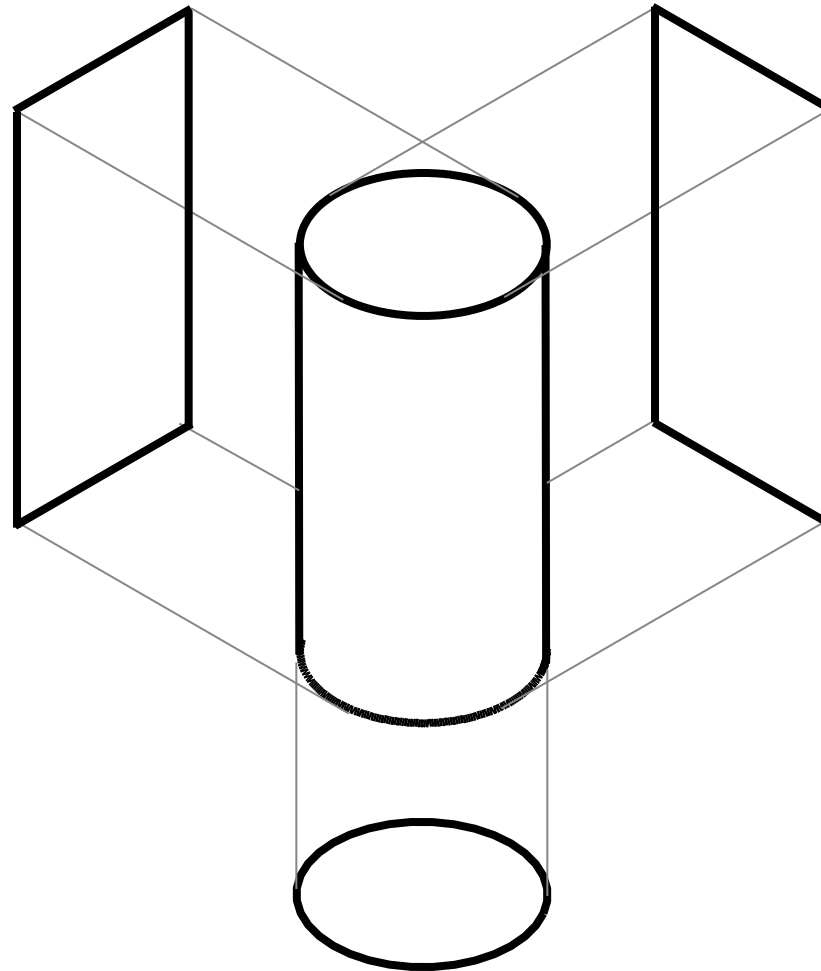
# Rebatimento



# Projeção de Circunferência

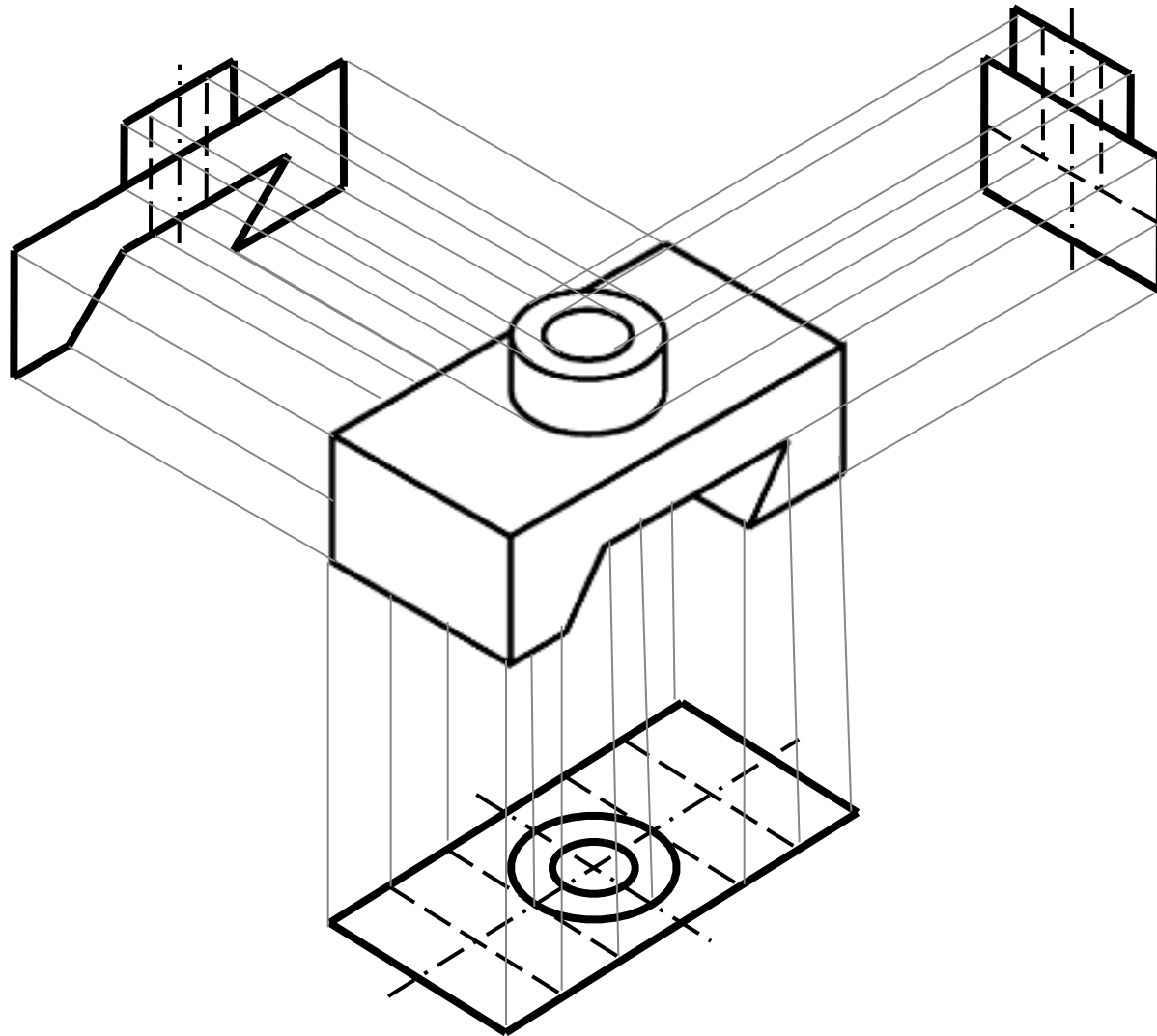


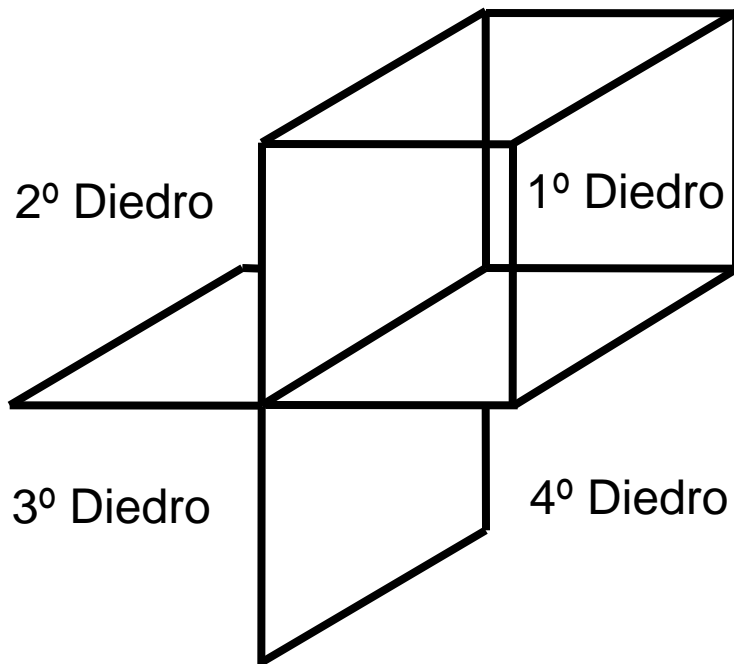
# Projeção de Cilindro

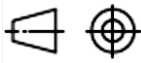
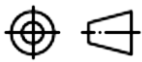




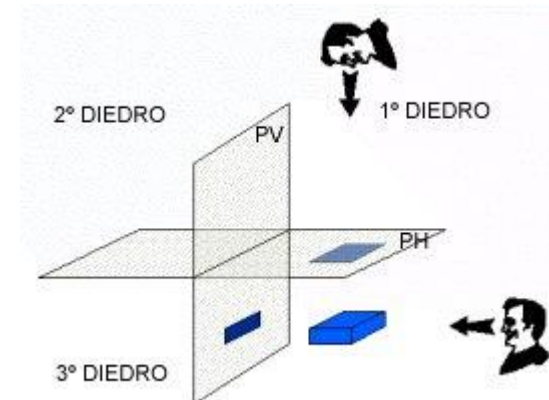
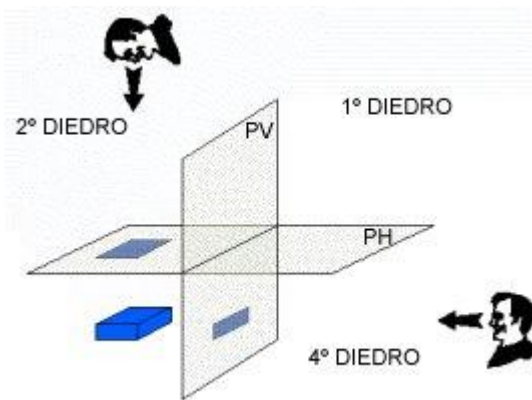
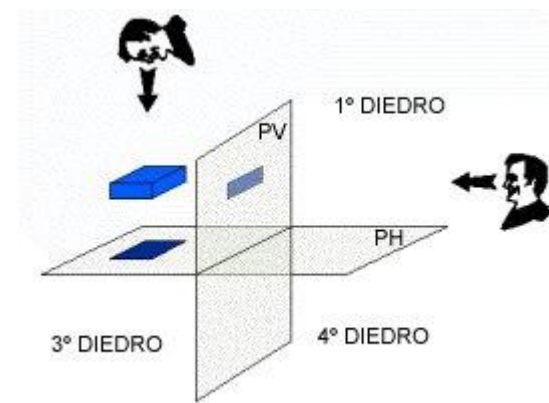
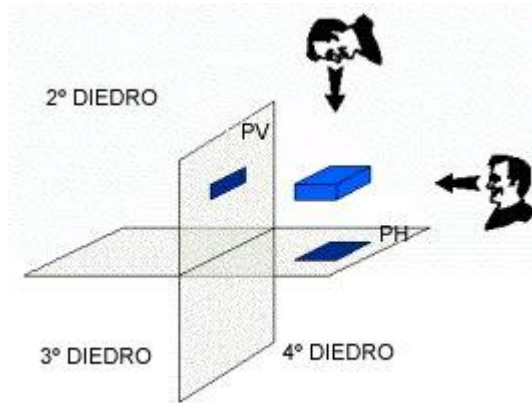
# Detalhes Cilíndricos

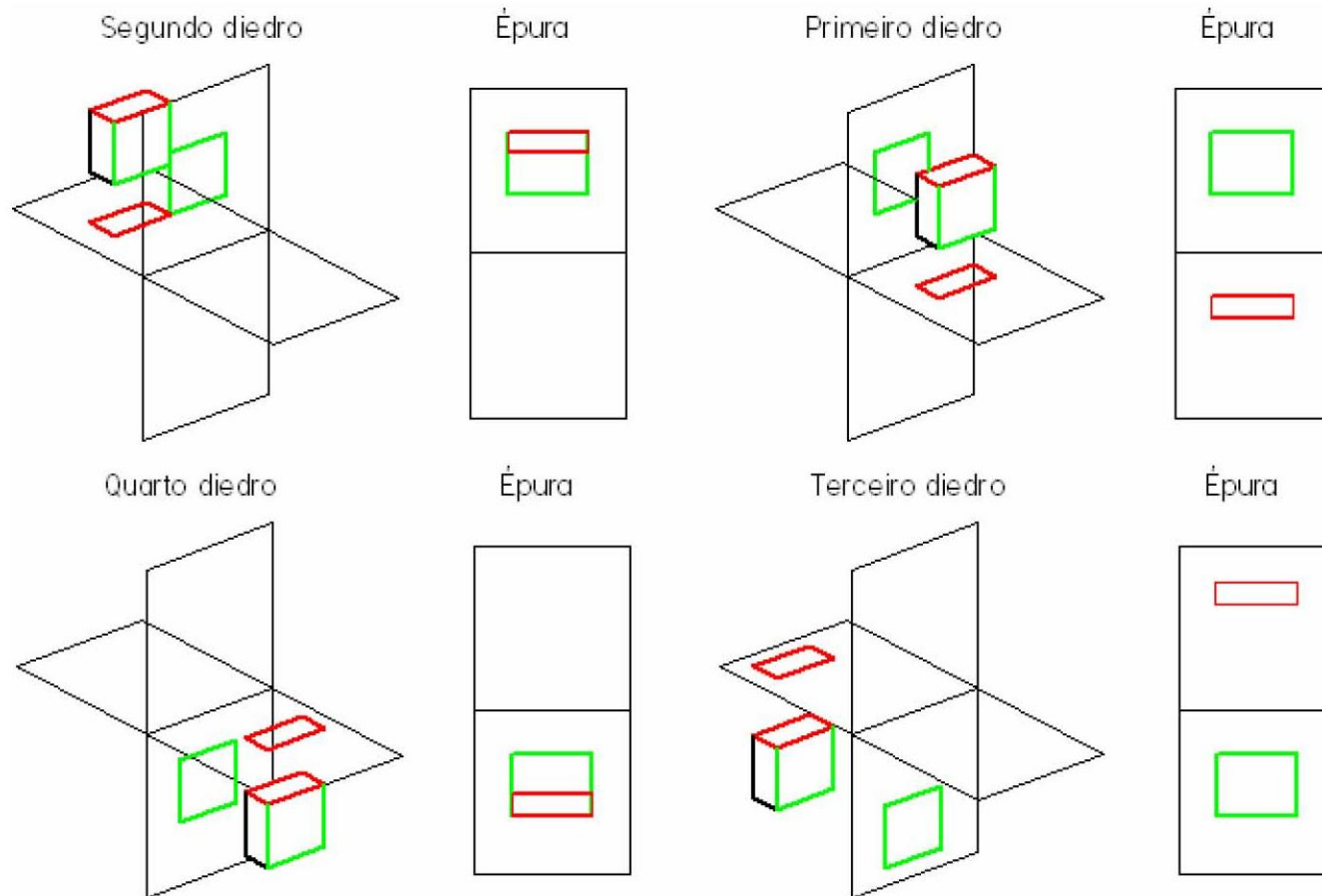




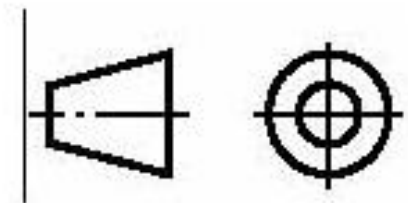
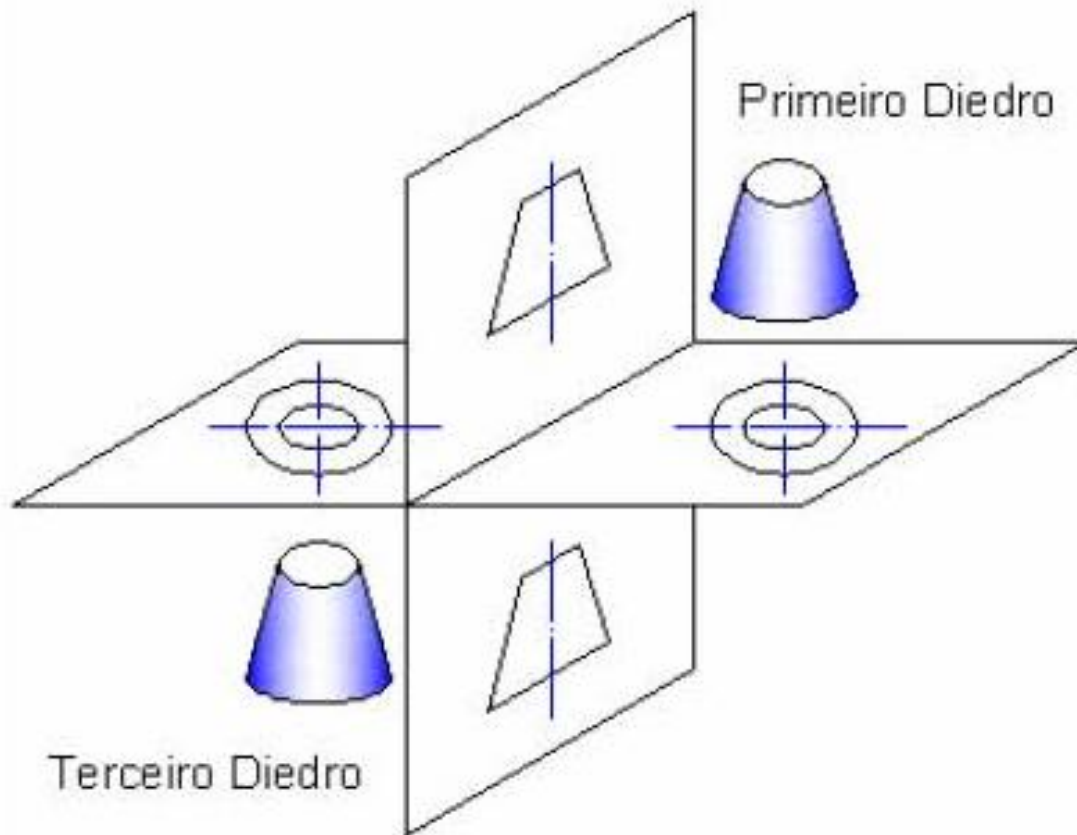
- ◆ ABNT recomenda utilizar projeção no 1º diedro.
- ◆ Projeção no 3º diedro utilizada nos EUA e Canadá.
- ◆ Simbologia:
  - 1º diedro: 
  - 3º diedro: 

# Posicionamento do Modelo e Observador





# PROJEÇÕES

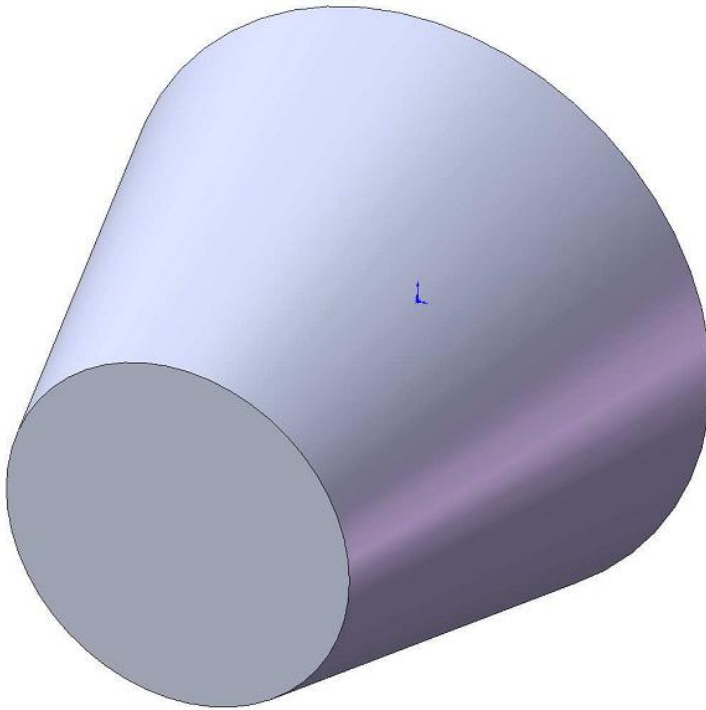


Primeiro Diedro



Terceiro Diedro

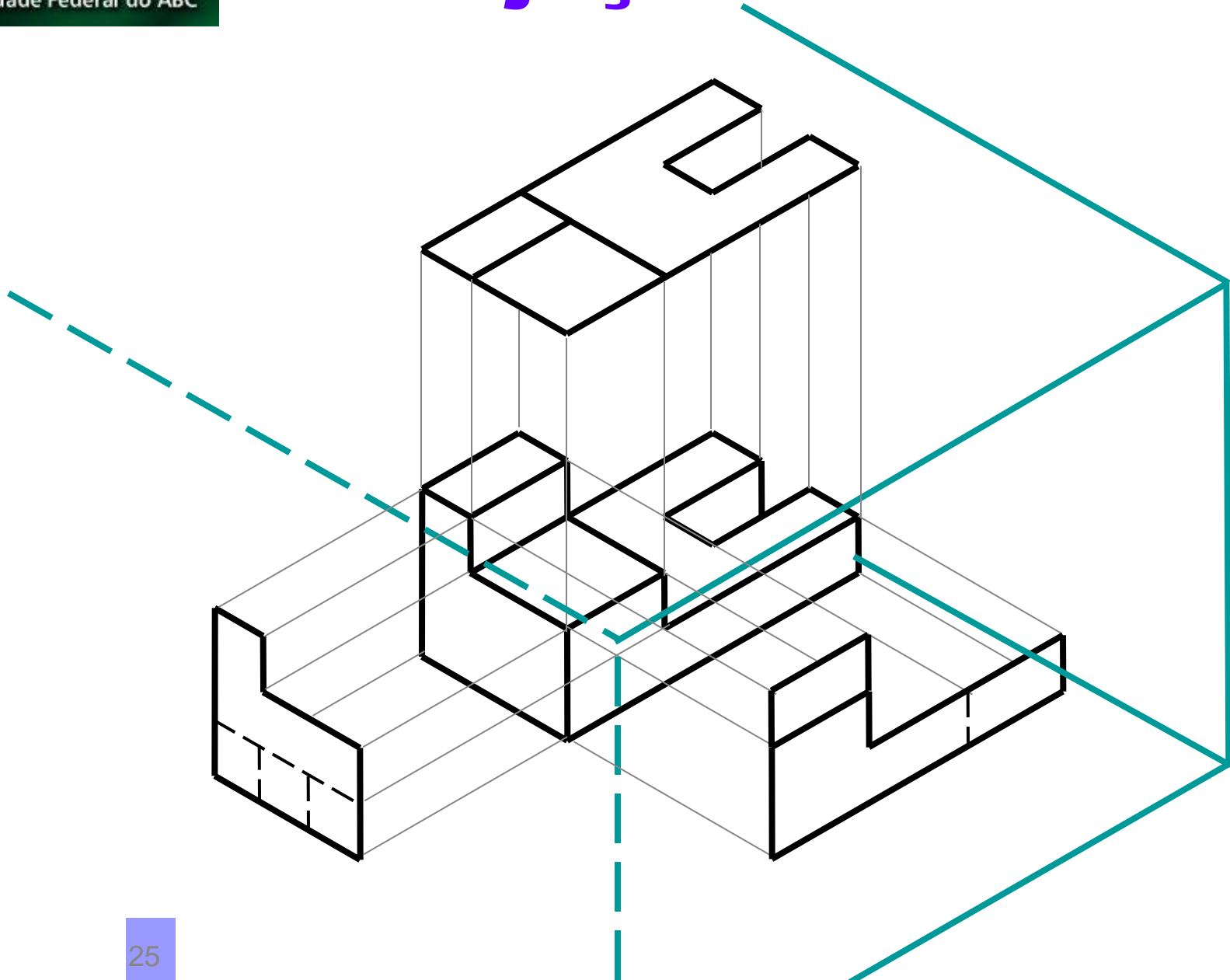
# Projeção no 3º Diedro



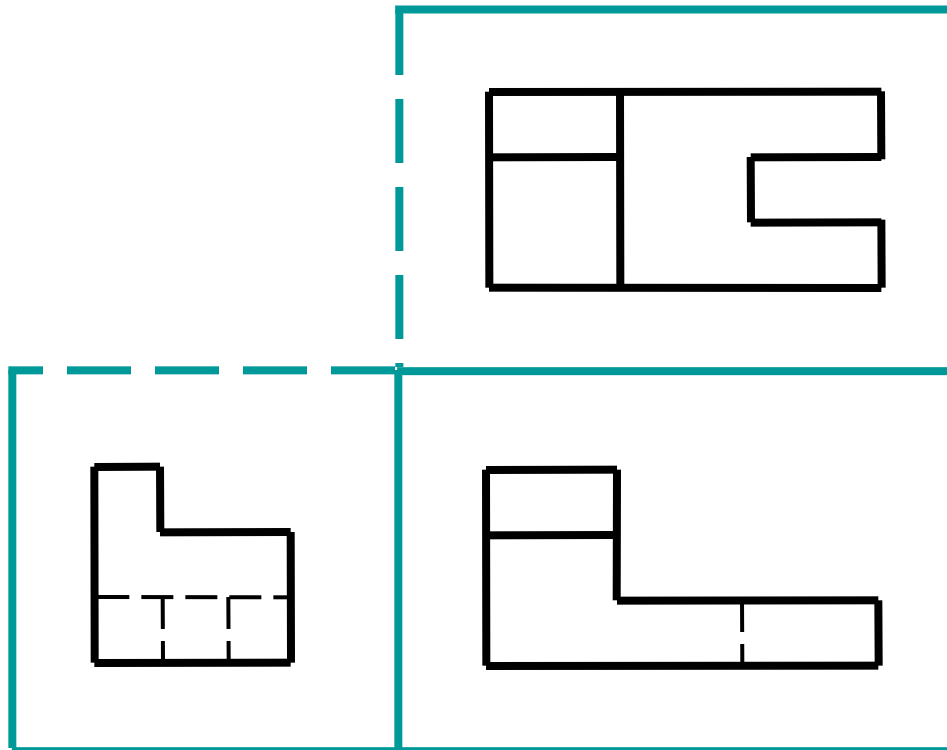
## ◆ Simbologia:

- 1º diedro: 
- 3º diedro: 

# Projeção no 3º Diedro

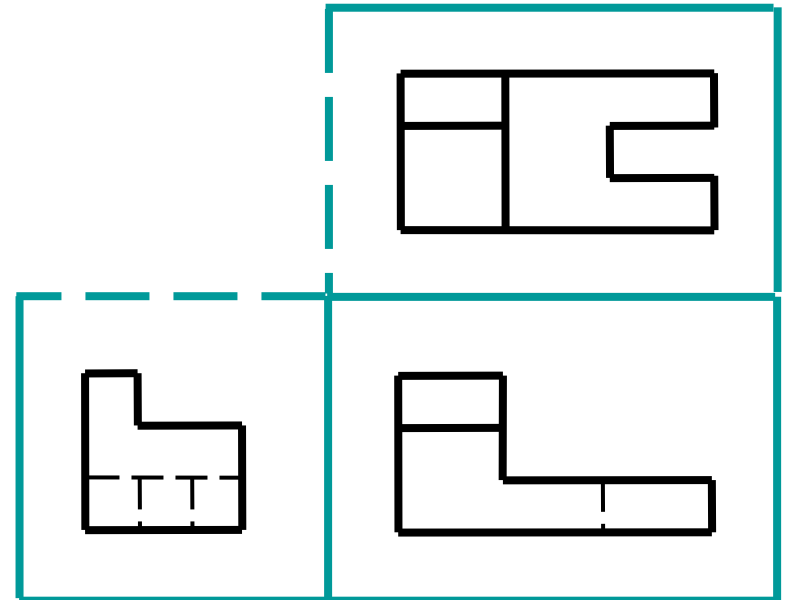
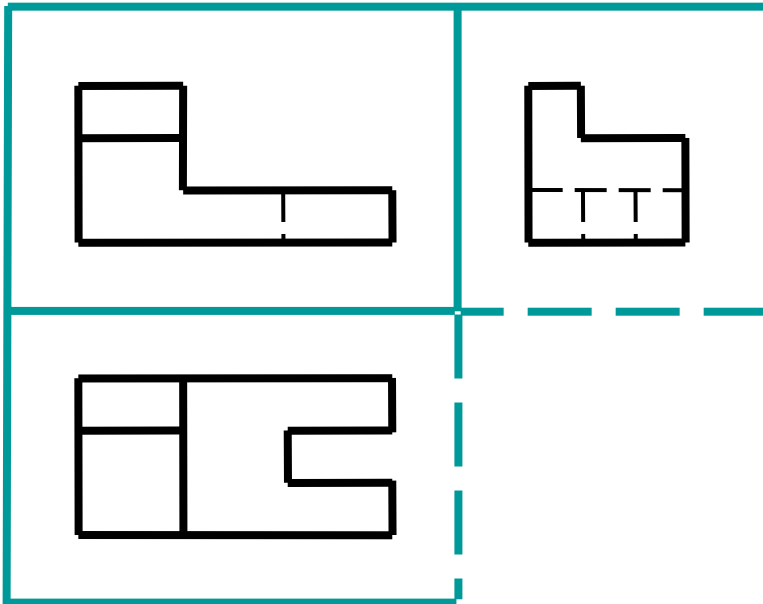


# Rebatimento no 3º Diedro

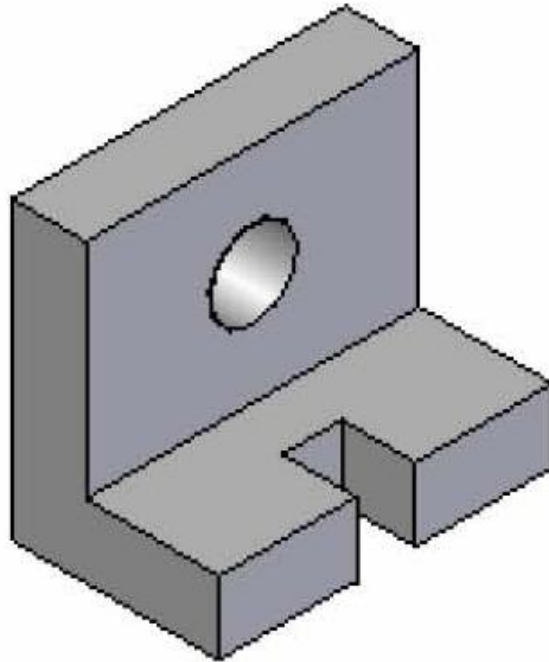




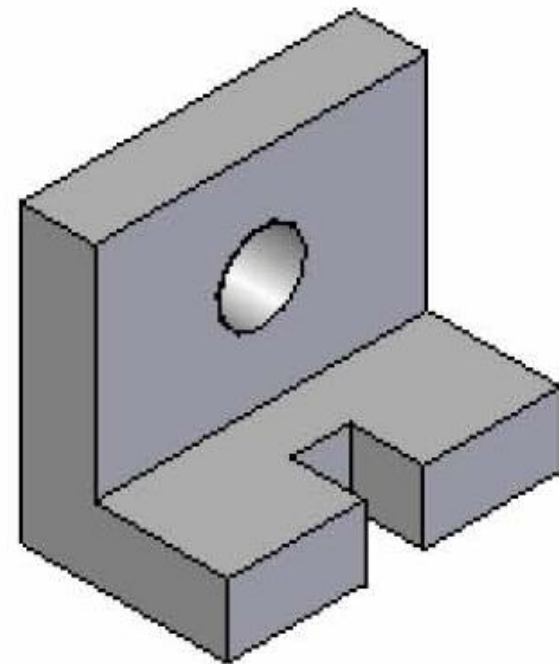
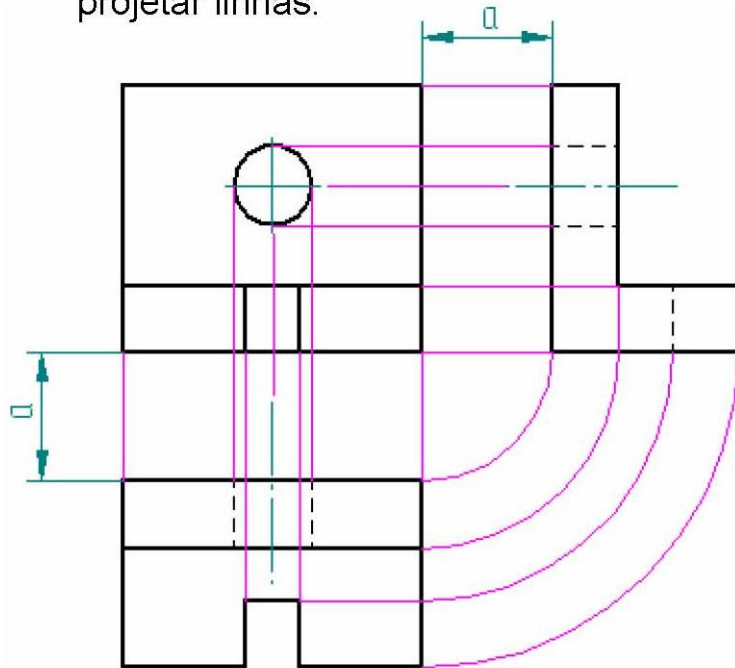
# Comparativo 1° e 3° Diedros



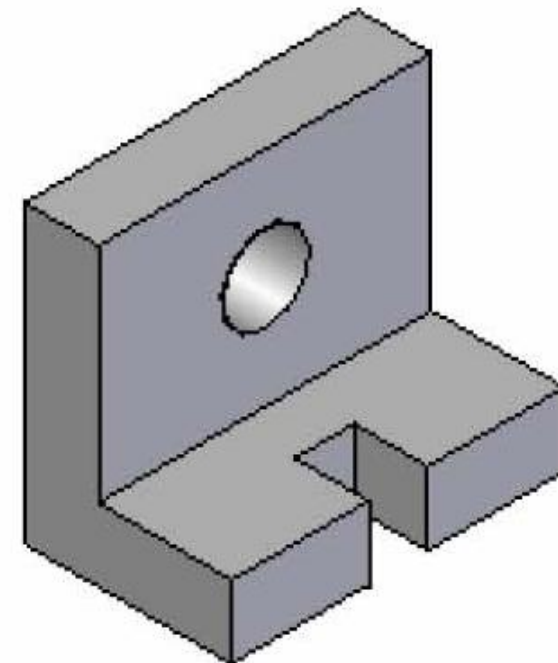
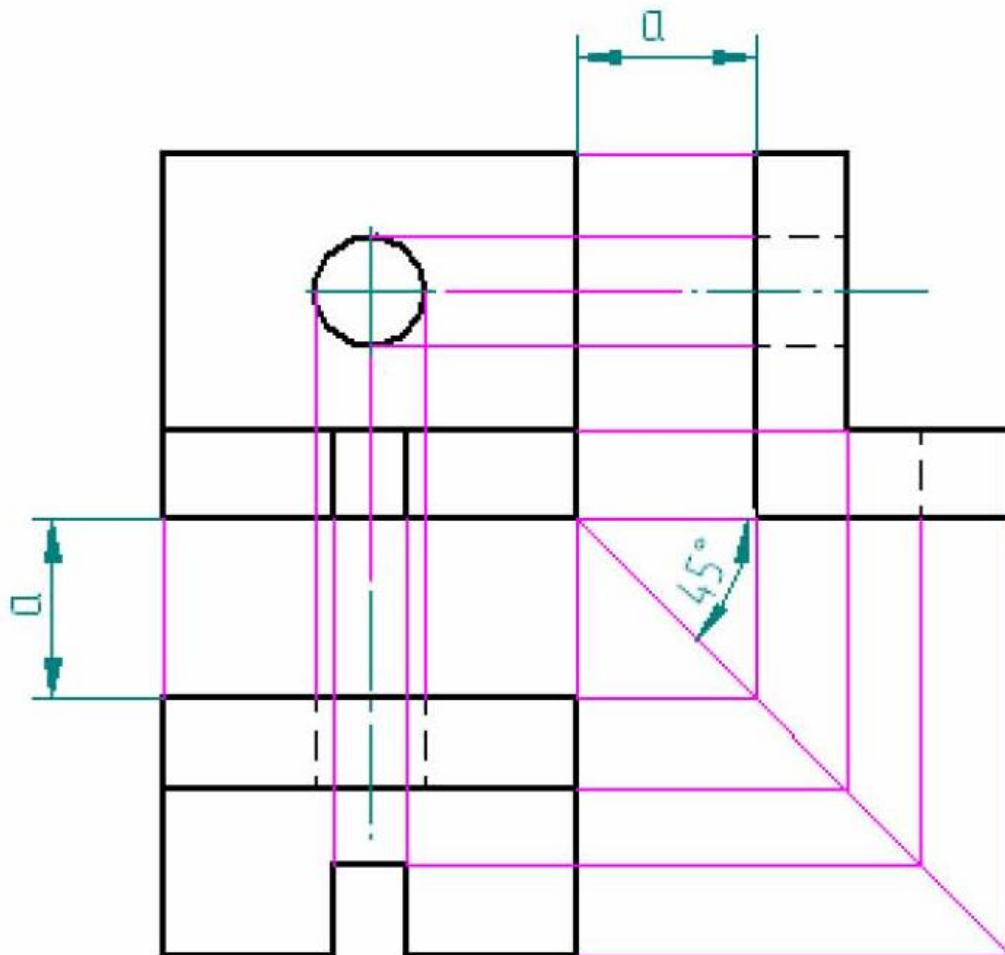
# EXEMPLO



projetar linhas.

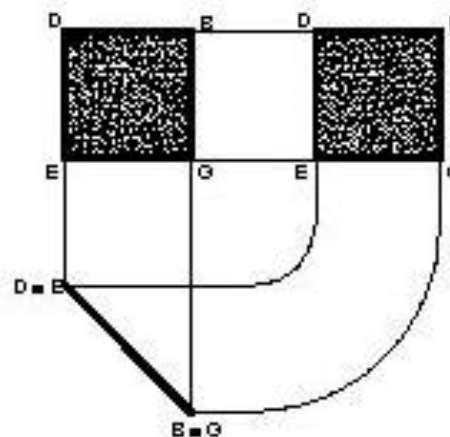
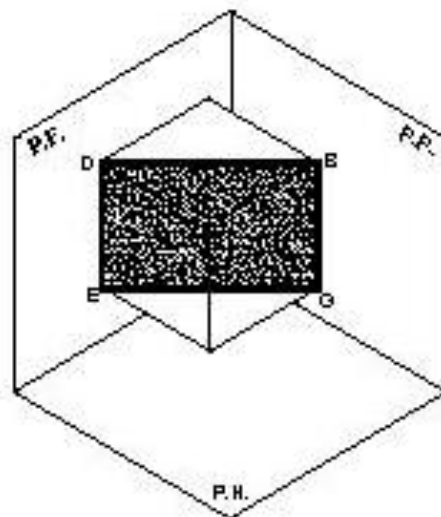


# PROJEÇÕES – 45 GRAUS

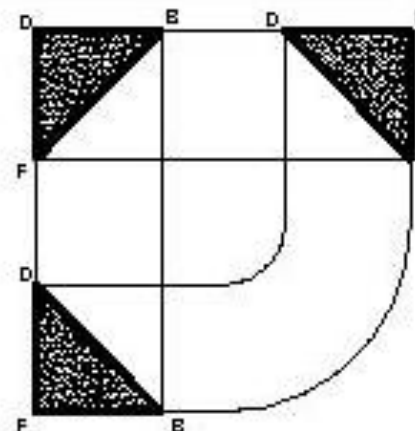
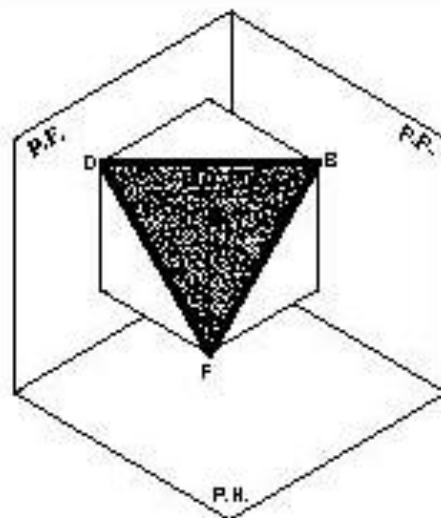


Distâncias iguais entre vistas

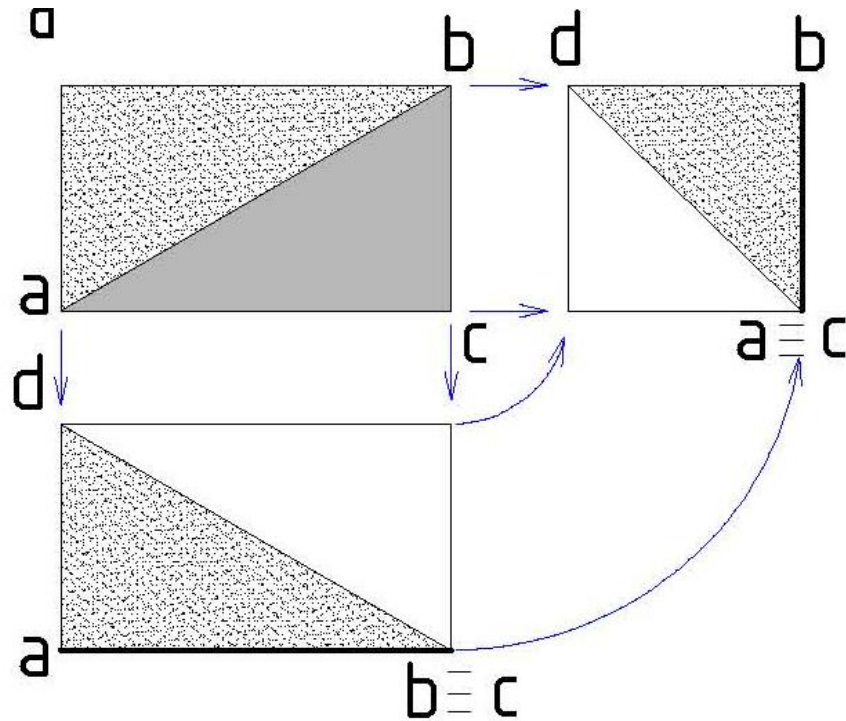
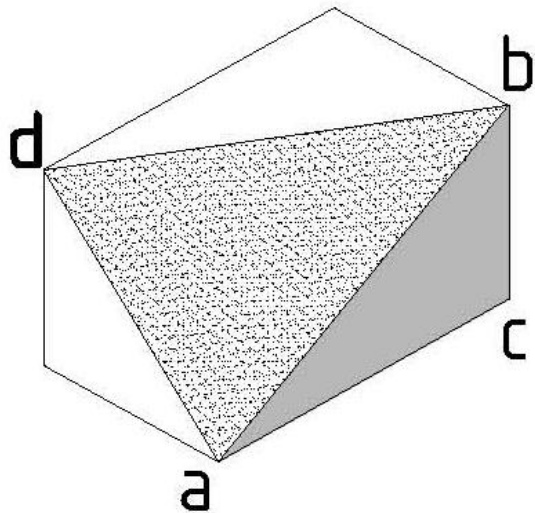
# PROJEÇÕES



Vertical - DEBG



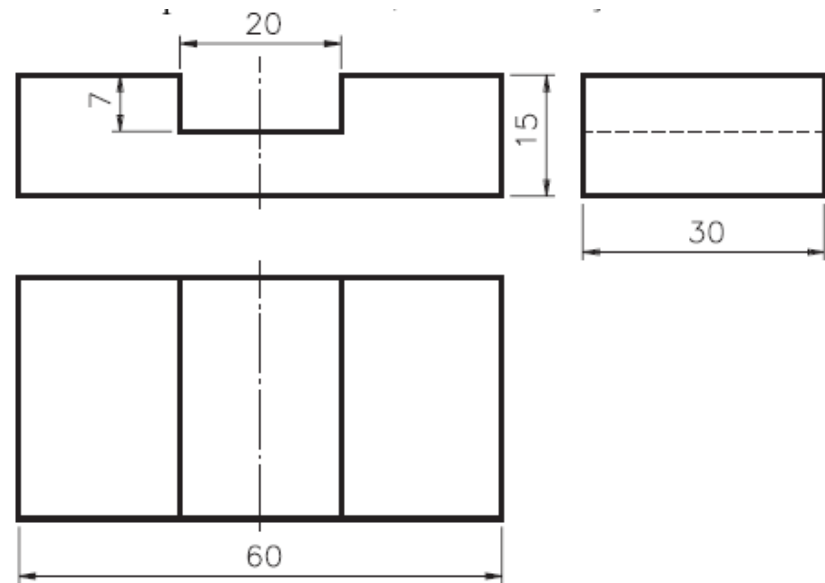
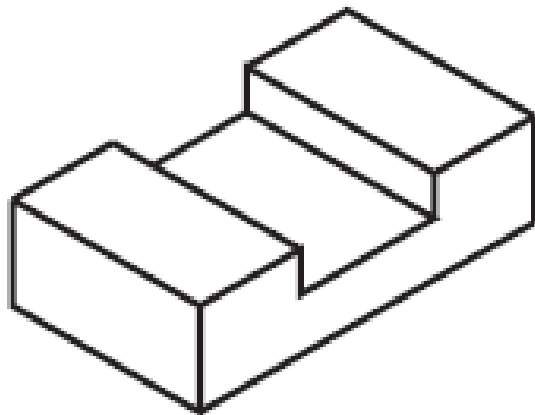
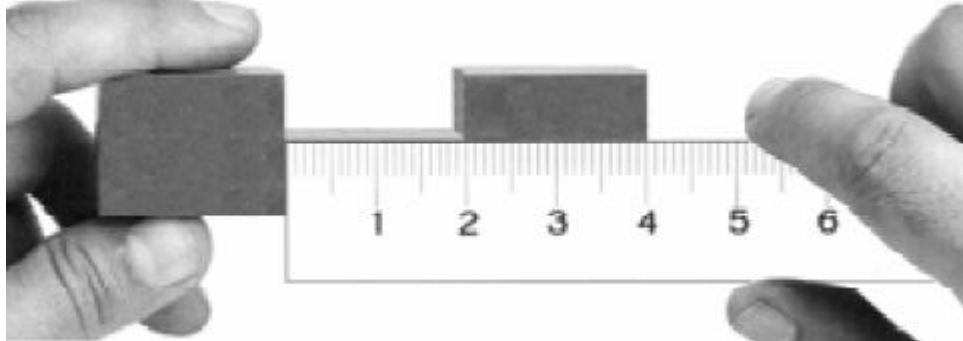
Qualquer - D B F





**Dimensionamento**

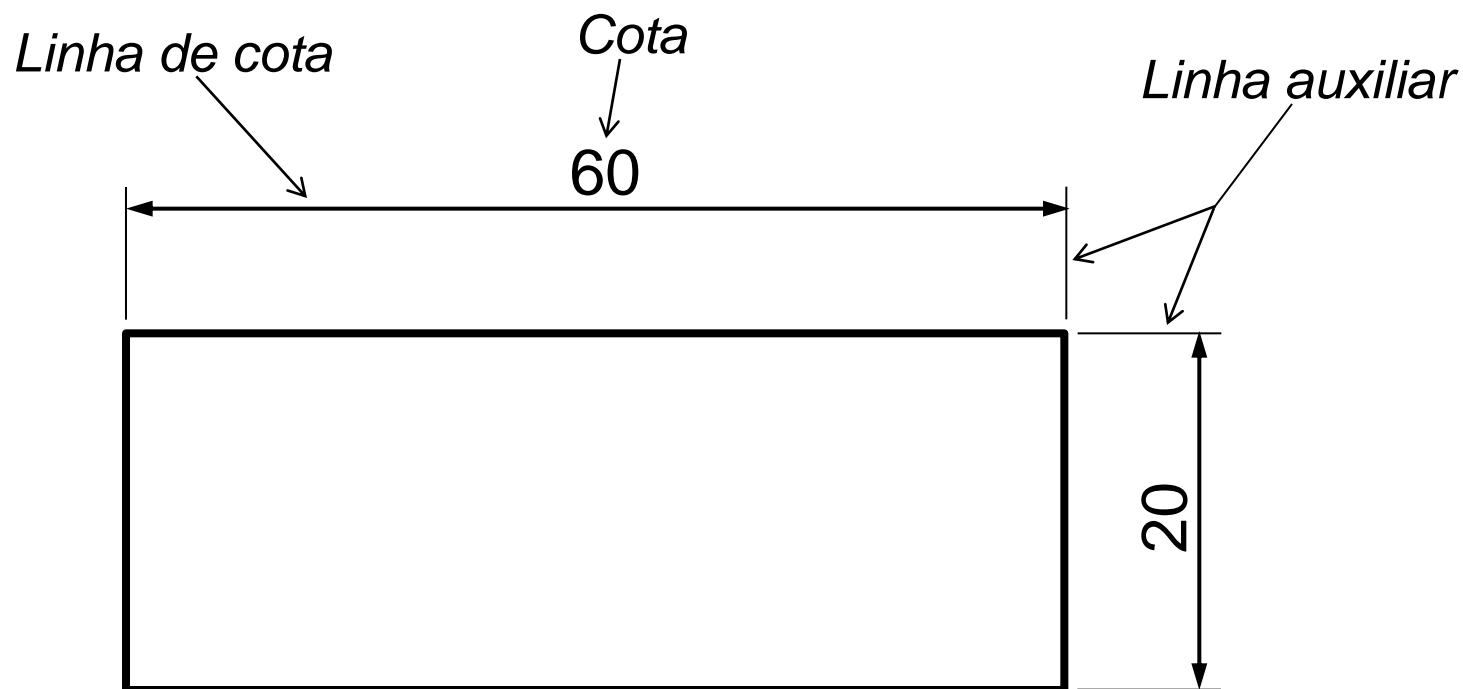
# Cotagem



Cotagem é a indicação das medidas da peça no desenho.



# Elementos de cotagem



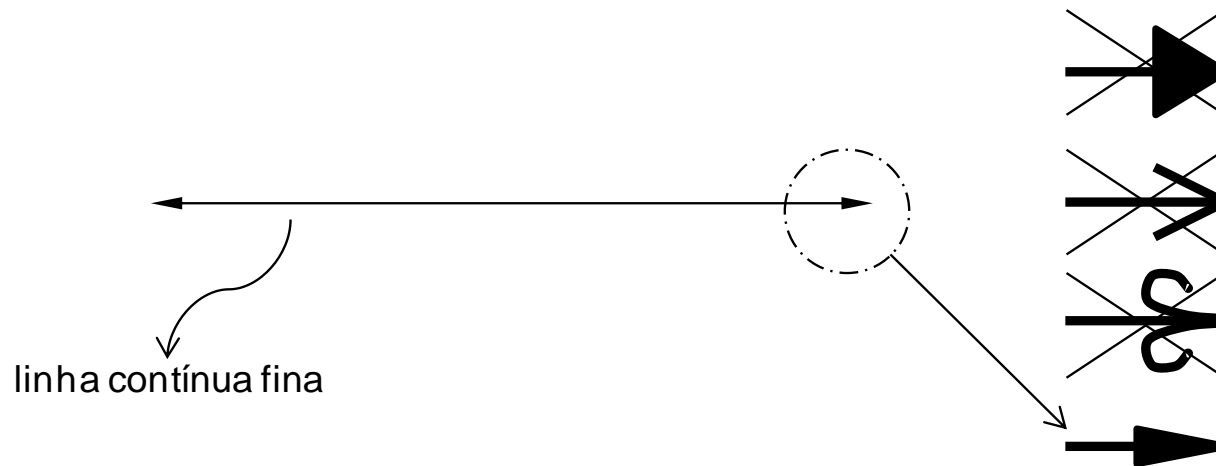
São necessários 3 elementos :

*Cota*

*Linha de cota*

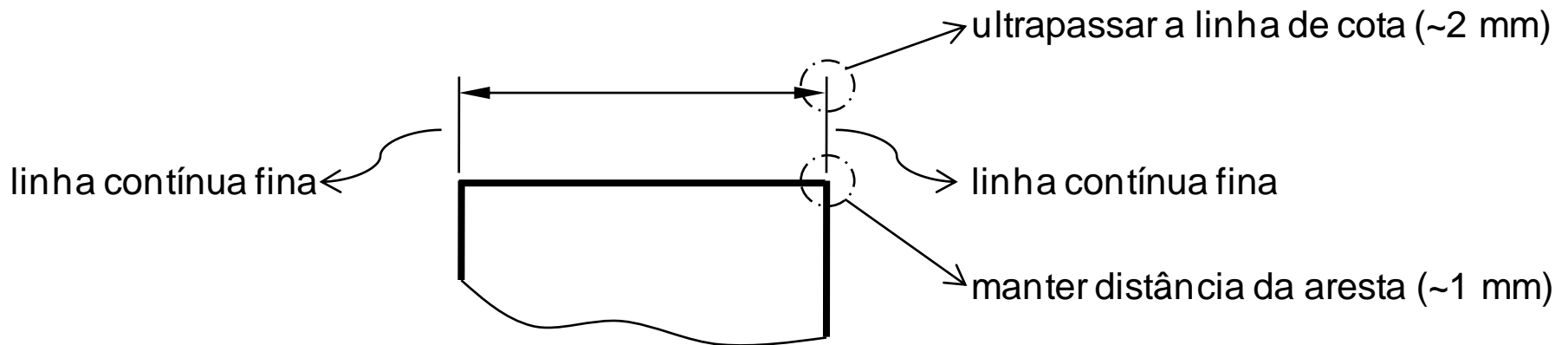
*Linha auxiliar*

# Cuidados na Cotagem



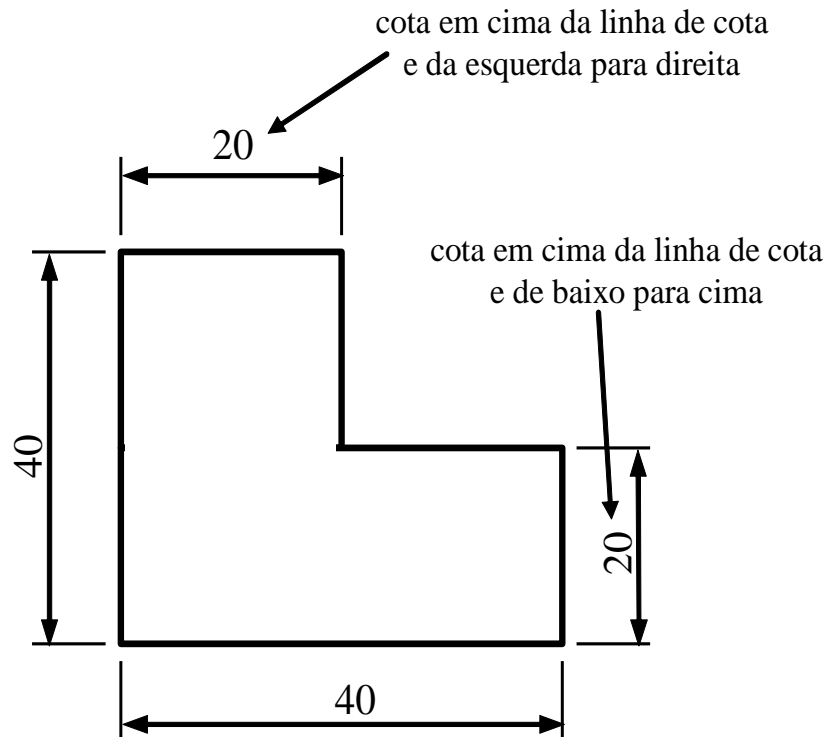
- As setas devem ser realmente “setas” (aprox. 3 mm)
- Evitar a cotagem em linhas tracejadas

# Cuidados na Cotagem



- linha auxiliar com espessura fina (~ 0,25 mm)

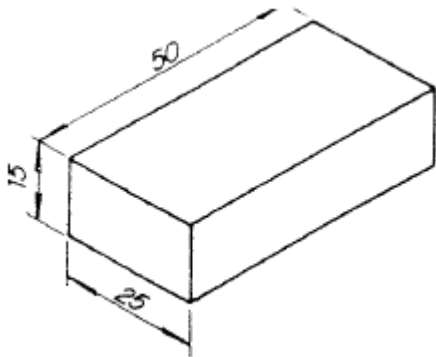
# Cuidados na Cotagem



- colocar a cota no centro da linha de cota
- ~1mm da linha da linha de cota

# Cotagem de elementos

❑ Nas peças com furos, rasgos e outros elementos, além de indicar as cotas básicas, é necessário indicar também as cotas de tamanho e de localização dos elementos.

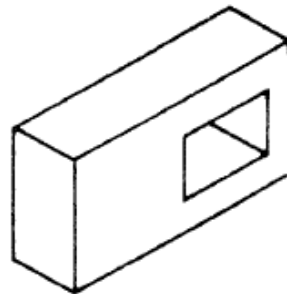


**Cotas básicas:**

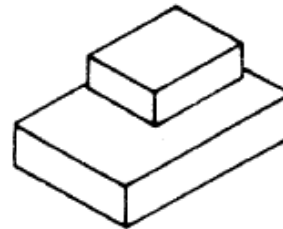
25 → largura

15 → altura

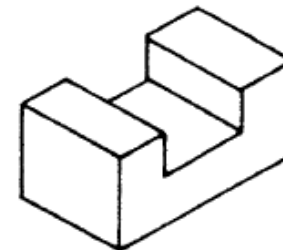
50 → comprimento



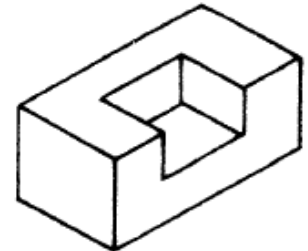
Furo



Saliência



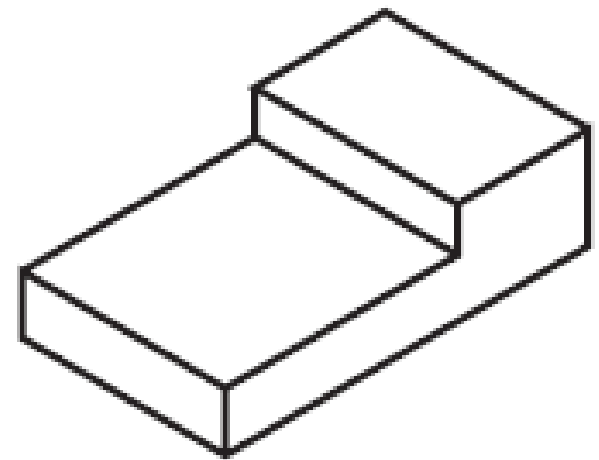
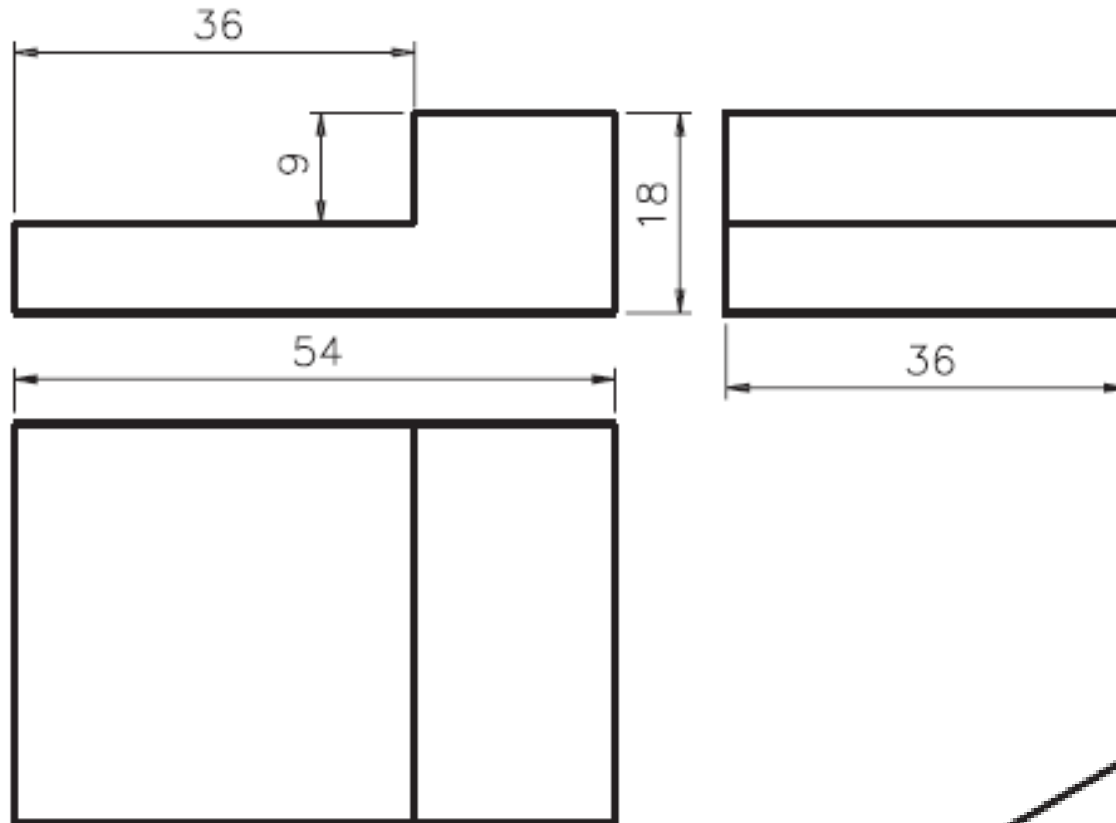
Rasgo passante



Rasgo "cego"

- Indicar as medidas suficientes para fabricação da peça.
- Não repetir cotas de uma mesma dimensão da peça.

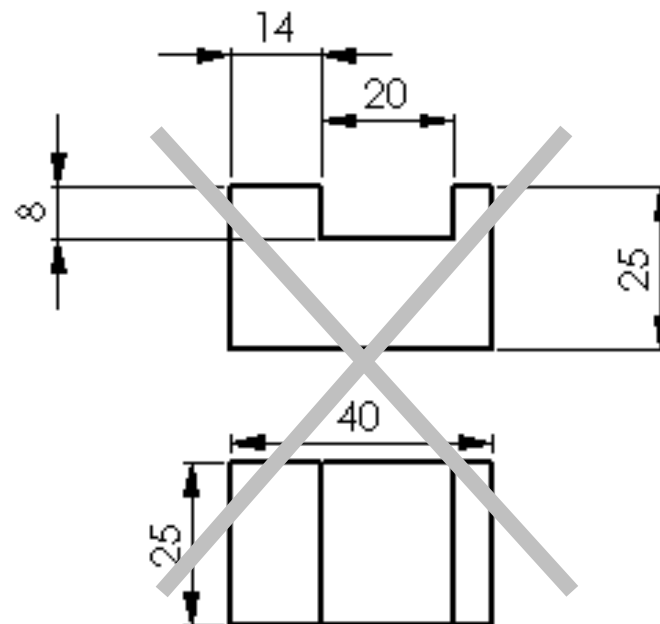
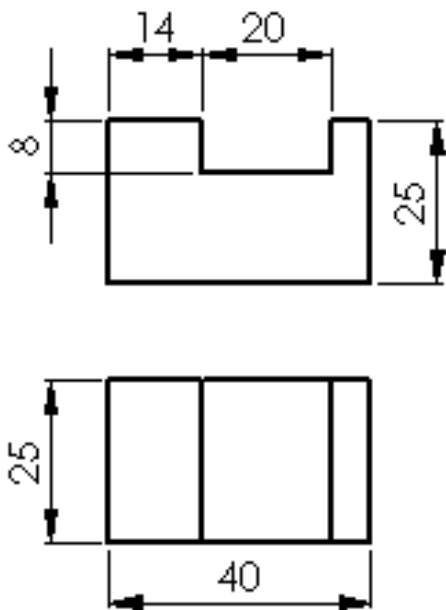
# Cotagem de elementos prismáticos



# Cotagem de elementos prismáticos

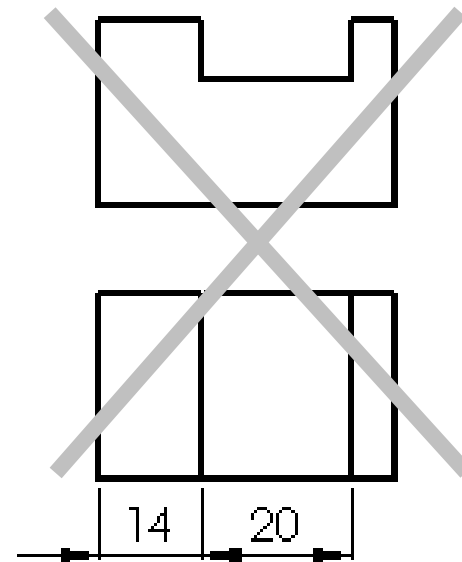
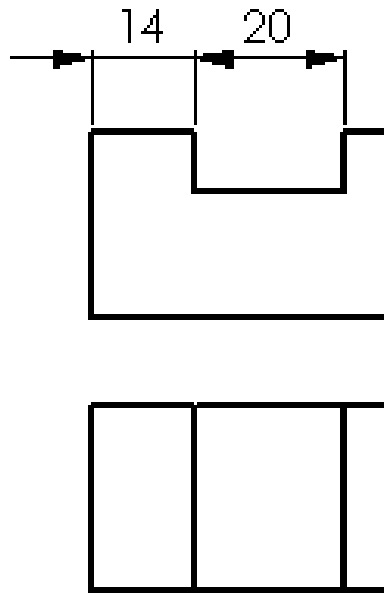
## Regra 1

Organizar as linhas de cota de modo a facilitar e entendimento do dimensionamento da peça



# Cotagem de elementos prismáticos

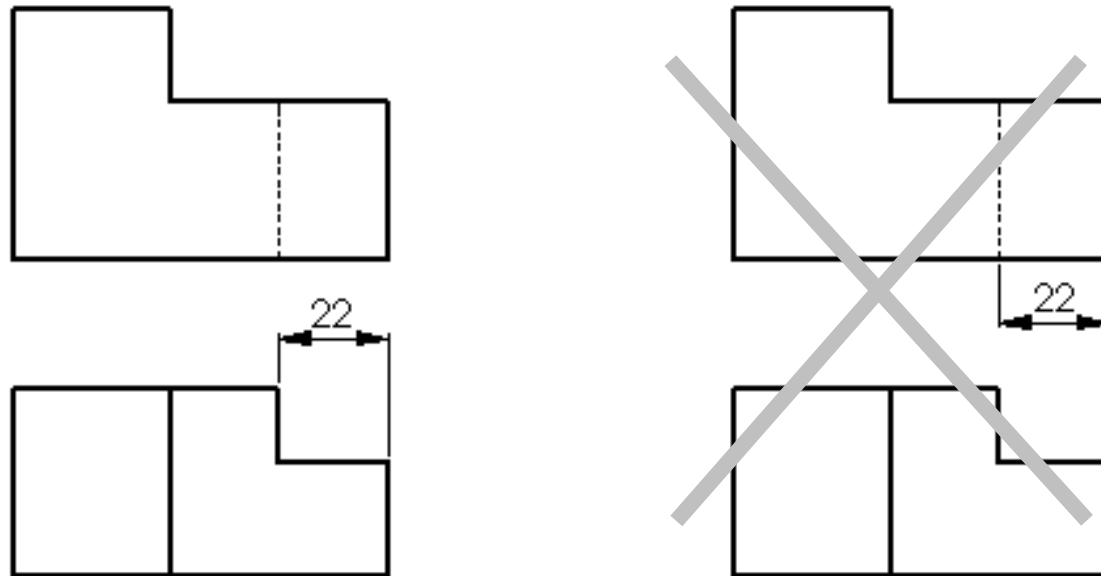
## Regra 2





# Cotagem de elementos prismáticos

## Regra 3

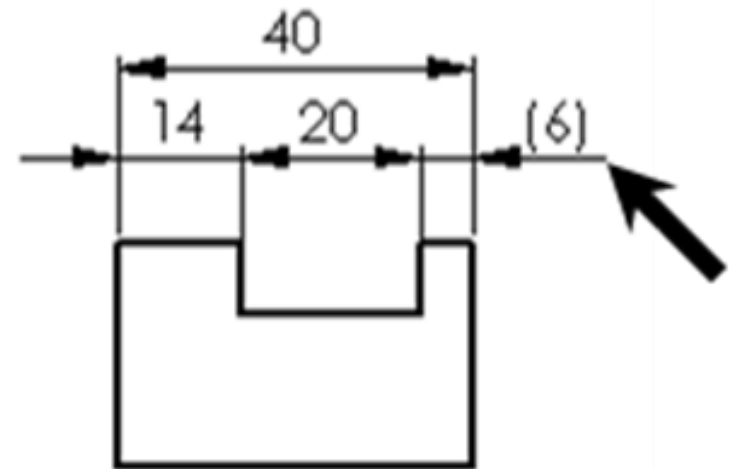
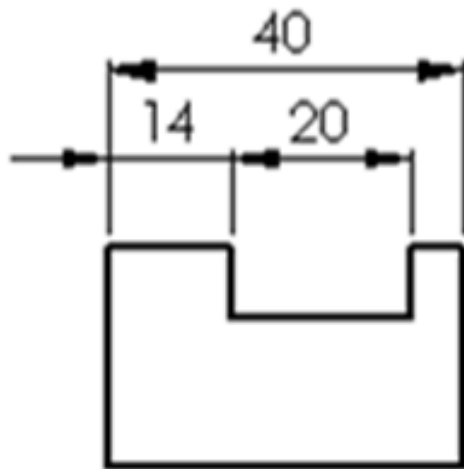


**Não cotar arestas invisíveis**

# Cotagem de elementos prismáticos

## Regras 4 e 5

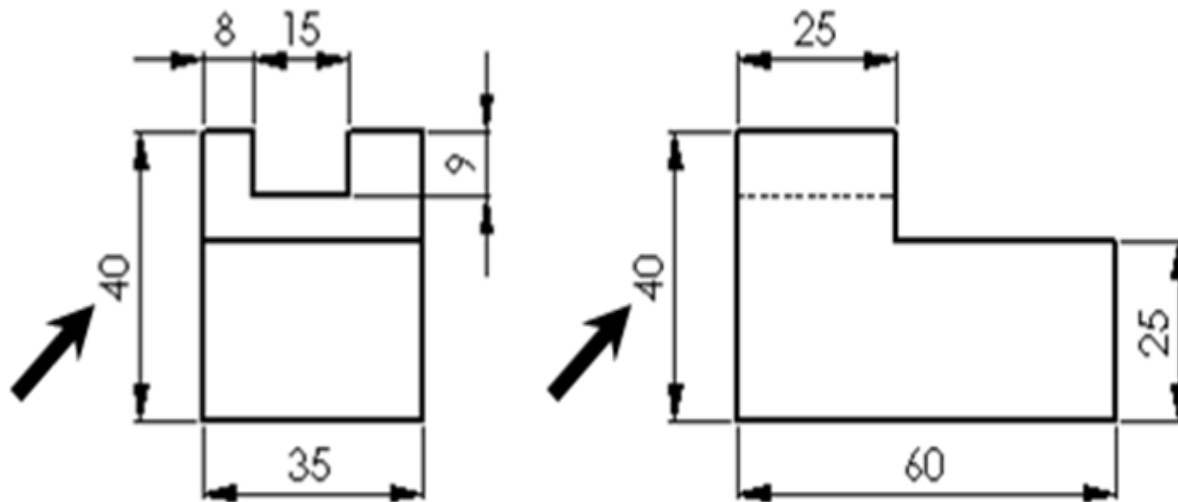
Indicar as dimensões básicas do objeto; comprimento, altura e largura, evitando-se cotar a última dimensão de uma cotagem em cadeia.



# Cotagem de elementos prismáticos

## Regra 6

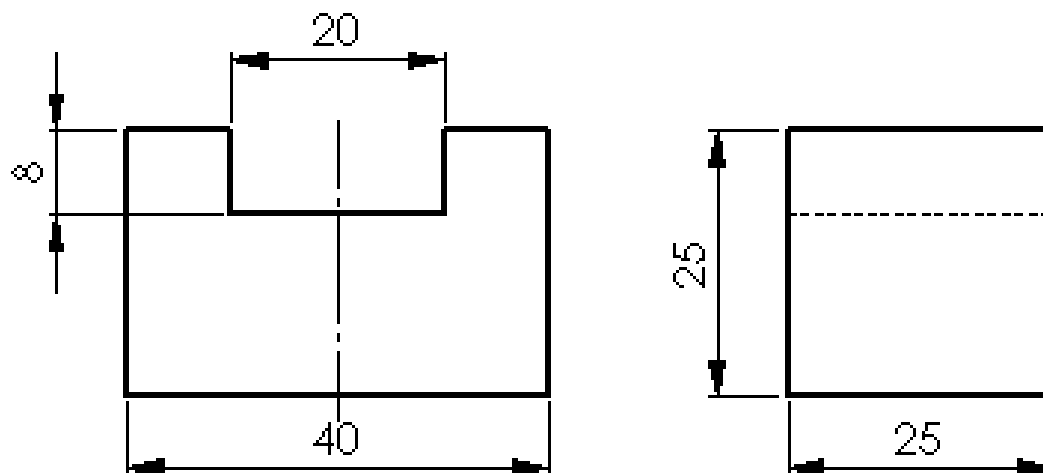
Não repetir a dimensão em uma das projeções



# Cotagem de elementos prismáticos

## Regra 7

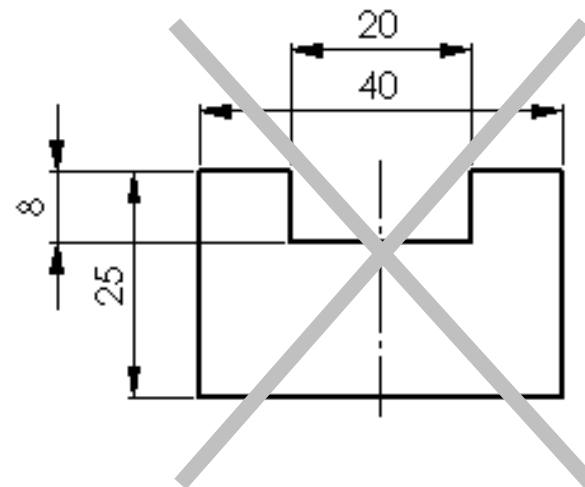
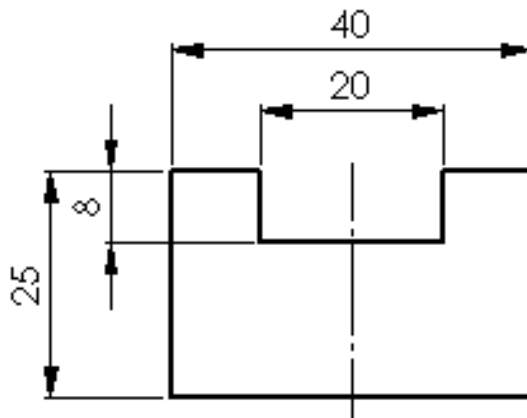
Se o objeto é simétrico não há necessidade de cotas de localização



# Cotagem de elementos prismáticos

## Regra 8

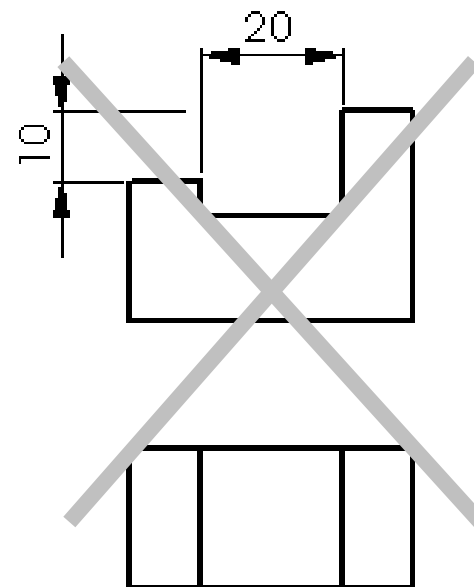
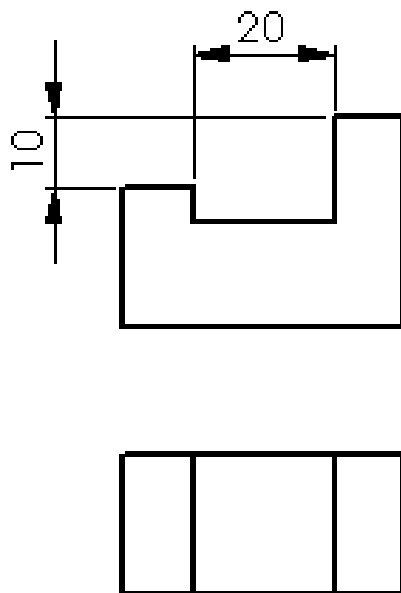
Evitar cruzar linhas de chamada com linhas de cotas



# Cotagem de elementos prismáticos

## Regra 9

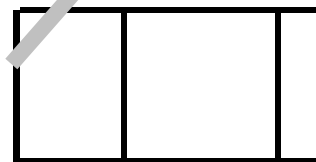
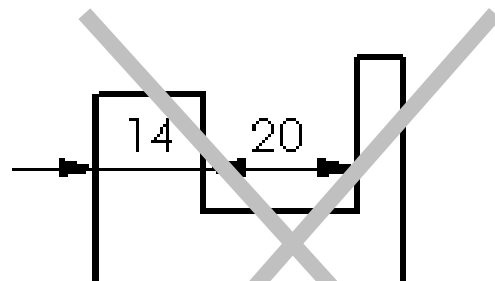
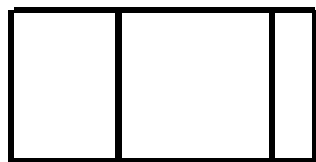
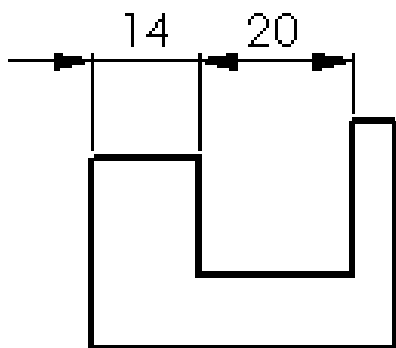
Linhas de chamada podem cruzar linhas de chamada



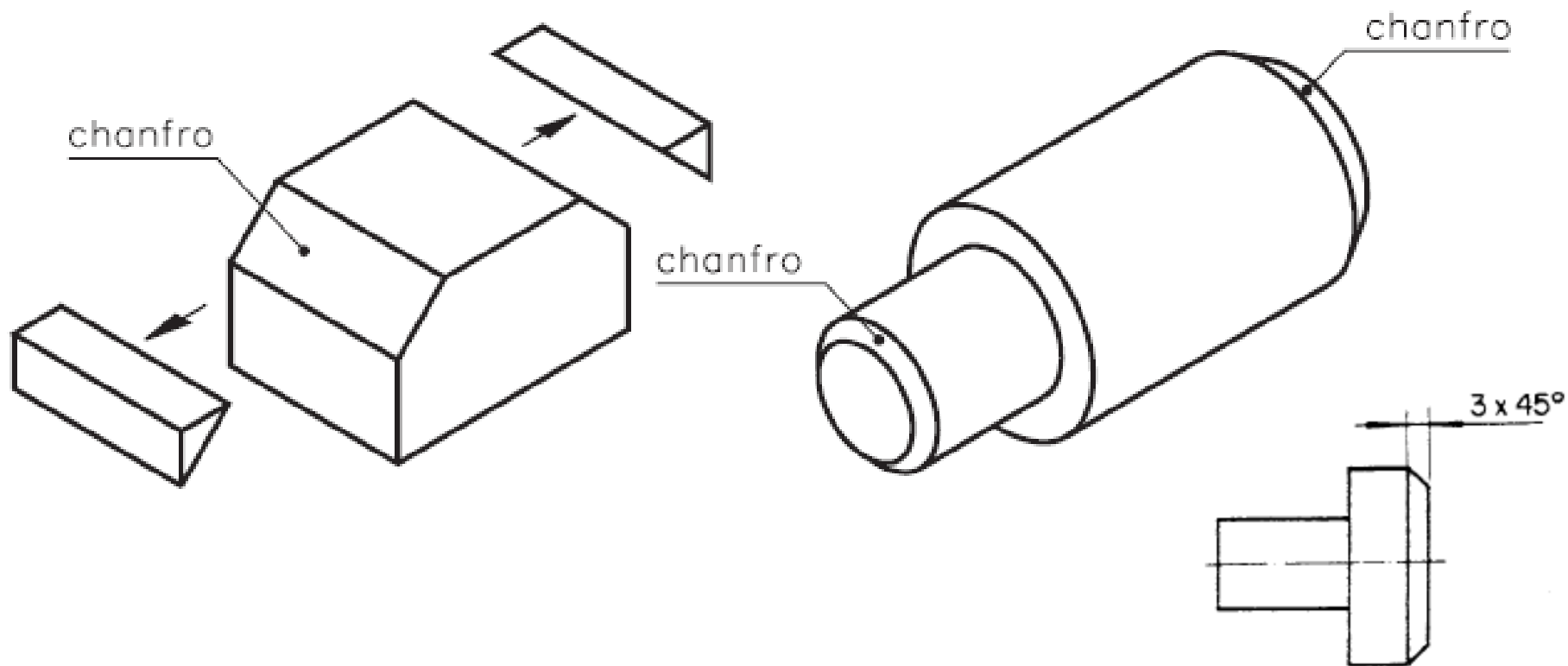
# Cotagem de elementos prismáticos

## Regra 10

Evitar cotar o elemento dentro de sua projeção



# Cotagem de elementos angulares

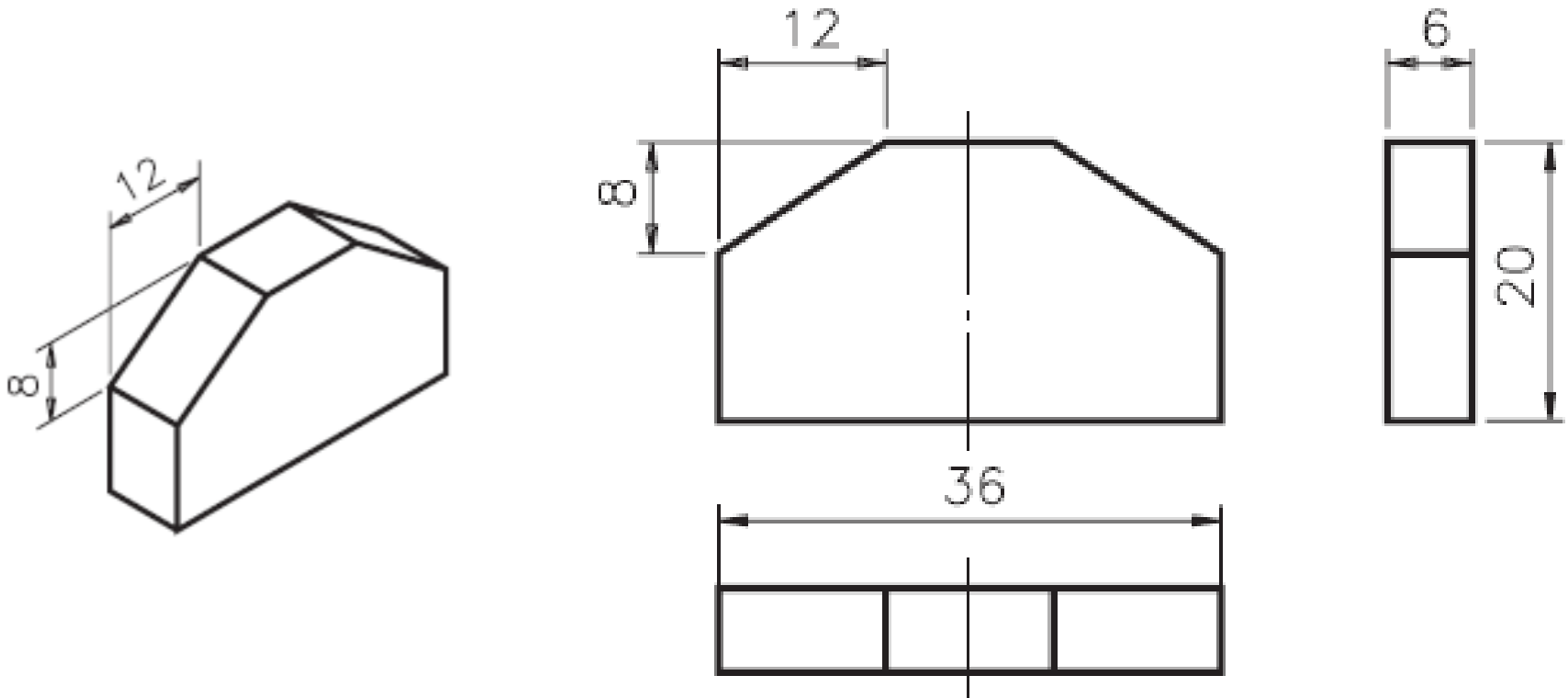


- **Cotas lineares:** referem-se a medidas de extensão.
- **Cotas angulares:** indicam medidas de aberturas de ângulos.

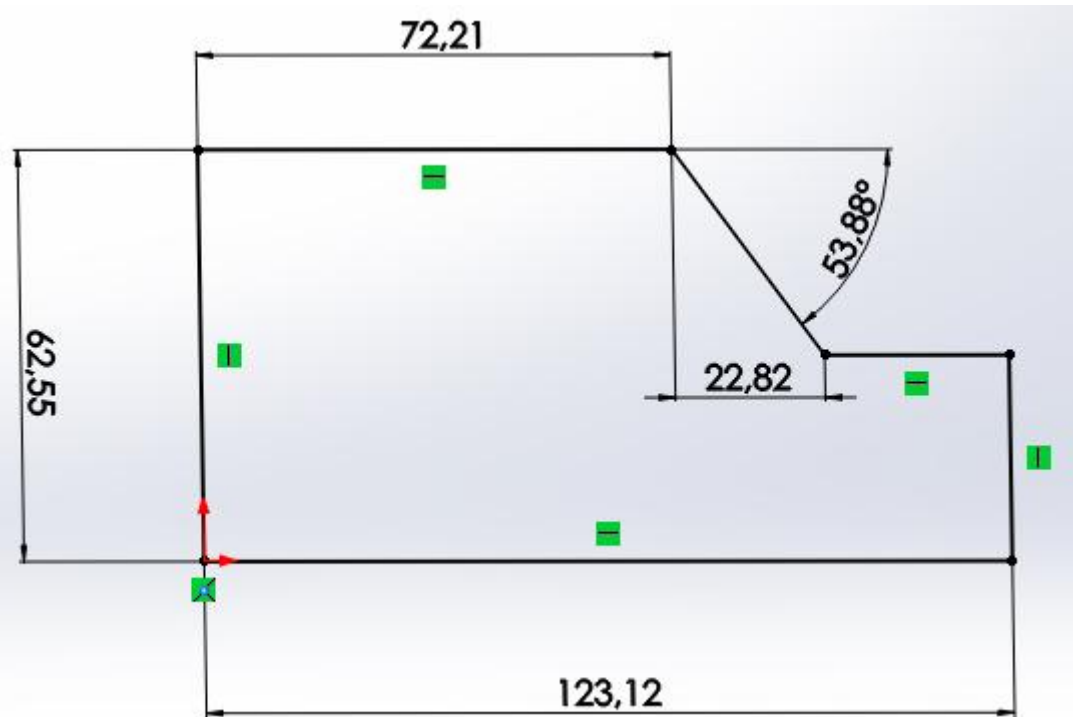
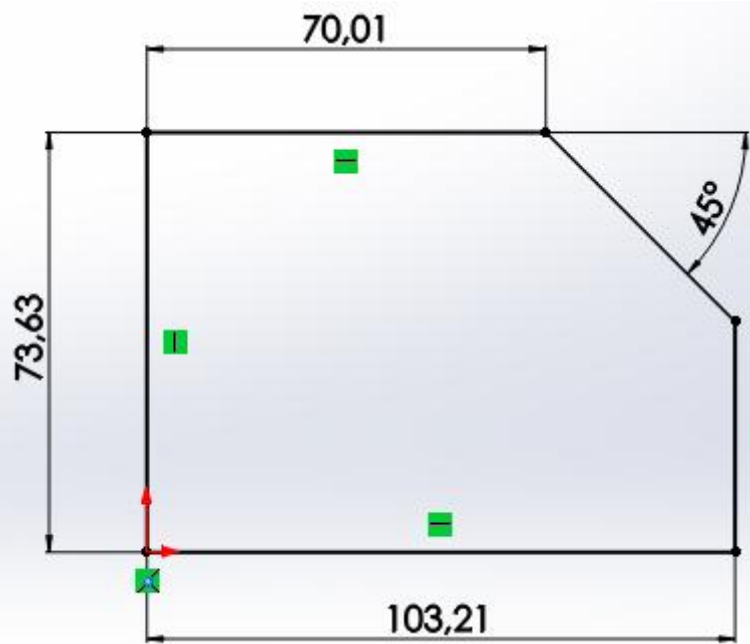


# Cotas lineares

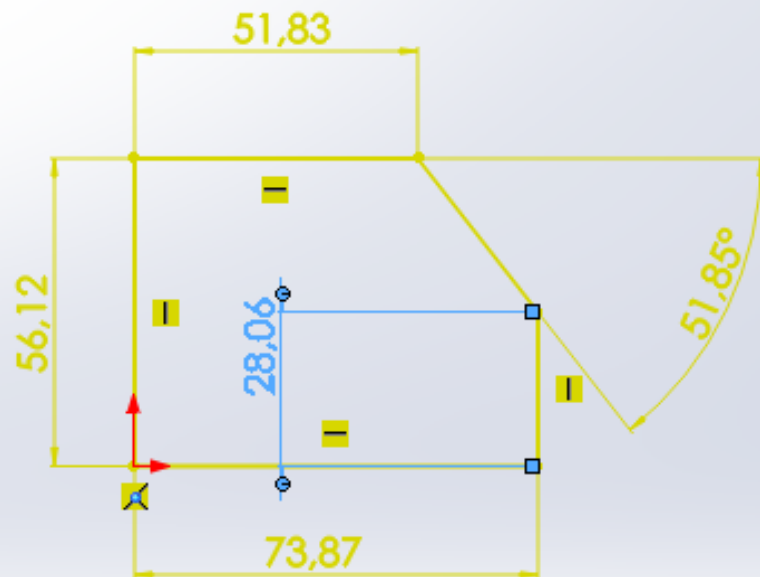
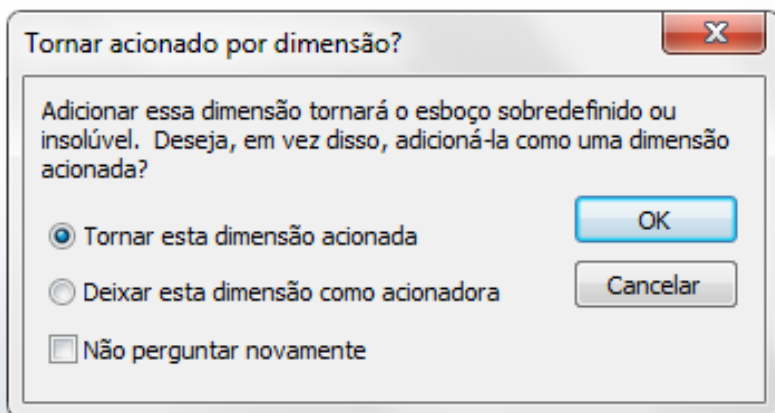
❑ A vista onde o chanfro aparece é a vista frontal. Portanto, colocar a cota nesta vista.



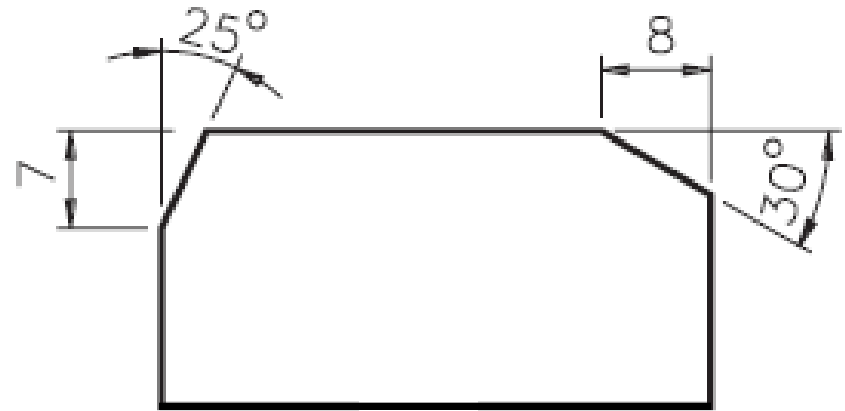
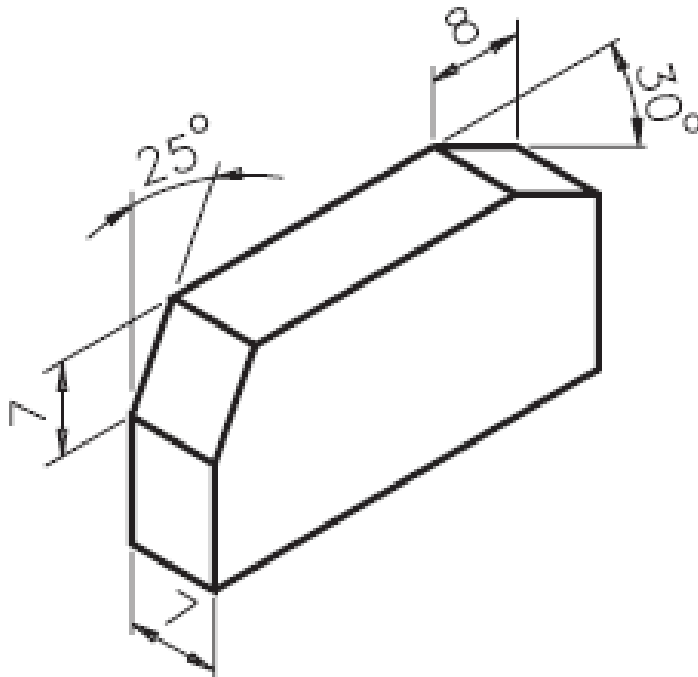
# COTAS - CORRETO



# COTAS - ERRADO



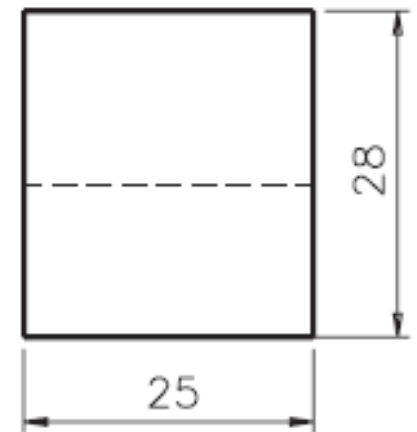
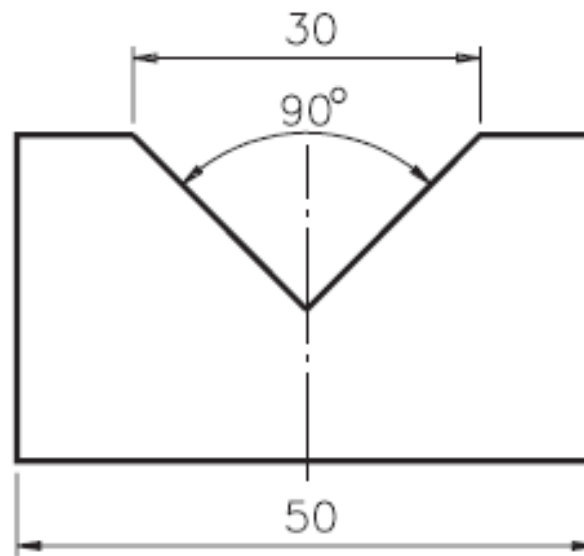
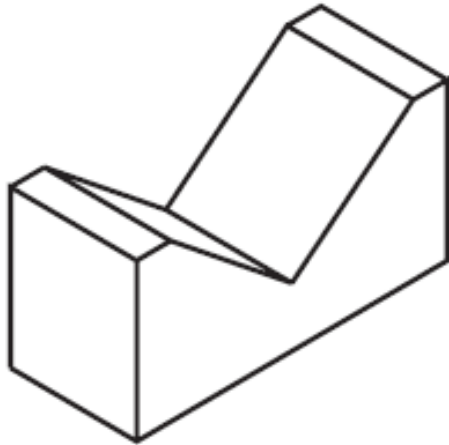
# Cotas angulares



ESP. 7

Neste exemplo os dois chanfros são diferentes, portanto cada um deles deve ser cotado separadamente.

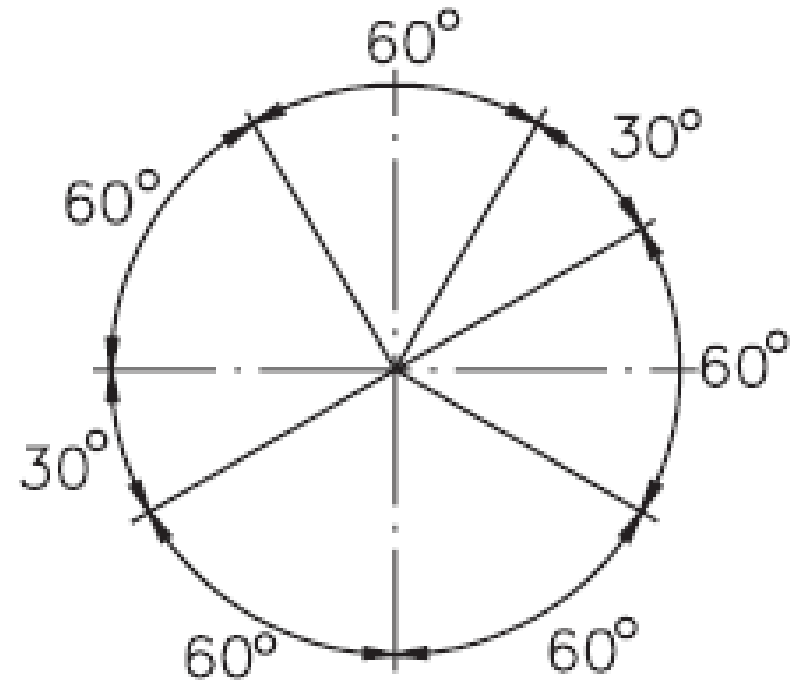
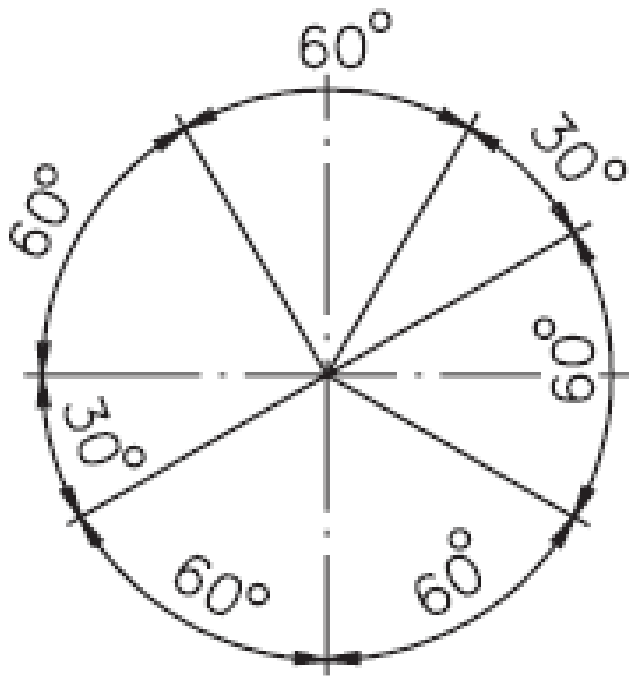
# Exemplo



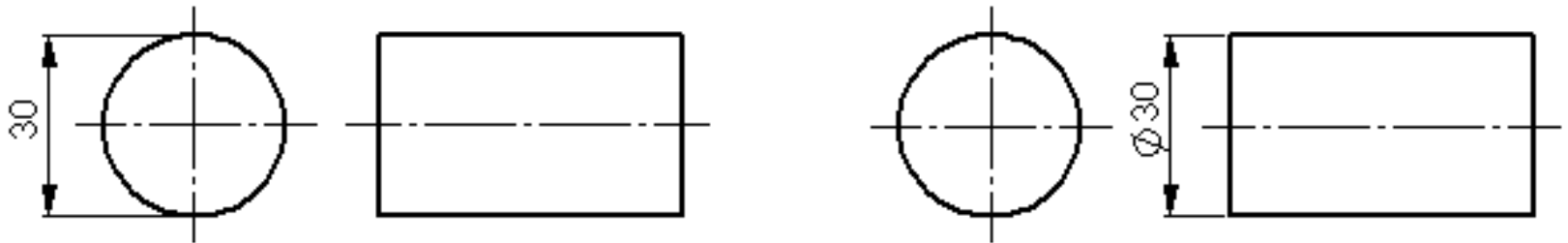
A cota  $90^\circ$  indica a abertura do ângulo do elemento. A cota 30 indica o comprimento do elemento.

# Indicação da cota

- ❑ A cotagem de elementos angulares é normalizada pela ABNT (NBR 10126) e são aceitáveis as duas formas para indicar cotas angulares no desenho.

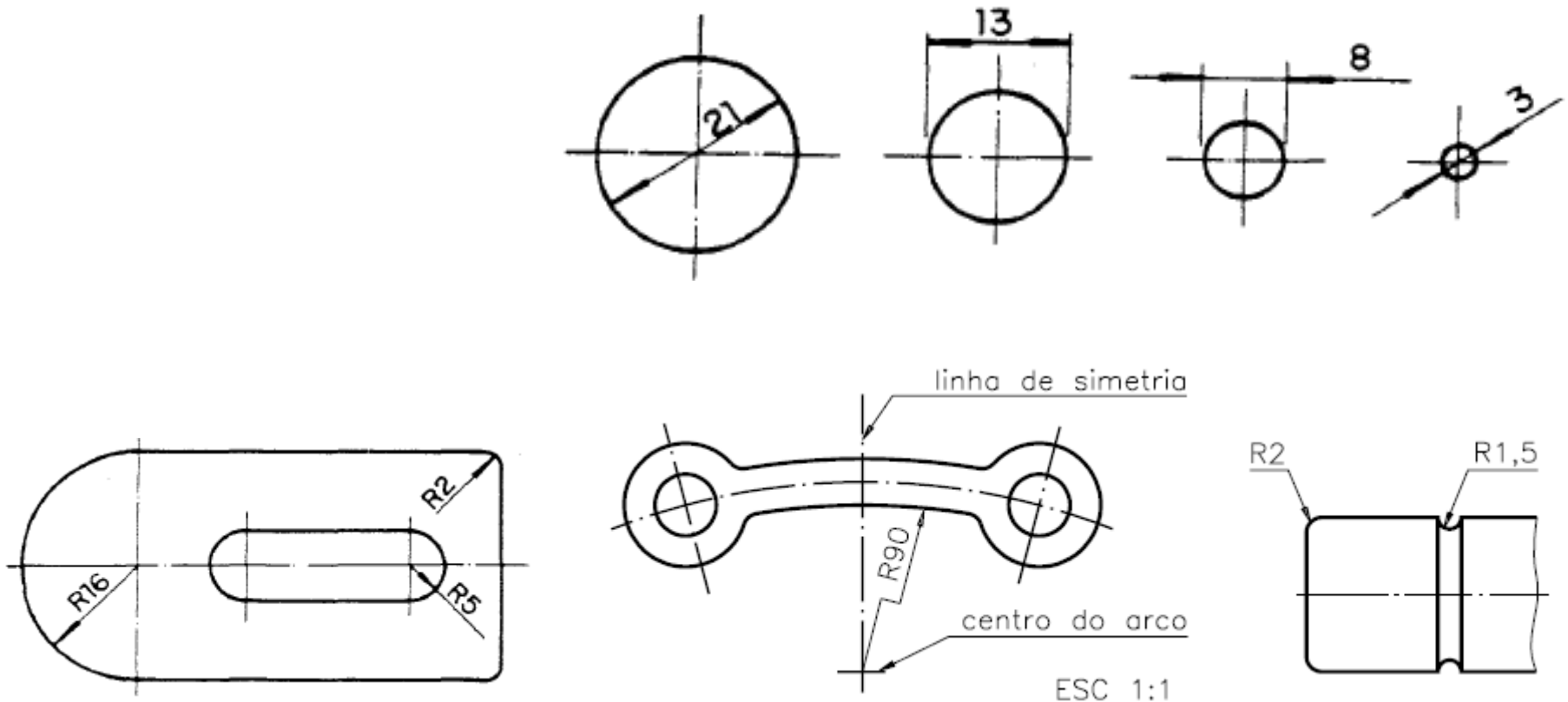


# Cotagem de diâmetros e raios



Cotagem do diâmetro nas projeções do objeto

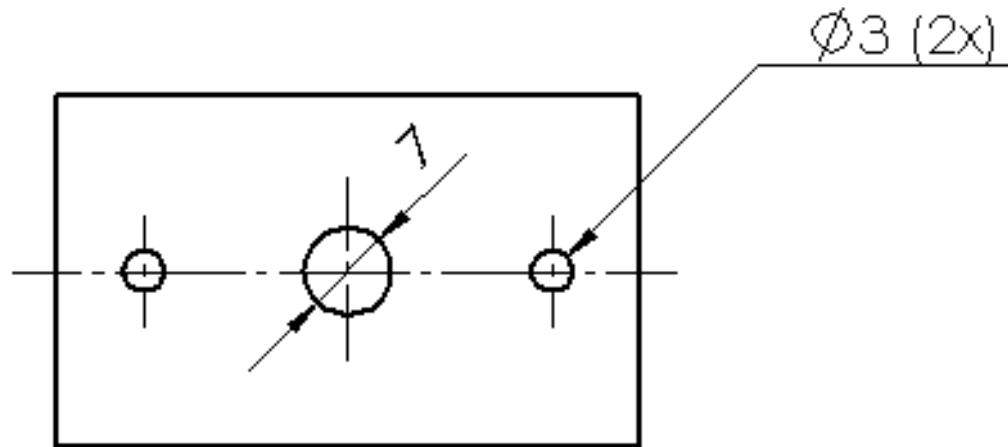
# Cotagem de diâmetros e raios



O símbolo  $\emptyset$  e a letra R aparecem inscritos antes da cota

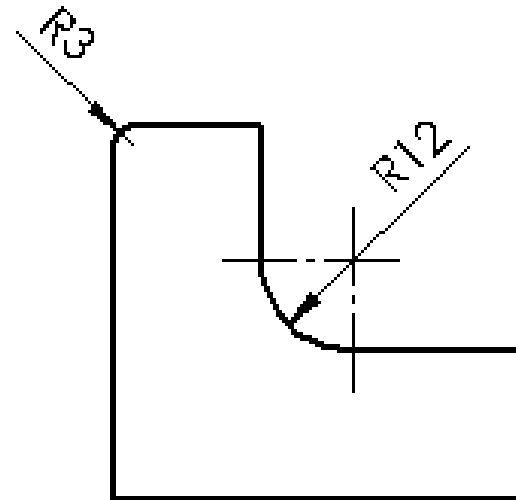
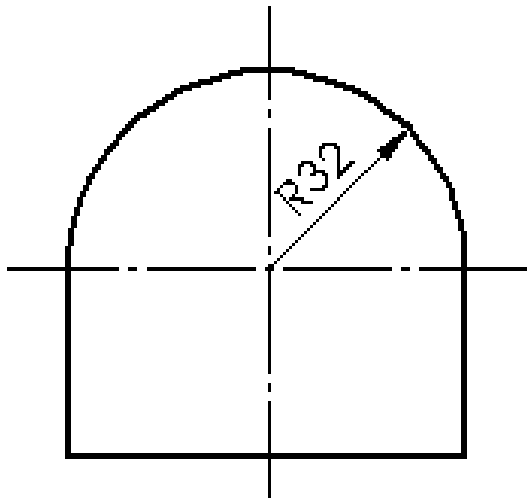


# Cotagem de diâmetros

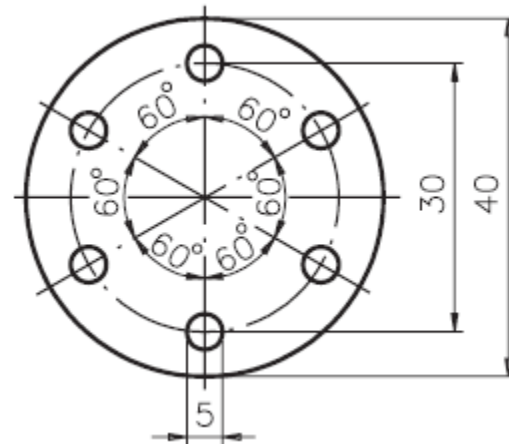
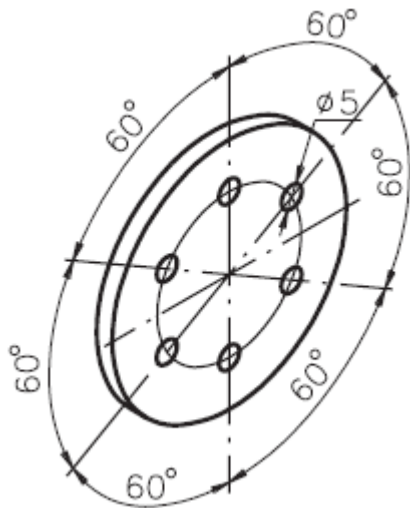
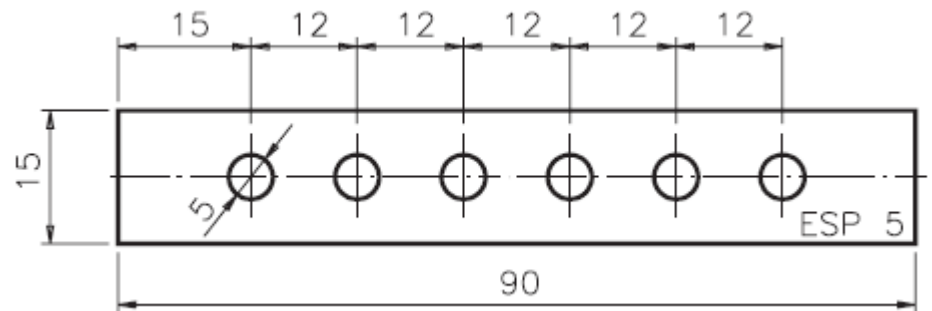
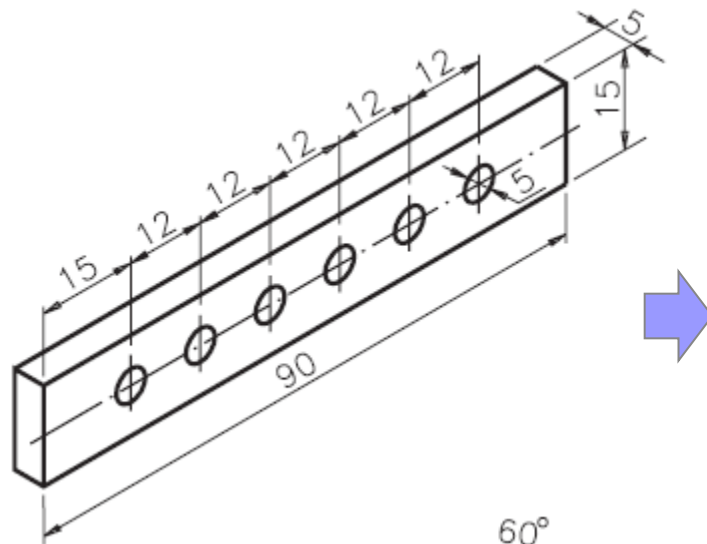


Cotagem especial de diâmetros

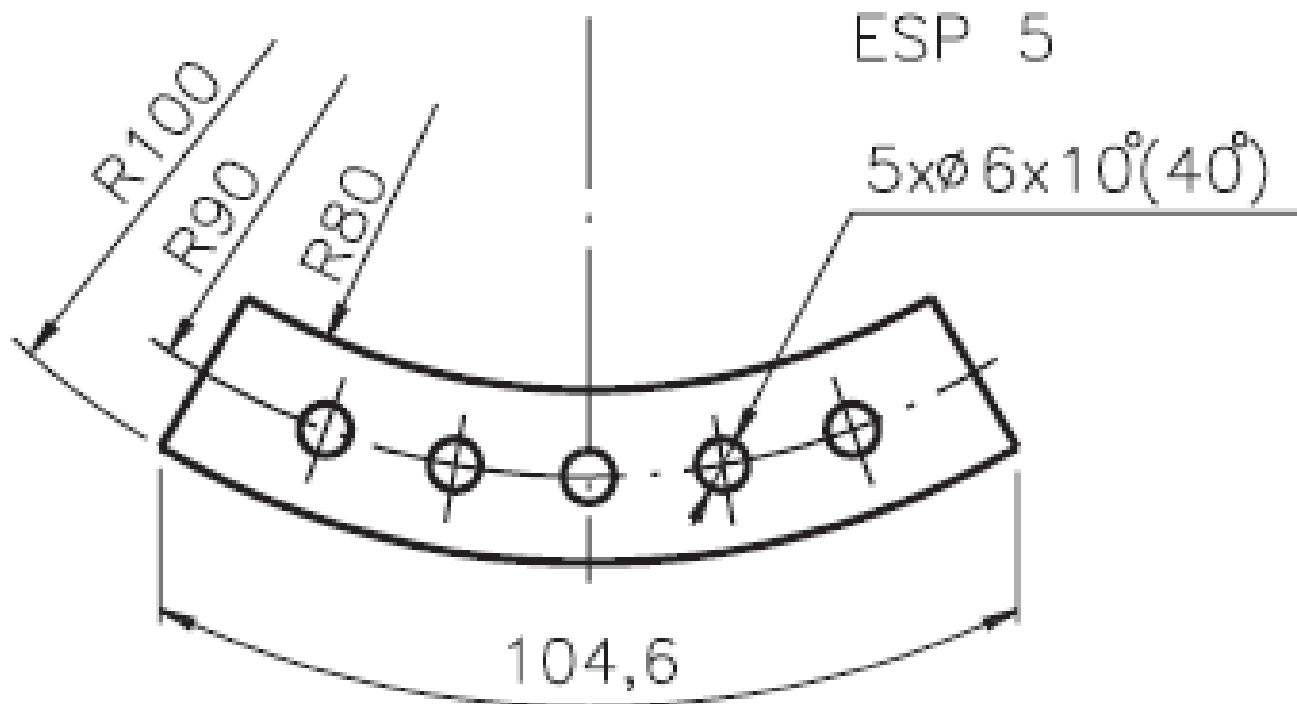
# Cotagem de raios



# Cotagem de elementos espaçados

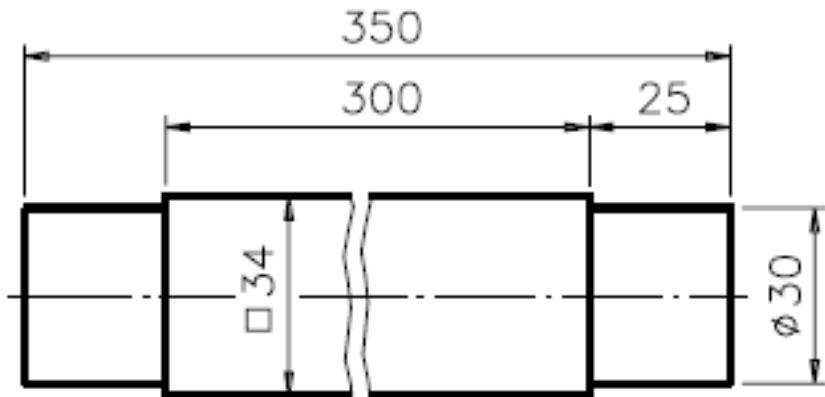


# Exemplo

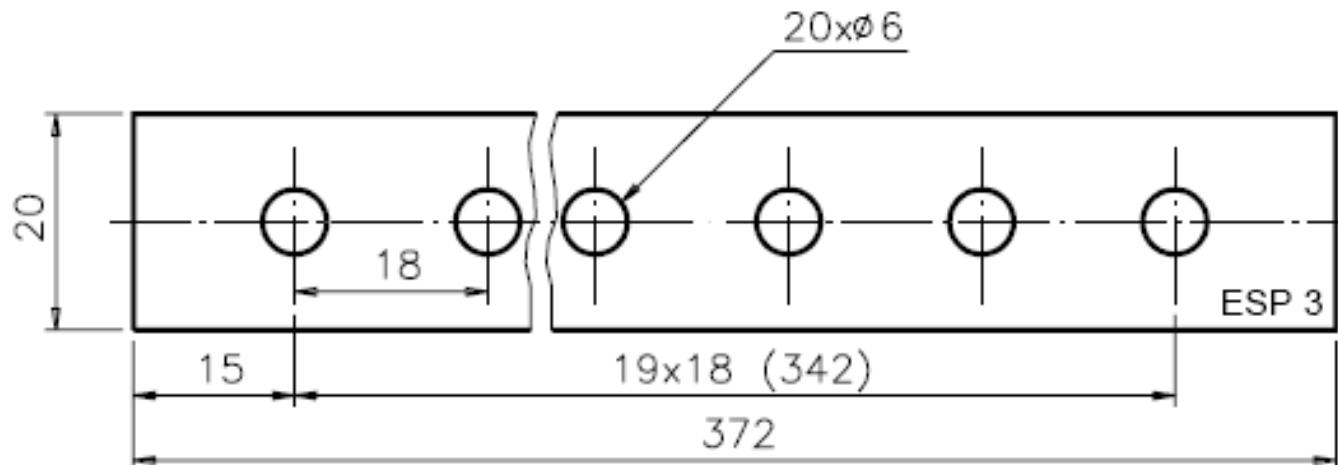


- A cota  $5 \times \varnothing 6 \times 10^\circ$  representa 5 furos com diâmetro de 6 mm espaçados igualmente a  $10^\circ$ . A cota  $(40^\circ)$  corresponde à soma dos quatro ângulos entre os furos.

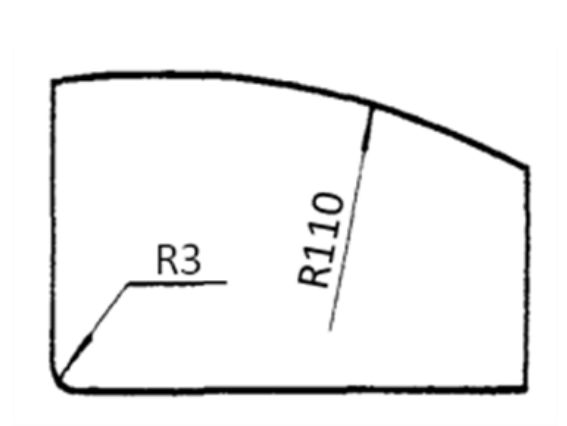
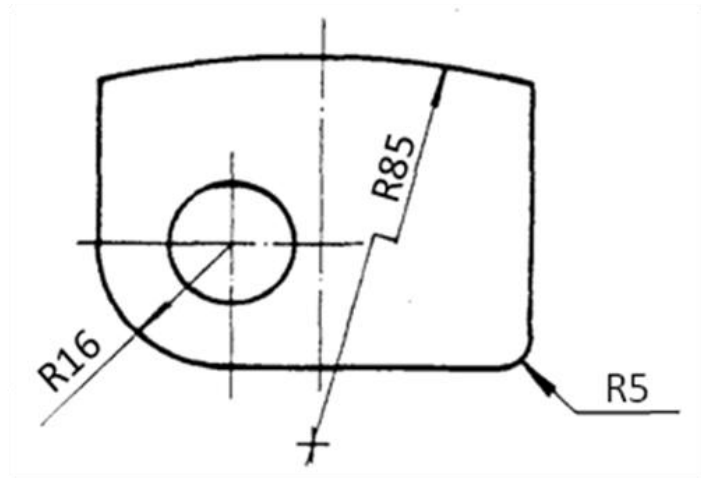
# Cotagem de peças com encurtamento



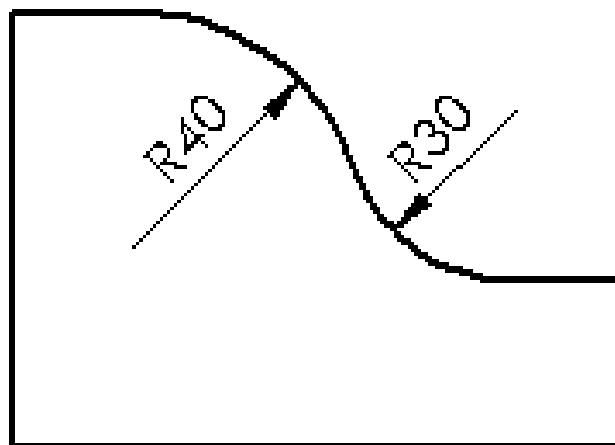
- A cota 19x18 indica que são 19 espaçamentos de 18 mm cada.
- (342) representa a distância total do centro do primeiro furo ao centro do último furo.



# Cotagem de raios grandes

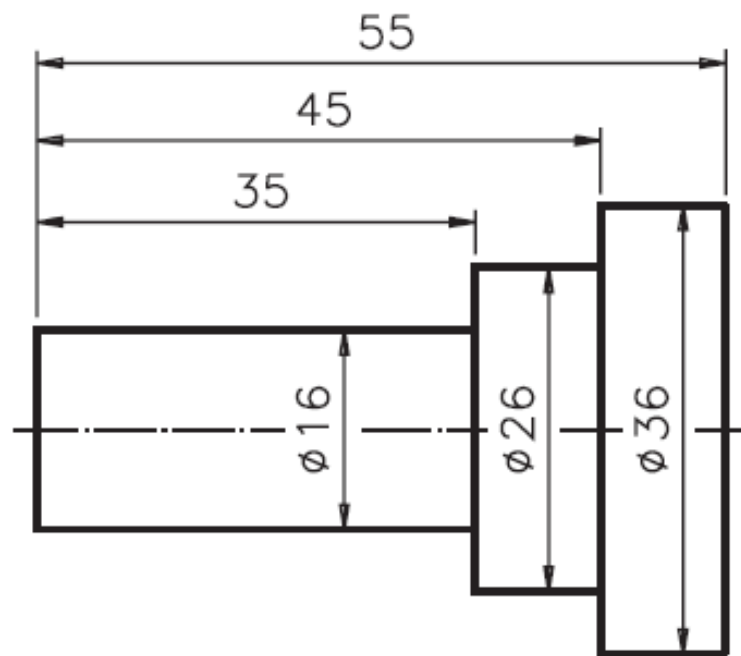
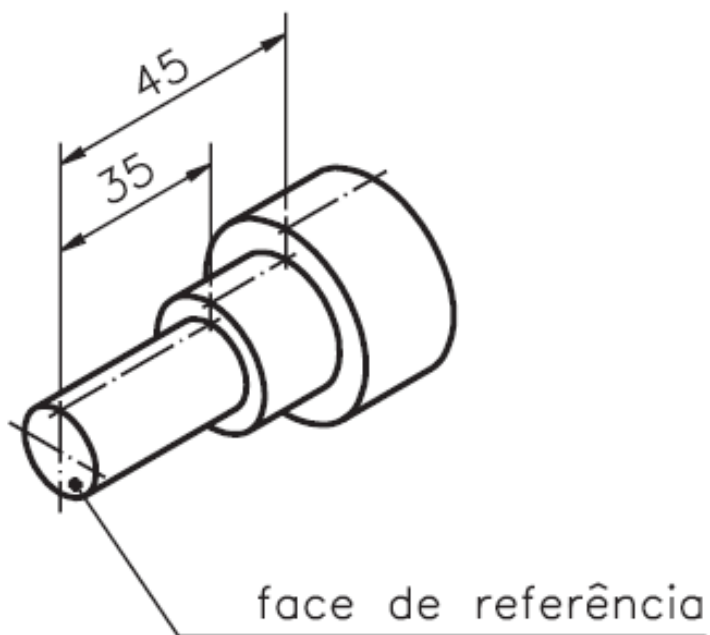


# Cotagem de objetos com raios tangentes



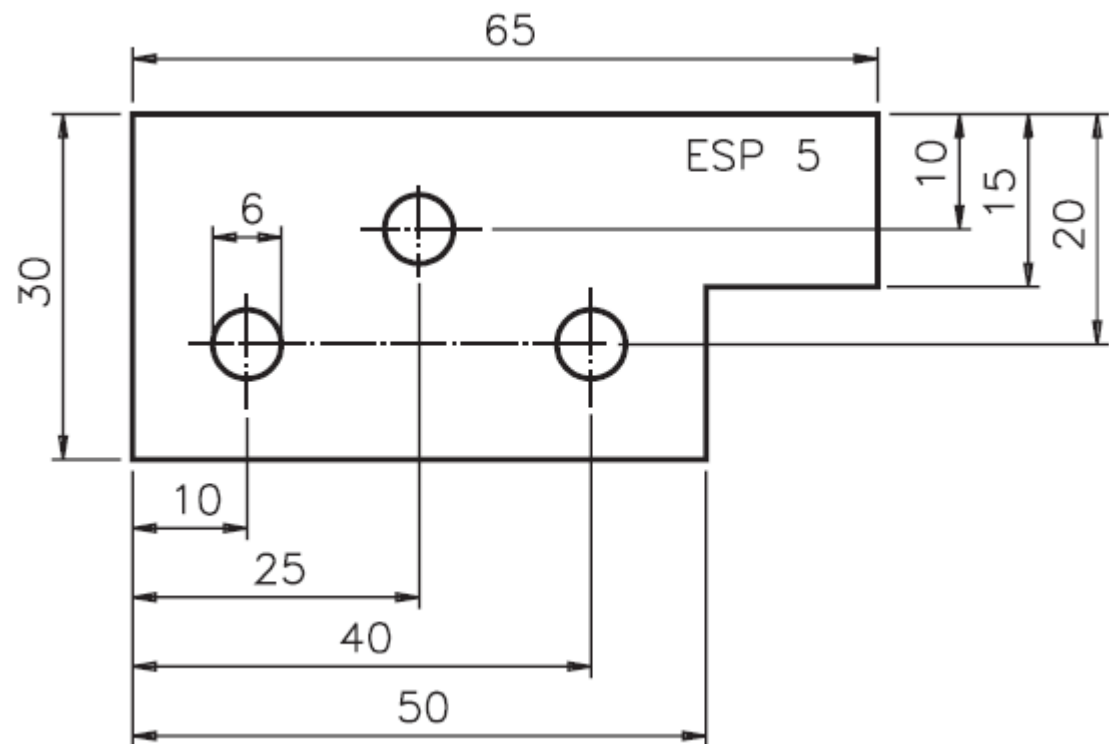
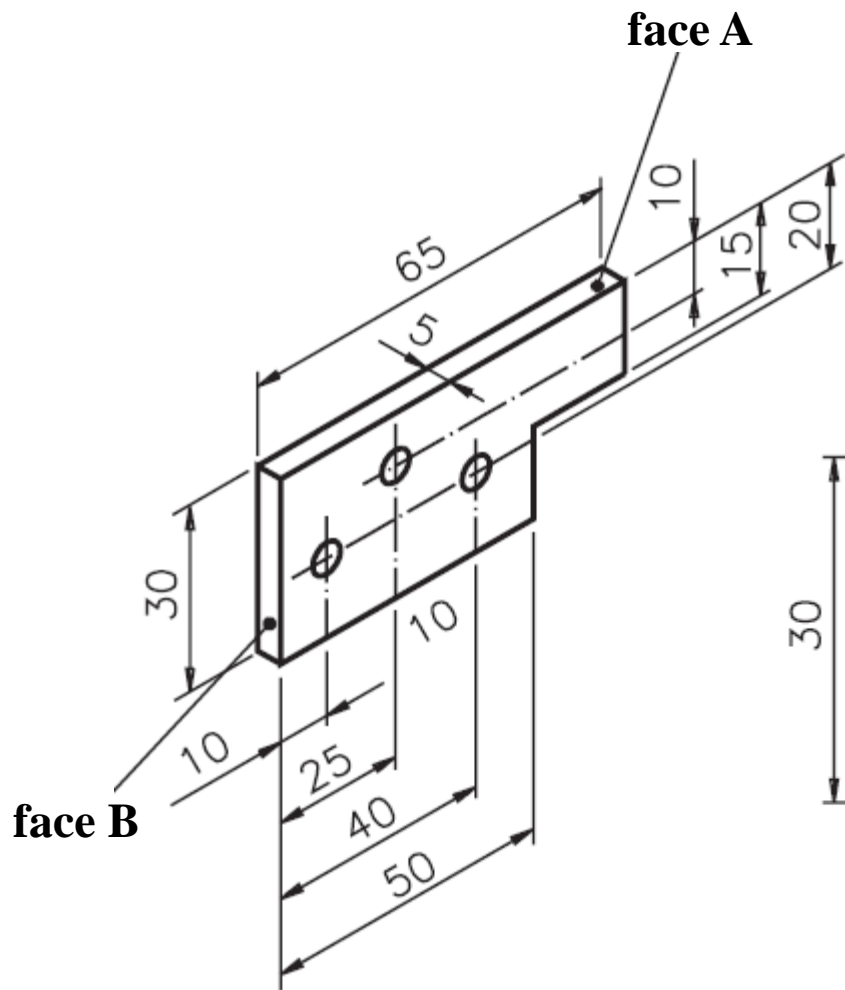
# Cotagem por elemento de referência

- cotagem por face de referência



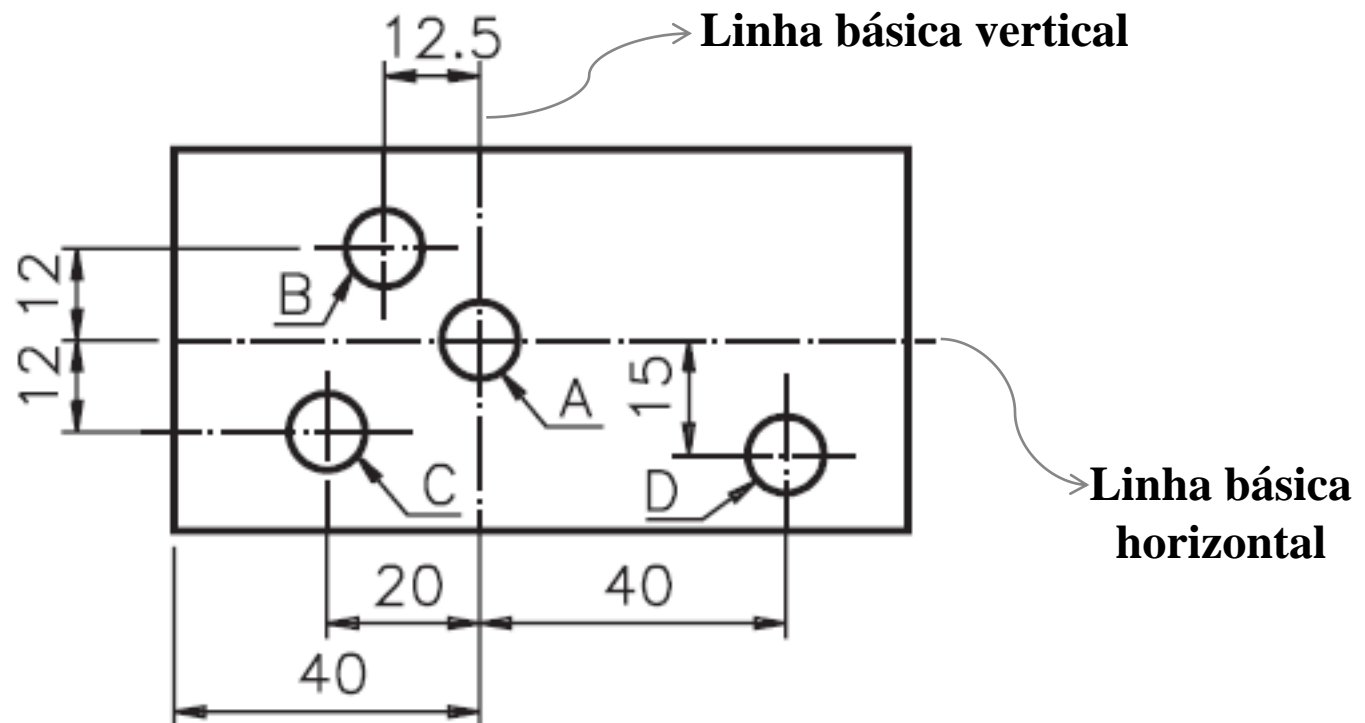


# Cotagem por faces de referências



# Cotagem por elemento de referência

- ❑ cotagem por linha básica



As medidas são indicadas a partir de linhas de simetria, linhas de centro ou qualquer outra linha que facilite a interpretação para fabricação da peça.



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# Desenho Técnico

## Dimensionamento – Parte 2



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# Sistemas de cotagem

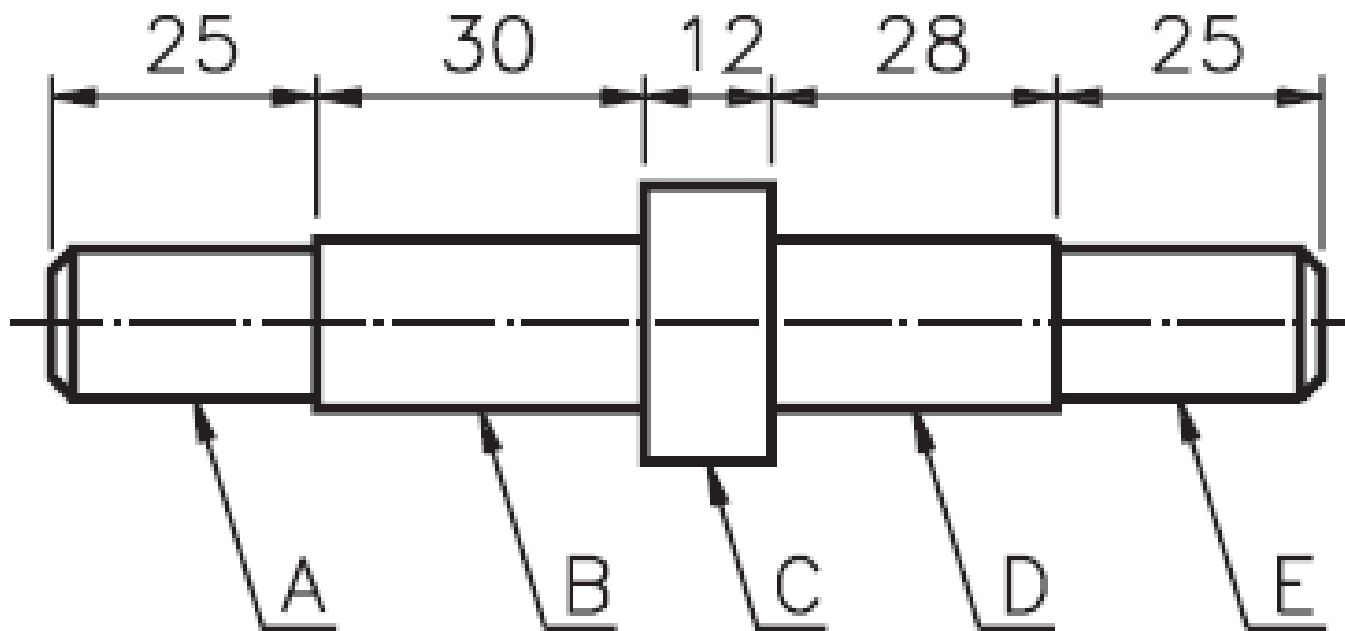
Modos organizados de estruturar a cotagem completa da peça:

- cotagem em cadeia
- cotagem por elemento de referência

A cotagem do desenho técnico deve conter todas as informações necessárias para evitar a realização de cálculos na fabricação da peça.

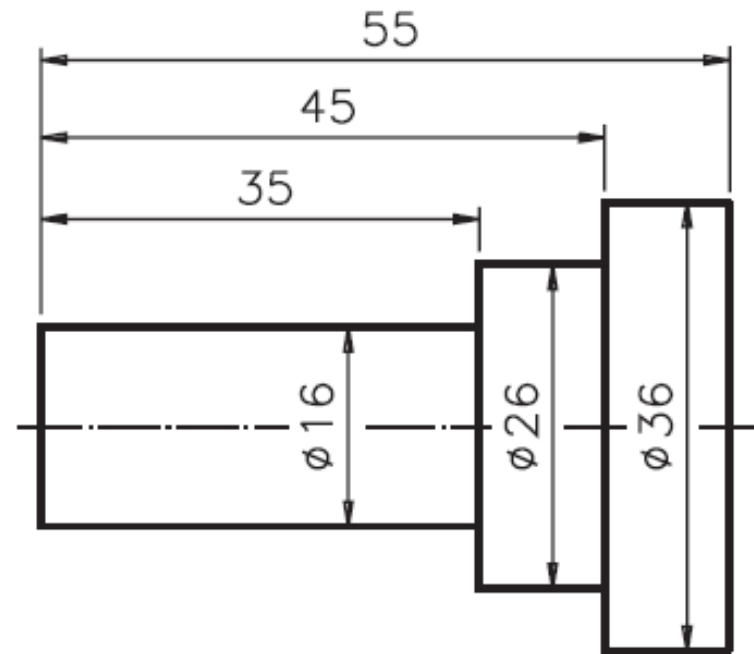
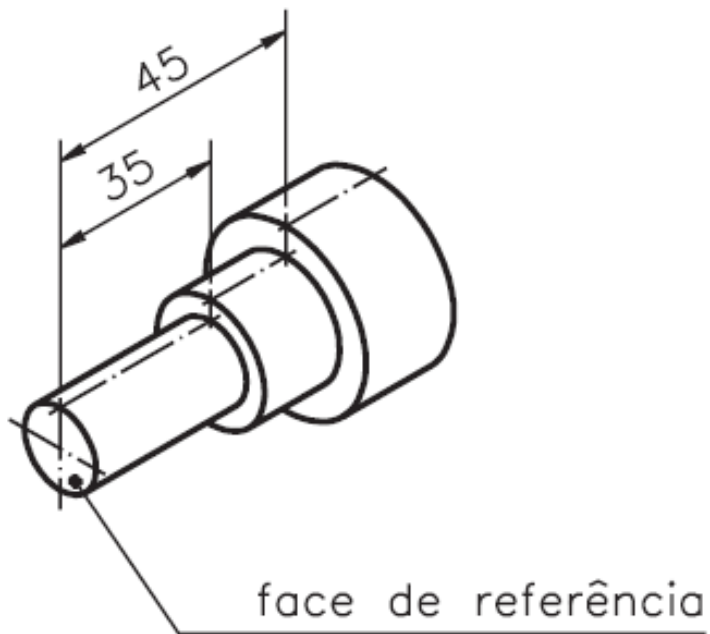


# Cotagem em cadeia



# Cotagem por elemento de referência

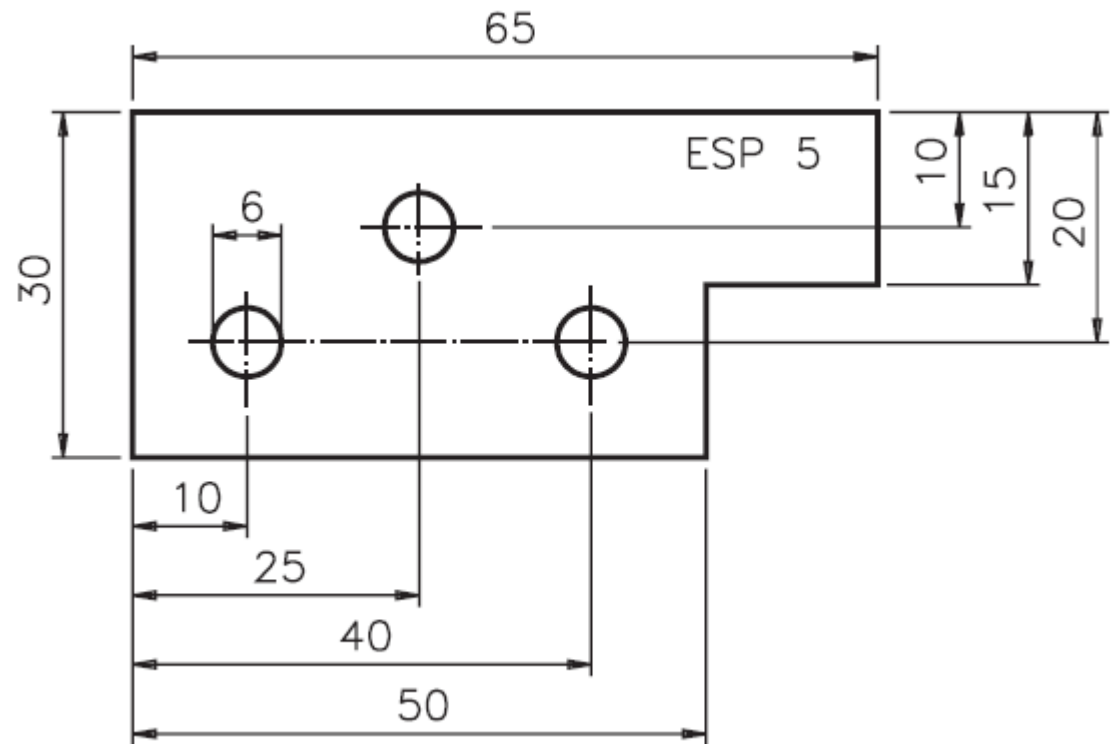
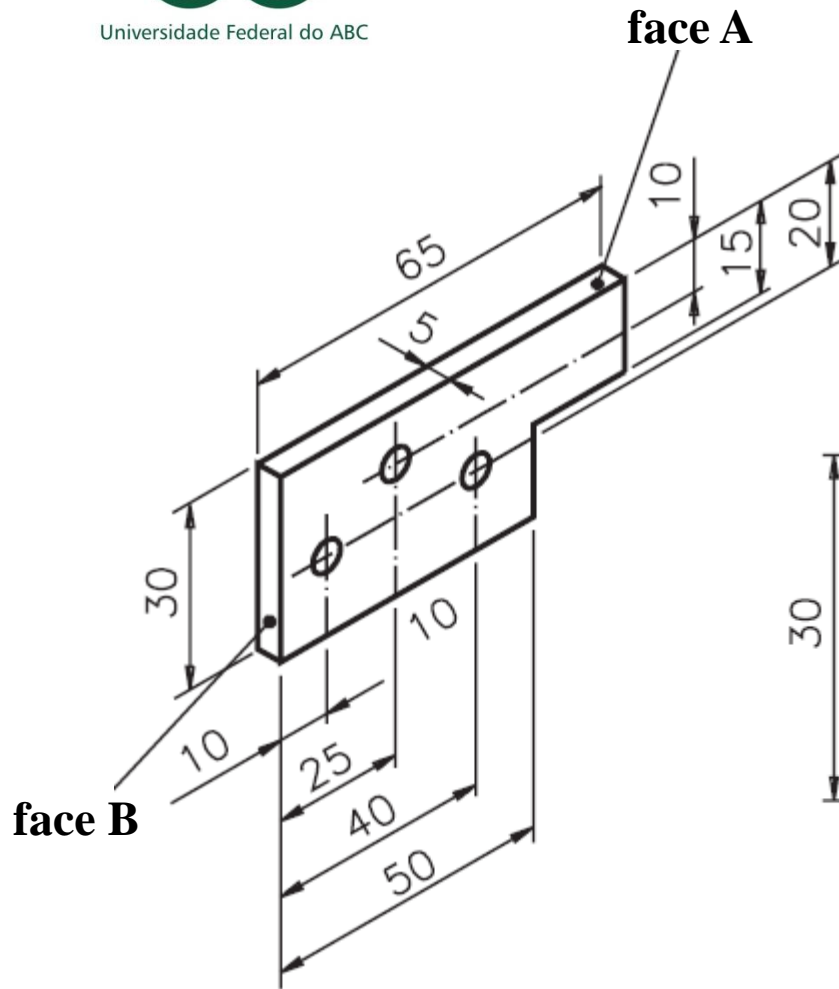
- cotagem por face de referência





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# Cotagem por faces de referências

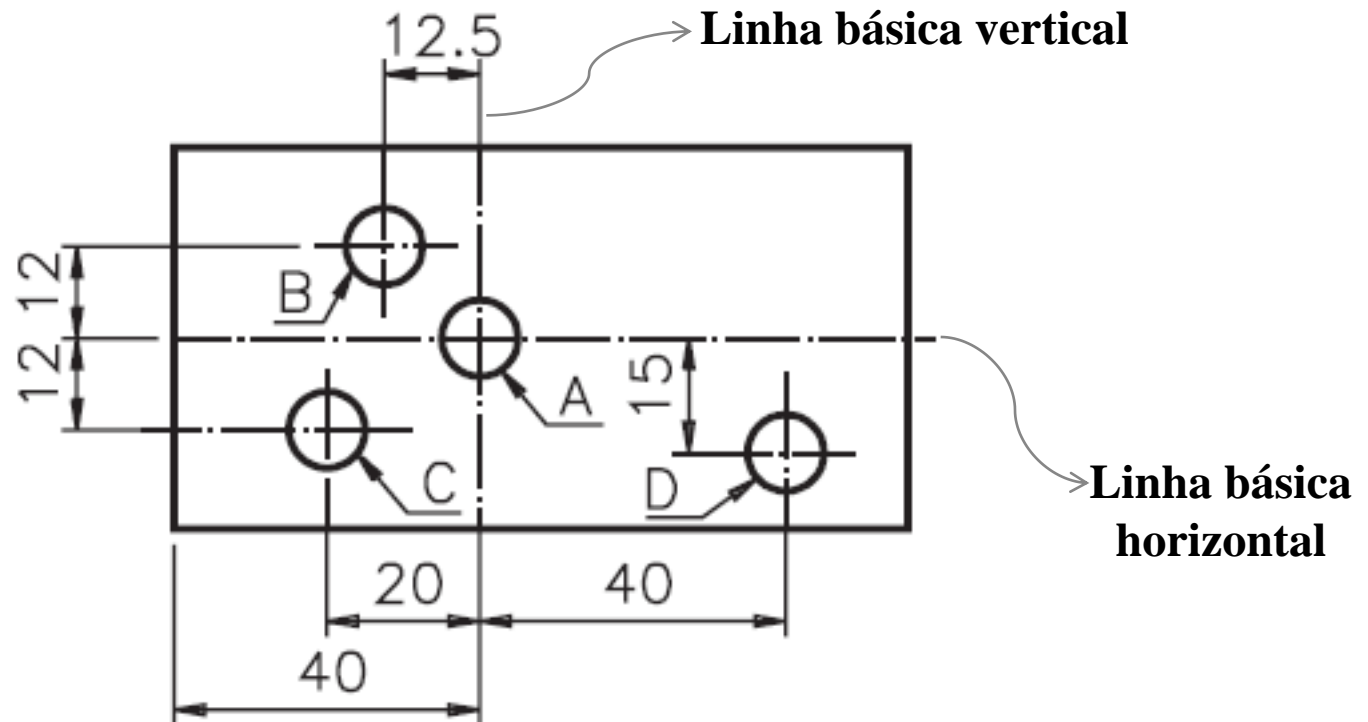




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# Cotagem por elemento de referência

- ❑ cotagem por linha básica



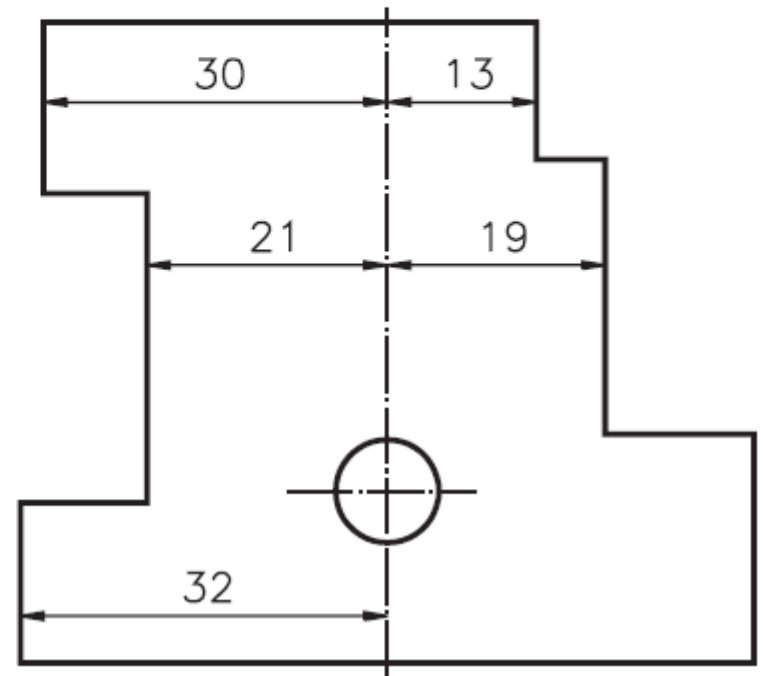
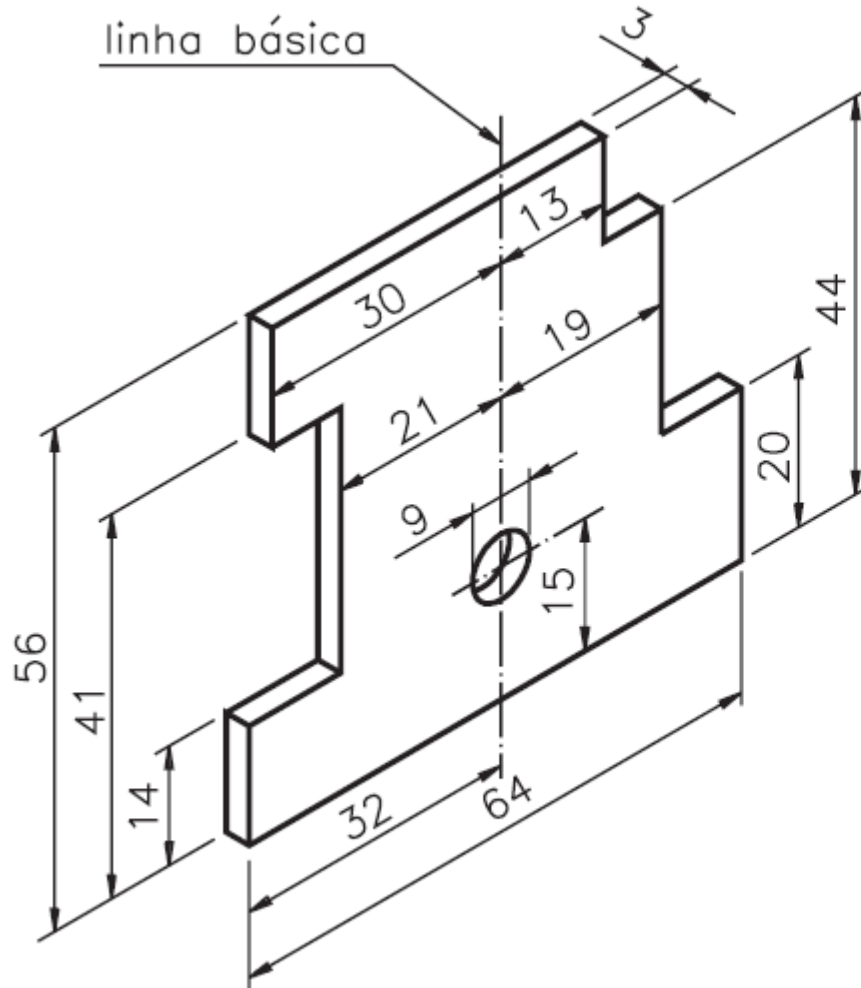
As medidas são indicadas a partir de linhas de simetria, linhas de centro ou qualquer outra linha que facilite a interpretação para fabricação da peça.





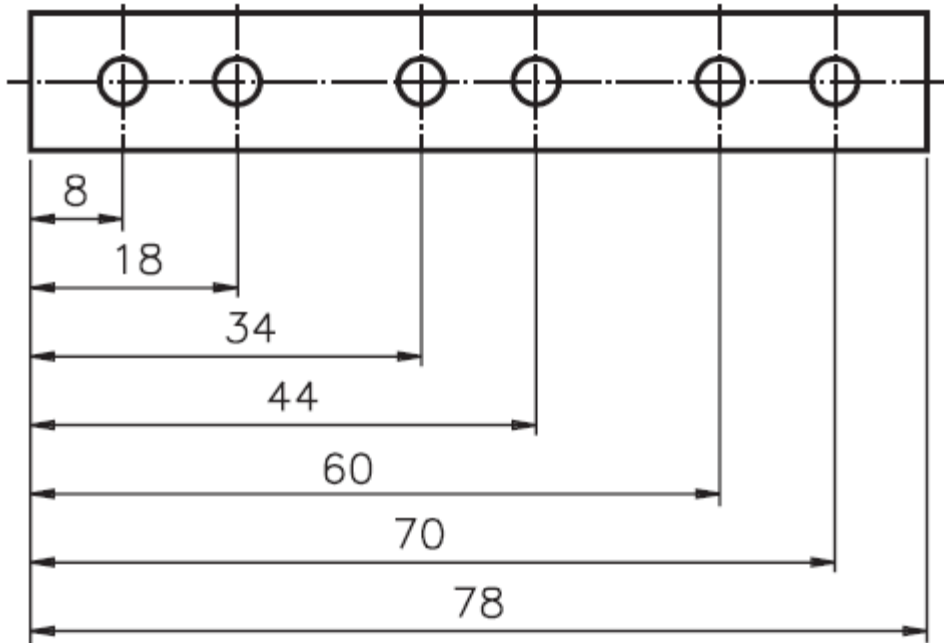
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# Cotagem por linha básica de referência



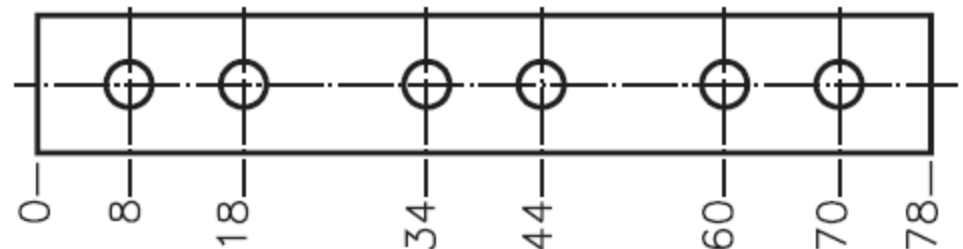


# Diferentes formas de cotagem



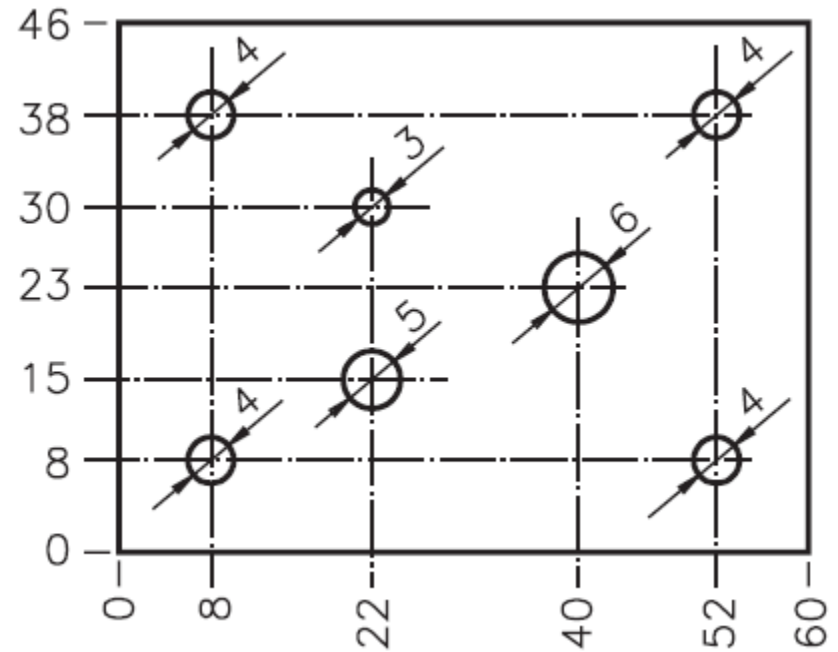
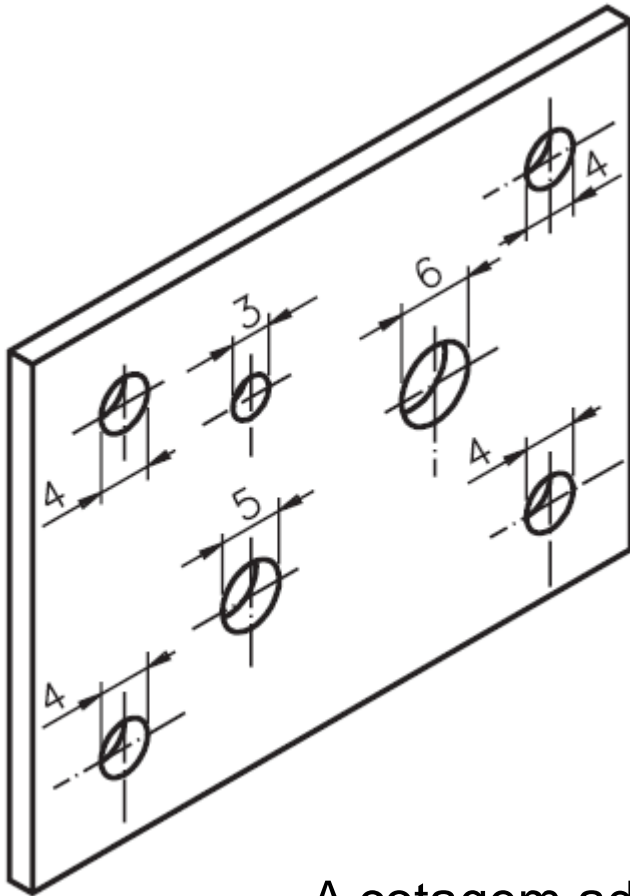
➤ cotagem em paralelo

➤ cotagem aditiva





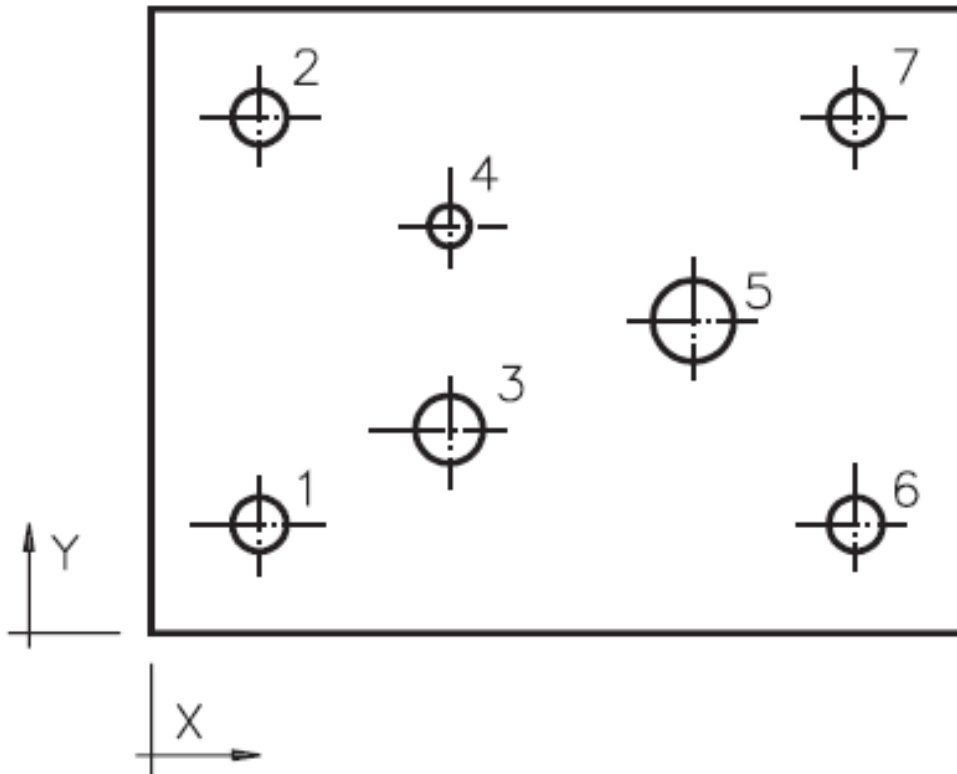
# Cotagem aditiva em duas direções



A cotagem aditiva em duas direções é uma maneira prática de indicar a localização dos furos.



# Cotagem por coordenadas



Nº	X	Y	∅
1	8	8	4
2	8	38	4
3	22	15	5
4	22	30	3
5	40	23	6
6	52	8	4
7	52	38	4

O ponto onde os eixos X e Y se cruzam é o ponto 0 (zero), ou ponto de origem da cotagem.



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# Desenho Técnico

## Desenho em Escala



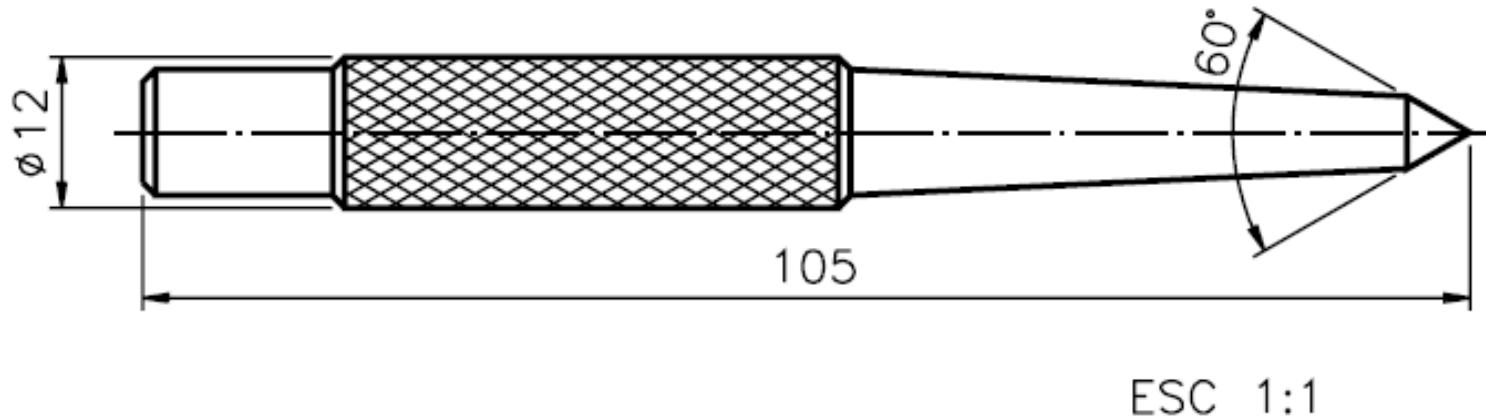
Jade Federal do ABC

# Desenho em escala

- O desenho em escala permite manter, reduzir ou ampliar o tamanho da representação de um objeto.
- A escala indica a relação do tamanho do desenho da peça com o tamanho real da peça.
- Existem três tipos de escala: natural, de redução e de ampliação.



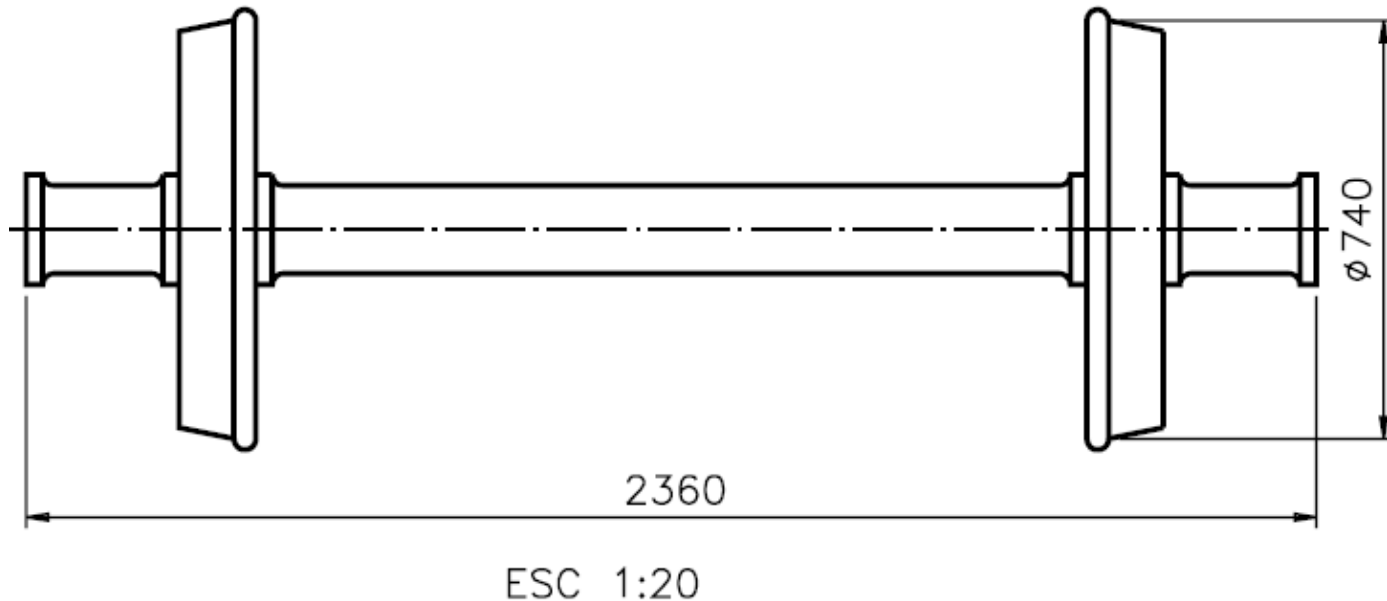
# Escala natural



➤ Escala natural é aquela em que o tamanho do desenho técnico é igual ao tamanho real da peça.



# Escala de redução

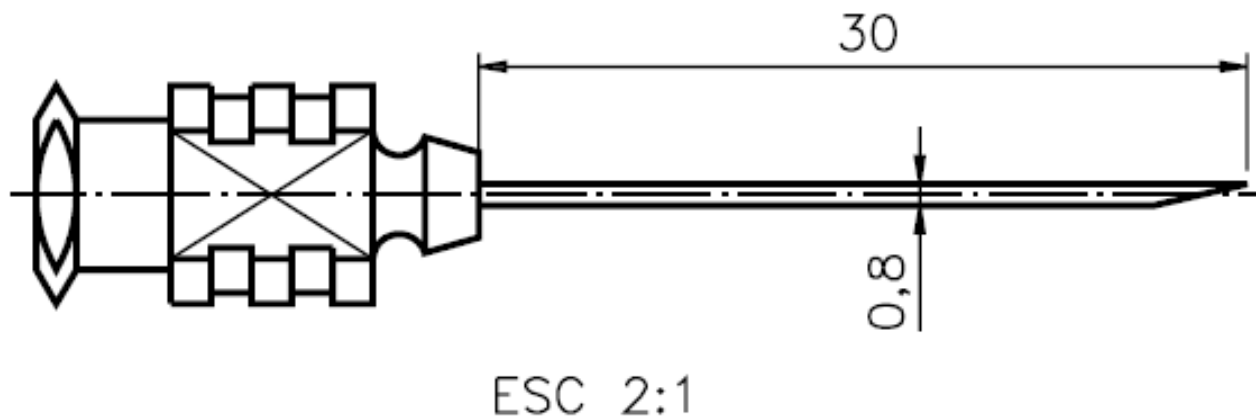


- Escala de redução é aquela em que o tamanho do desenho técnico é menor que o tamanho real da peça.



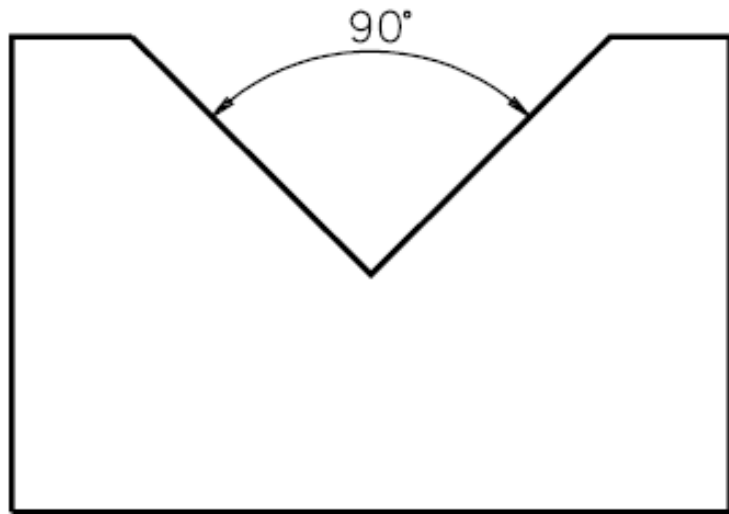


# Escala de ampliação

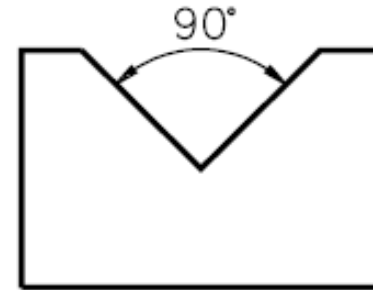


- Escala de ampliação é aquela em que o tamanho do desenho técnico é maior ao tamanho real da peça.

# Cotagem de ângulos em diferentes escalas



ESC 1:1



ESC 1:2

No desenho em escala, cotas que indicam medida de ângulo permanecem as mesmas.



# Escalas recomendadas (NBR 8196)

CATEGORIA	ESCALAS RECOMENDADAS		
<b>Escalas de ampliação</b>	20 : 1	50 : 1	10 : 1
	2 : 1	5 : 1	
<b>Escala natural</b>	1 : 1		
<b>Escala de redução</b>	1 : 2	1 : 5	1 : 10
	1 : 20	1 : 50	1 : 100
	1 : 200	1 : 500	1 : 1 000
	1 : 2 000	1 : 5 000	1 : 10 000



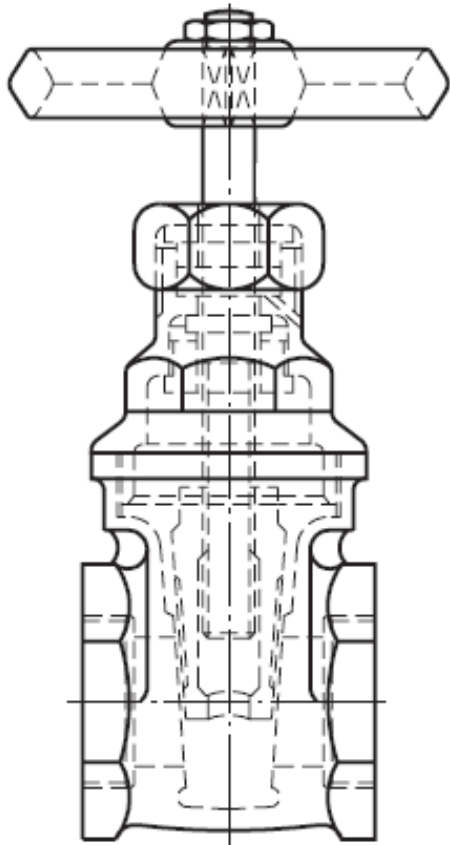
**Desenho em Corte**

# Introdução ao corte

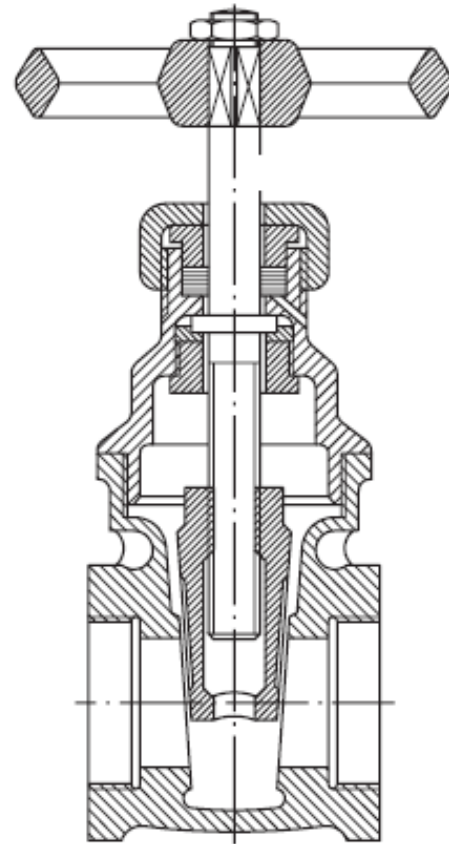


visualizar  
detalhes internos

# Desenho em corte

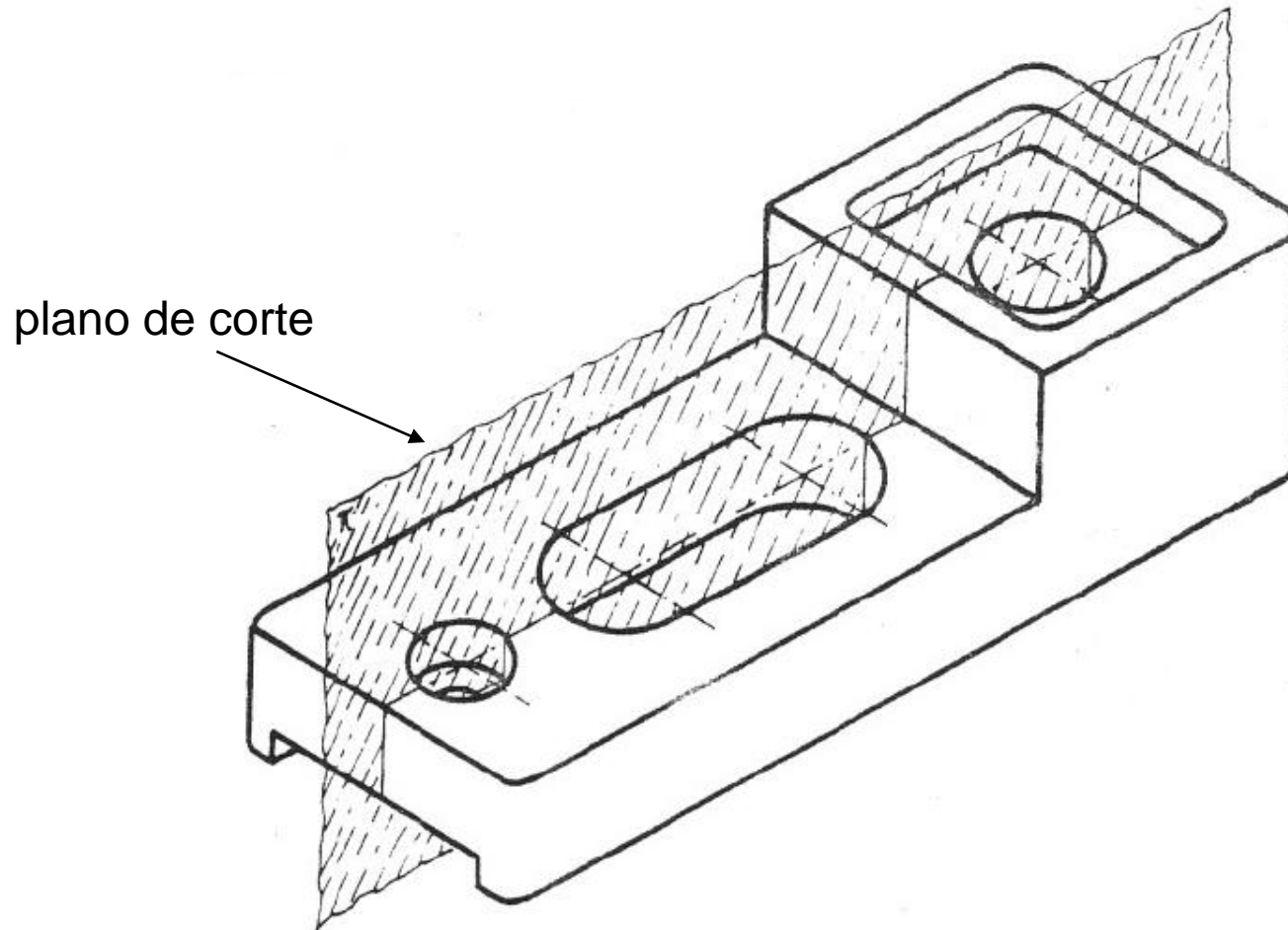


projeção da peça



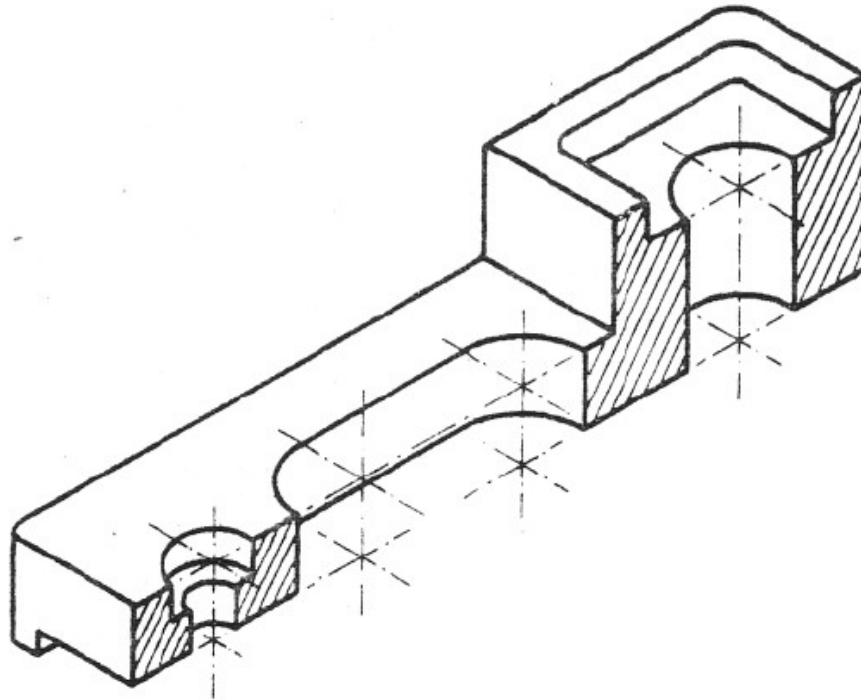
vista em corte

# Corte Total



Os cortes são representados sempre que for necessário mostrar elementos internos da peça.

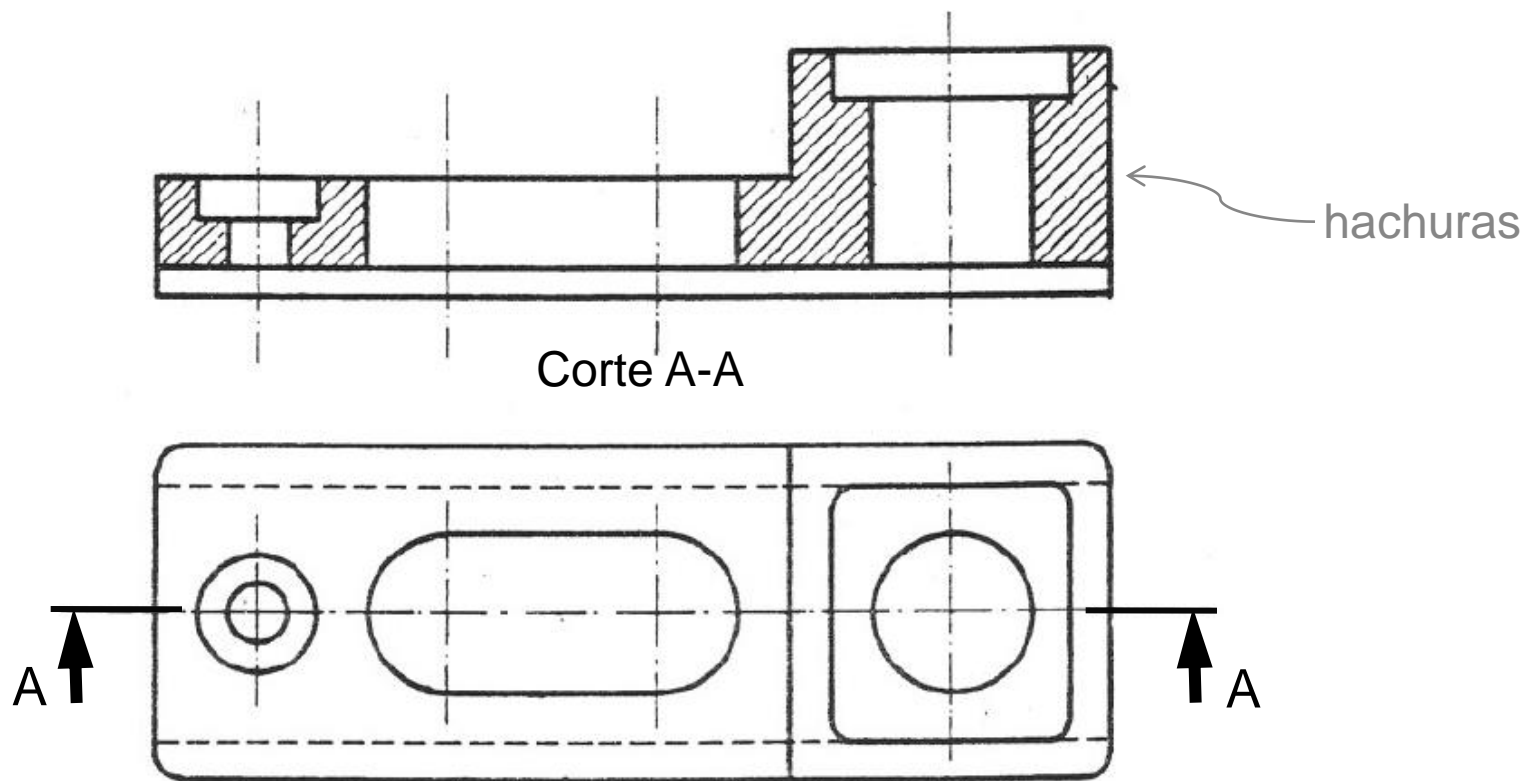
# Visualização do corte



Corte significa divisão, separação e em desenho técnico eles são imaginários.



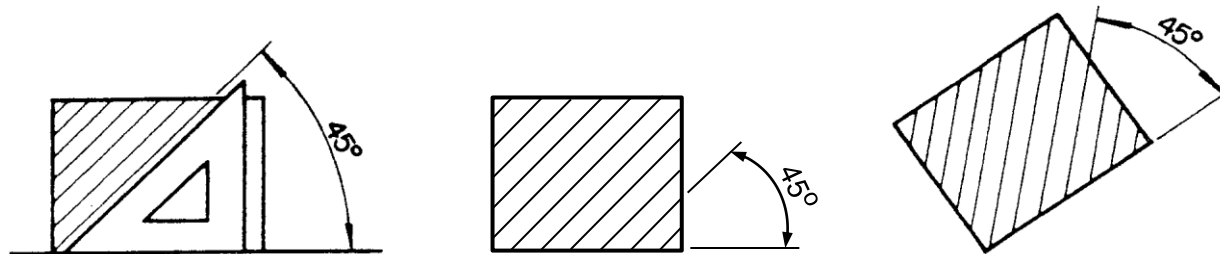
# Projeções em corte



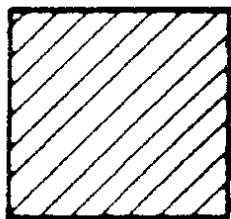
Os cortes podem ser representados em qualquer das vistas do desenho técnico.

# Hachuras

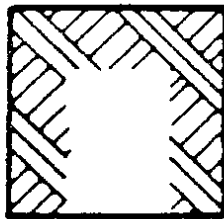
- Hachuras são linhas estreitas que representam uma superfície em corte



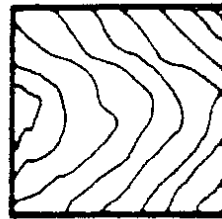
- Hachuras para diversos tipos de materiais (NBR 12298)



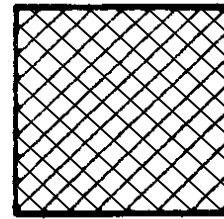
Metais



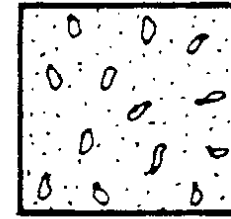
Terreno



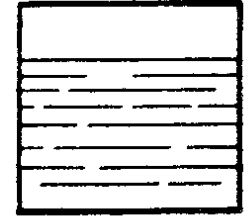
Madeira



Vidro e  
sintéticos

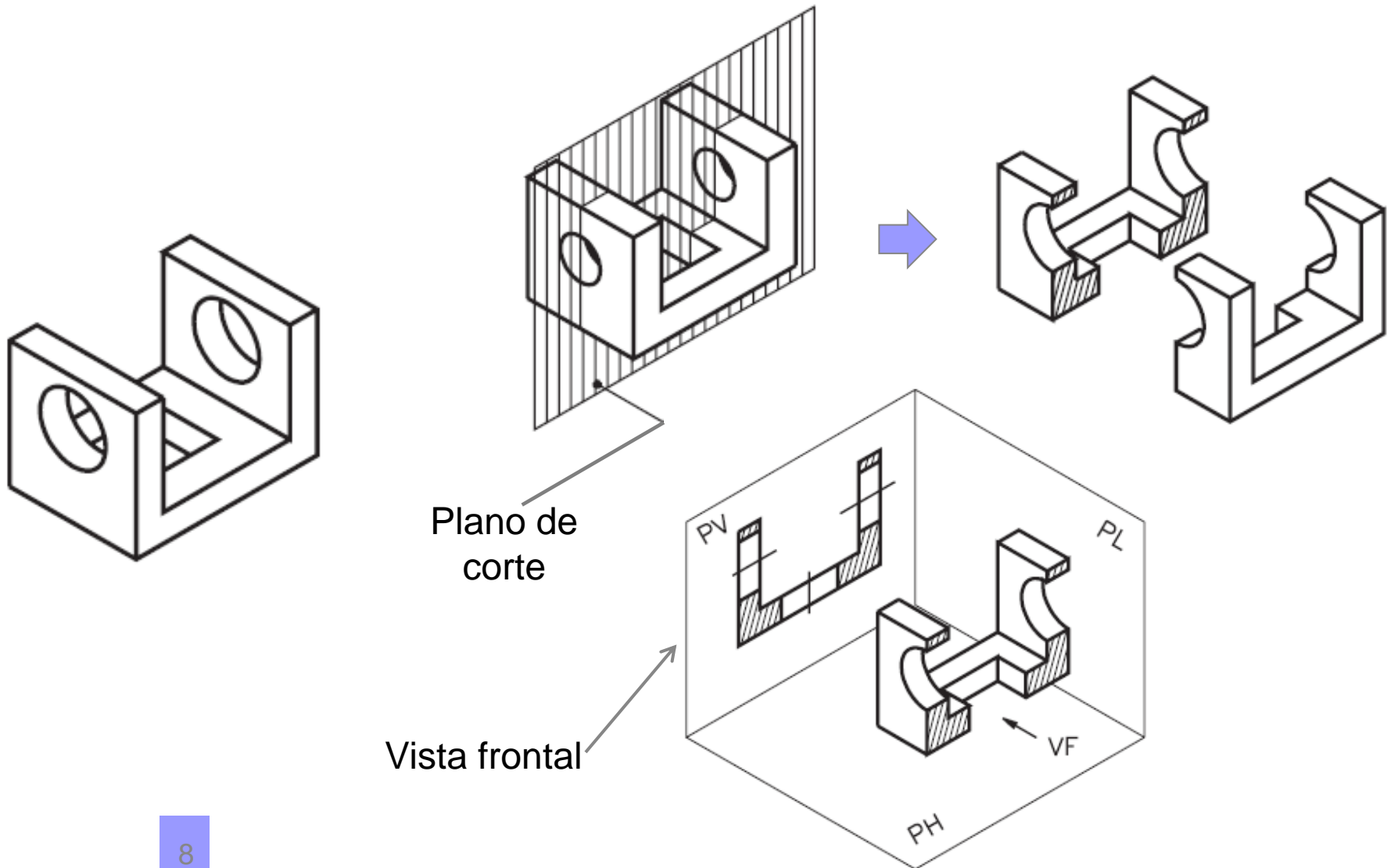


Concreto

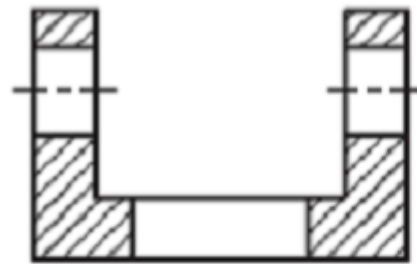
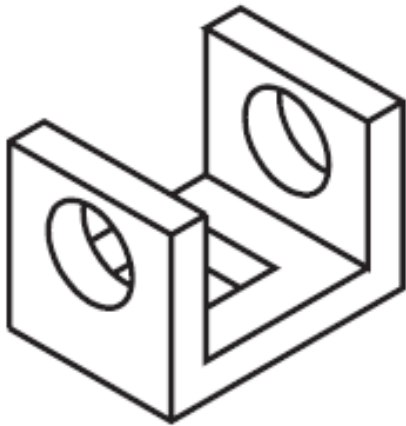


Líquidos

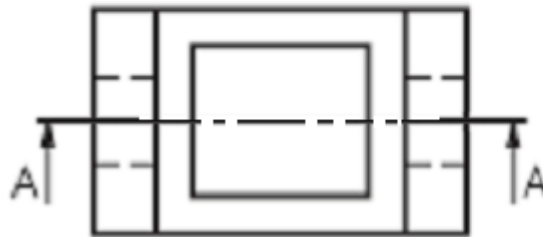
# Vista frontal em corte



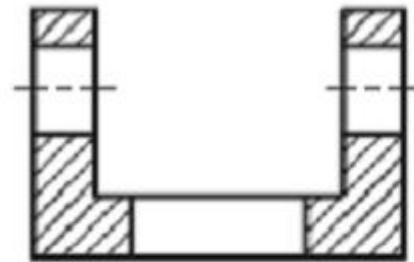
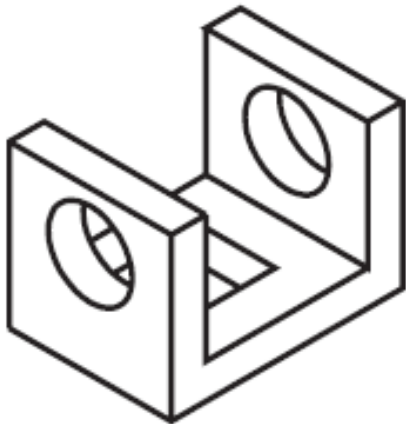
# Indicação do corte



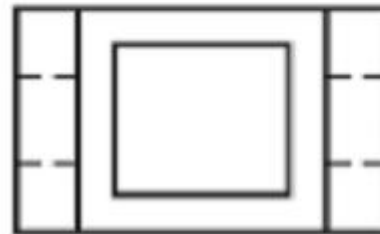
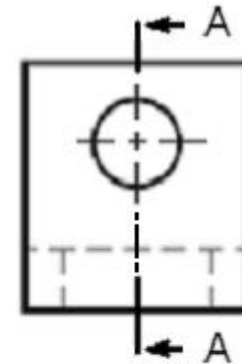
Corte AA



# Indicação do corte



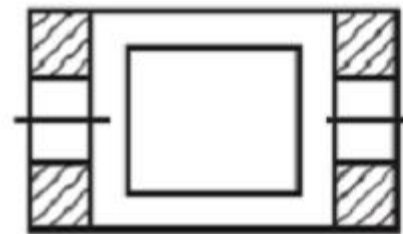
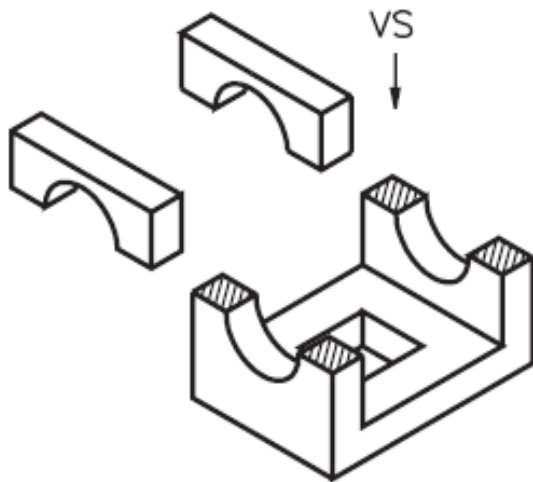
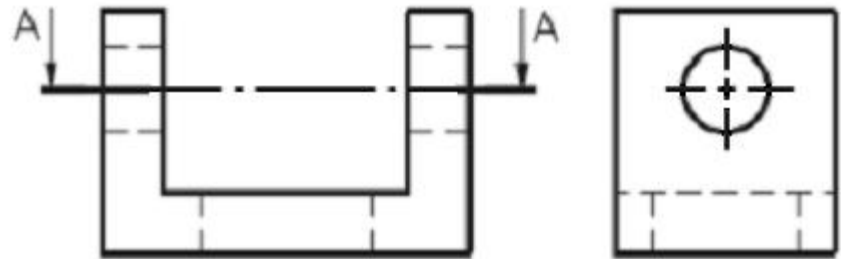
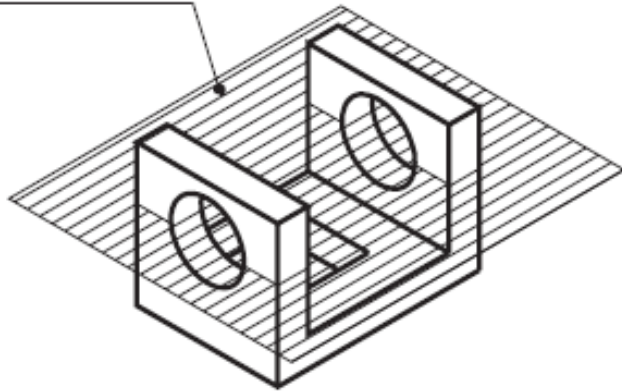
Corte AA



A corte da vista frontal pode ser indicado tanto na vista superior como na vista lateral esquerda.

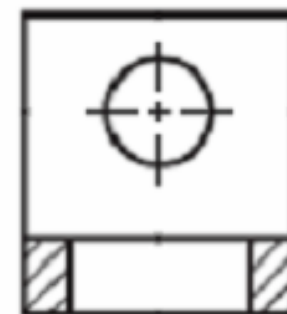
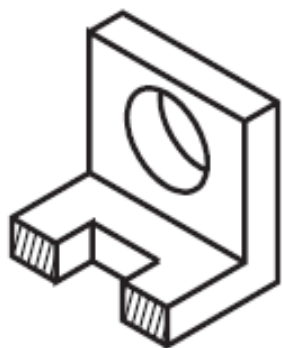
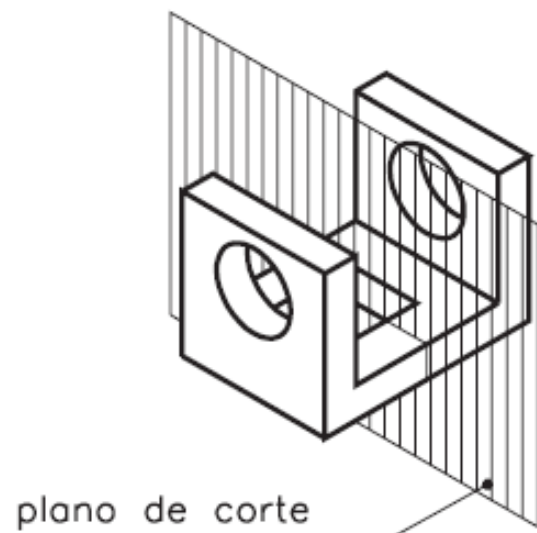
# Vista superior em corte

plano de corte

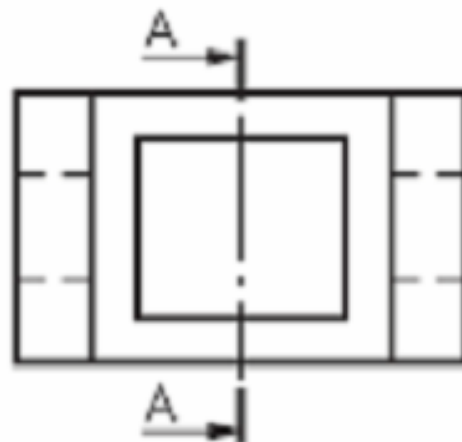


Corte AA

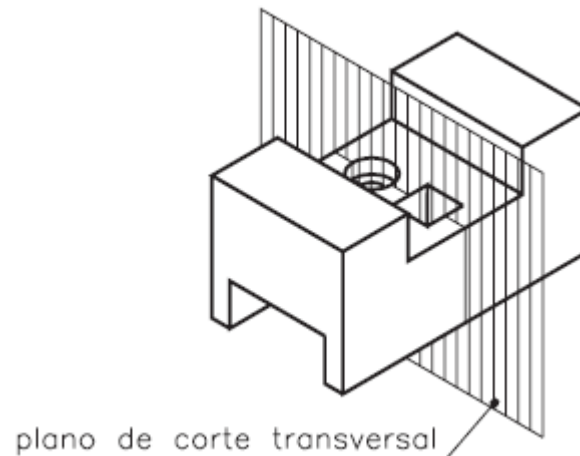
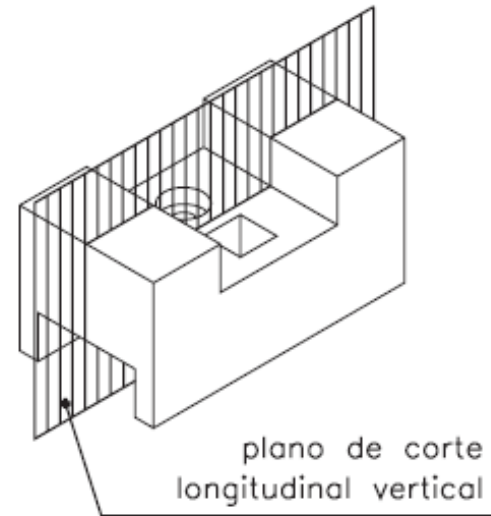
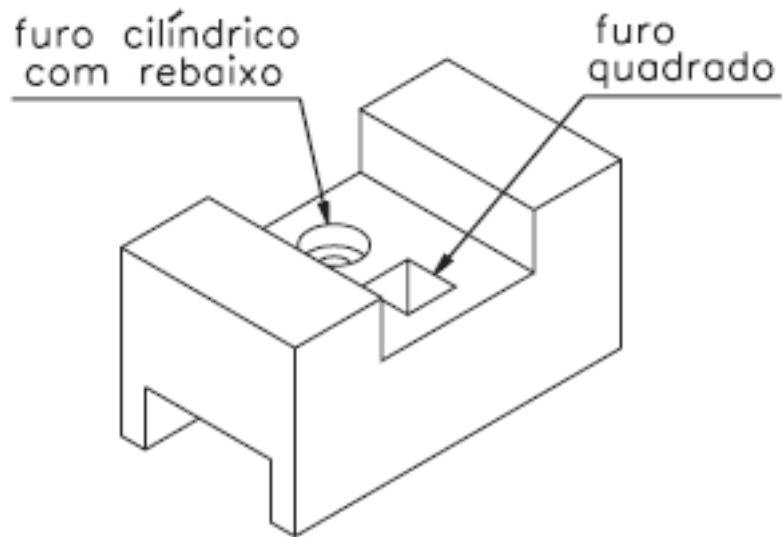
# Vista lateral em corte



Corte AA

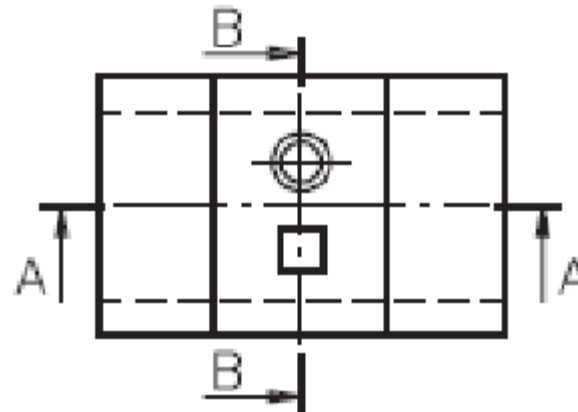
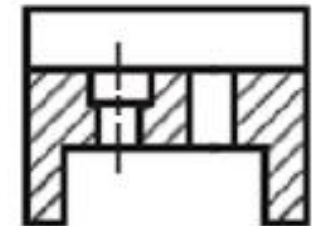
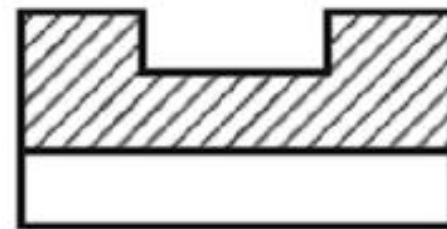
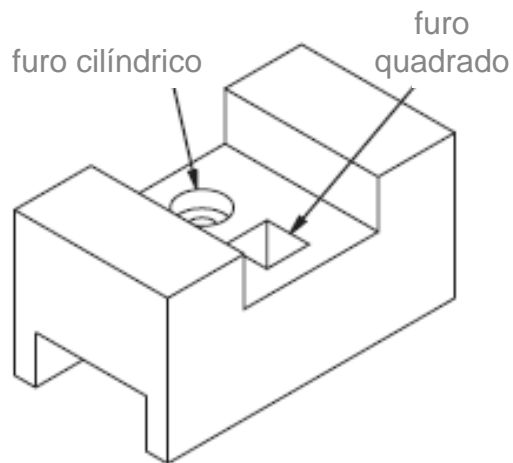


# Mais de um corte

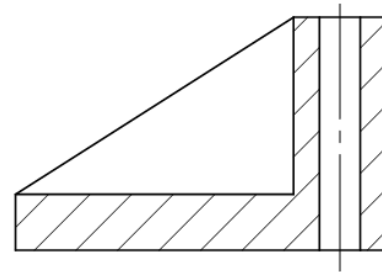
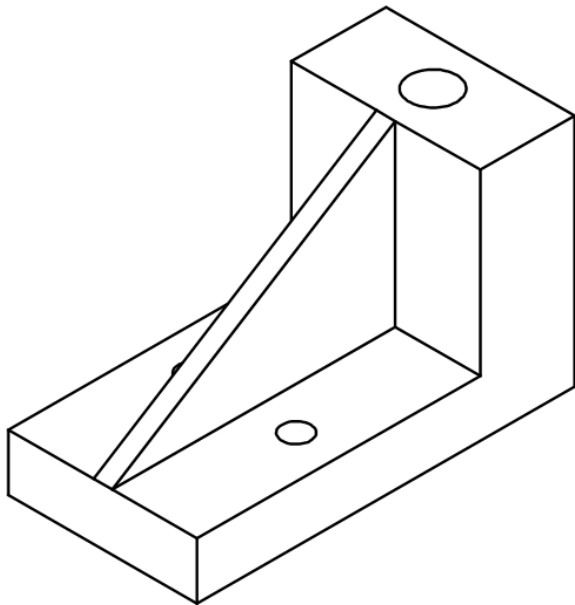




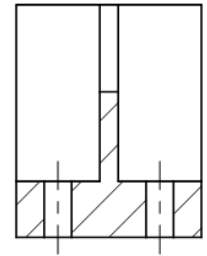
# Projeções em corte



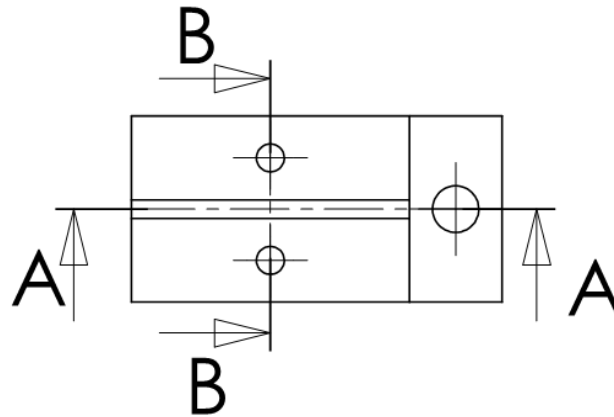
# Corte de Nervuras



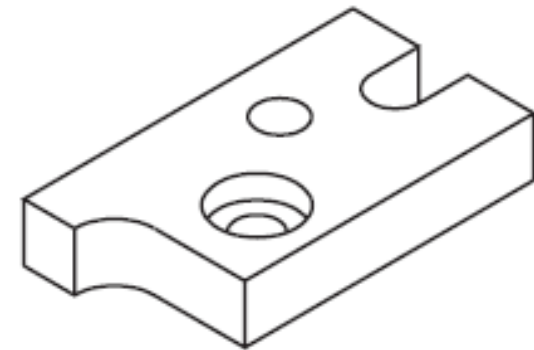
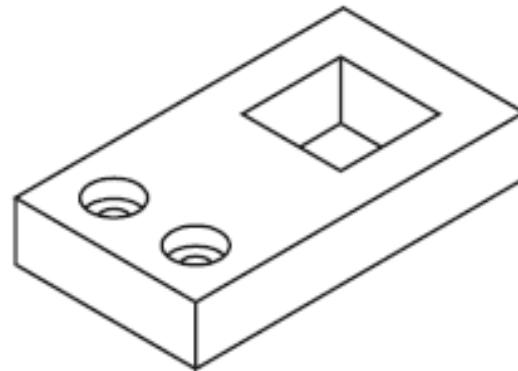
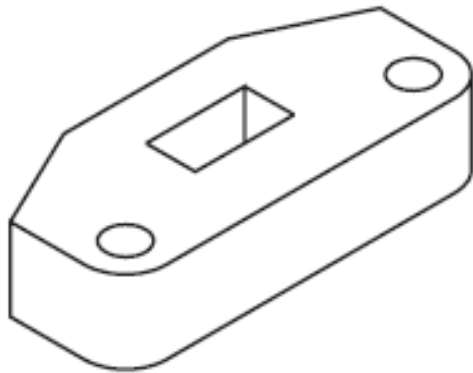
CORTE A-A



CORTE B-B

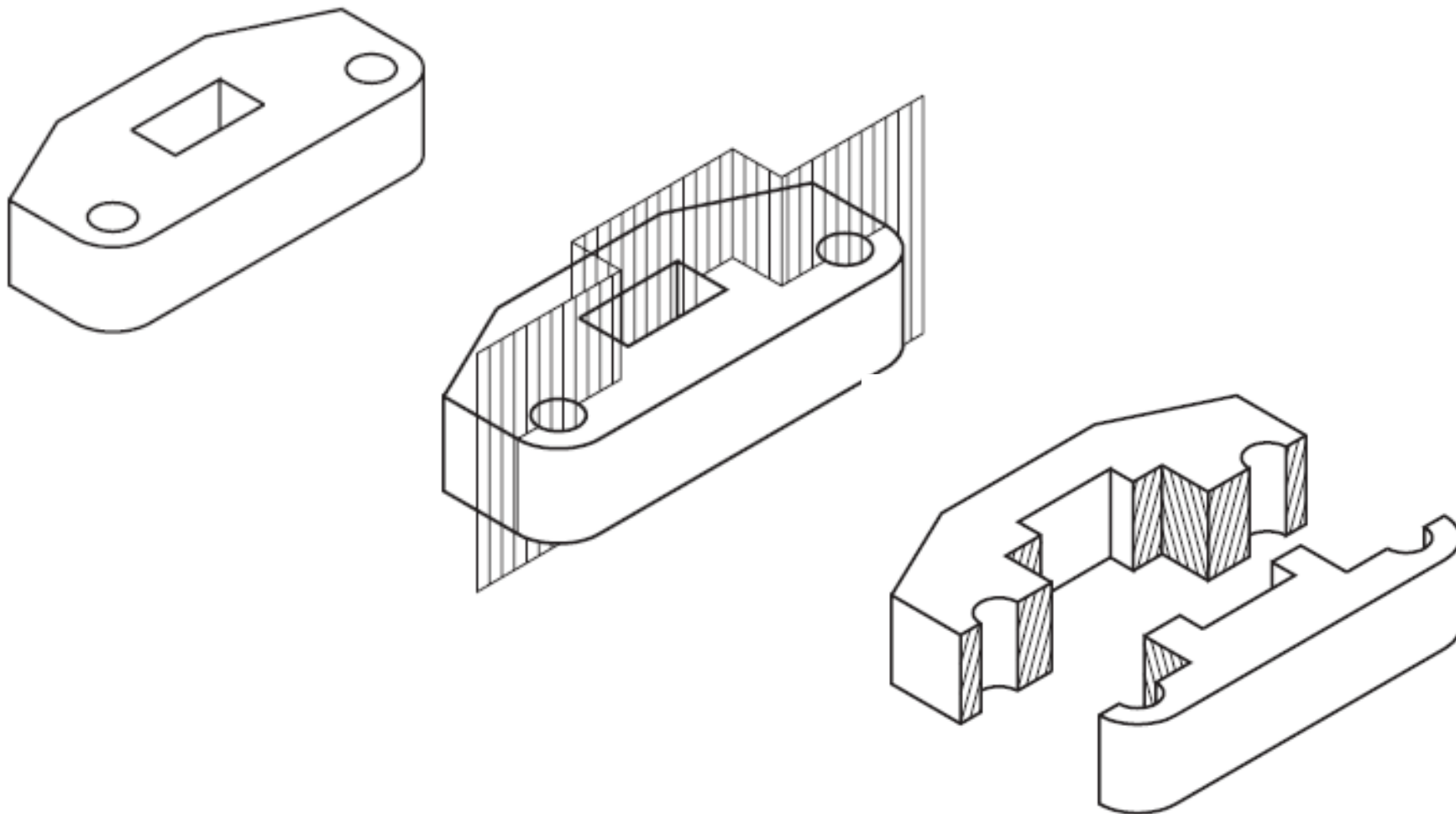


# Corte composto

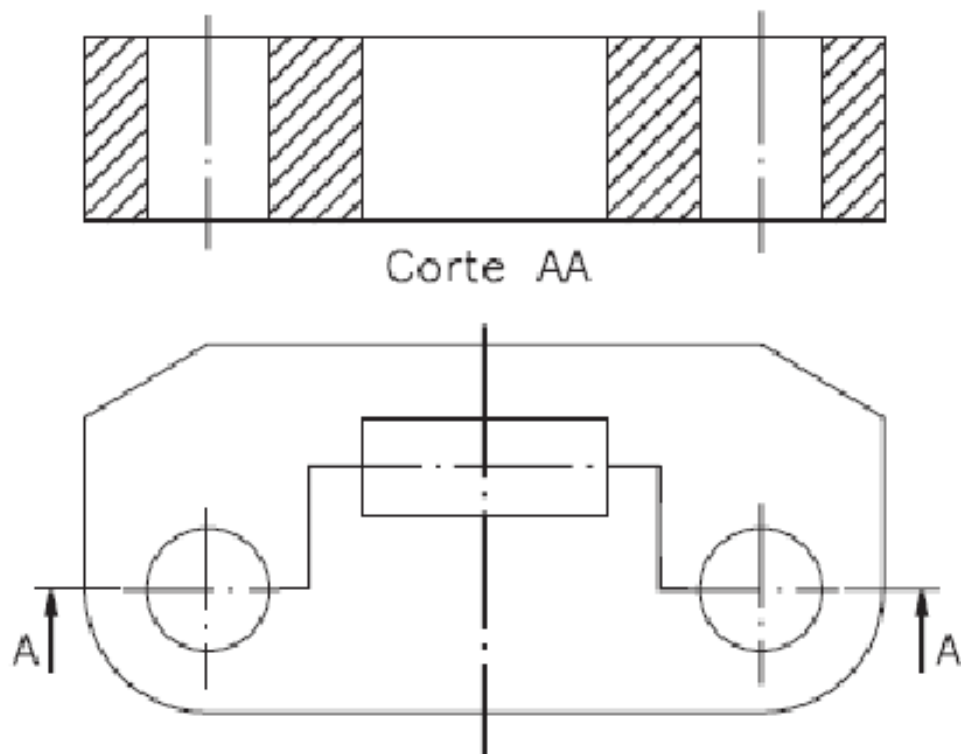


Para visualizar detalhes internos da peça fora de alinhamento é necessário aplicar um corte composto.

# Corte composto - Exemplo

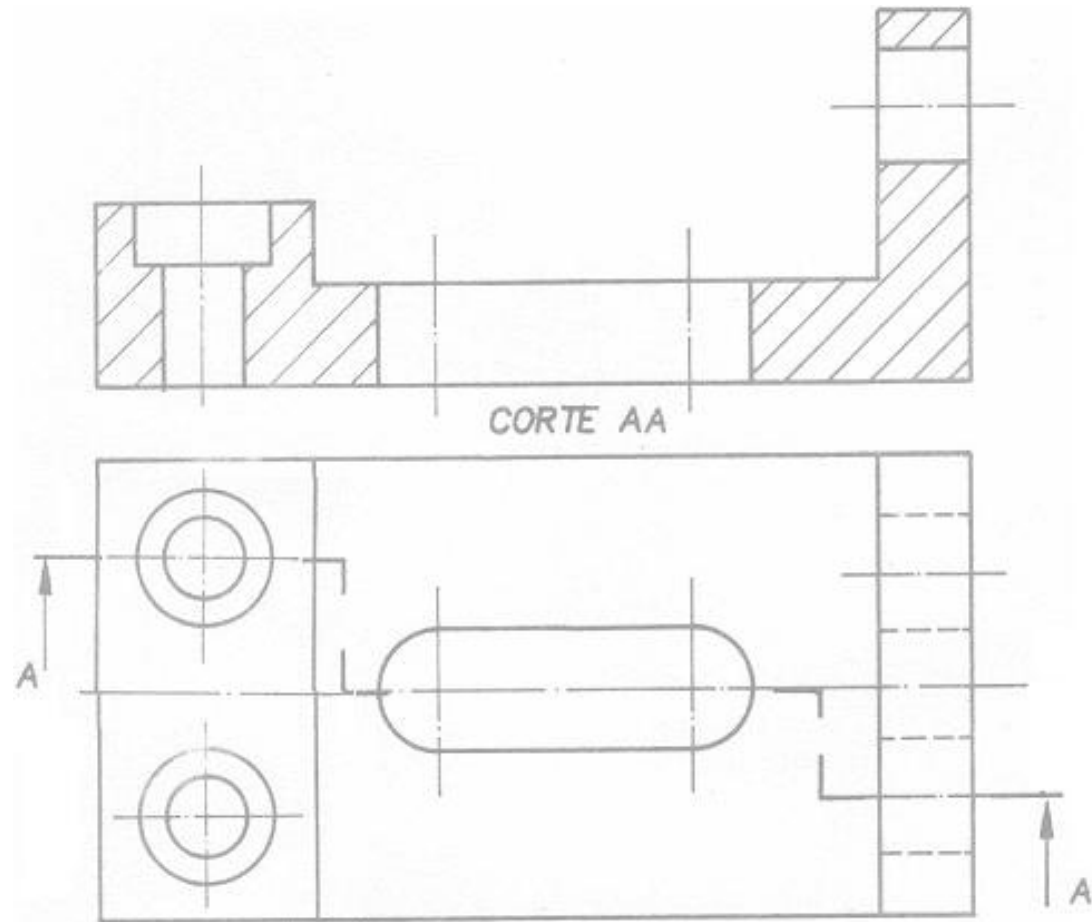
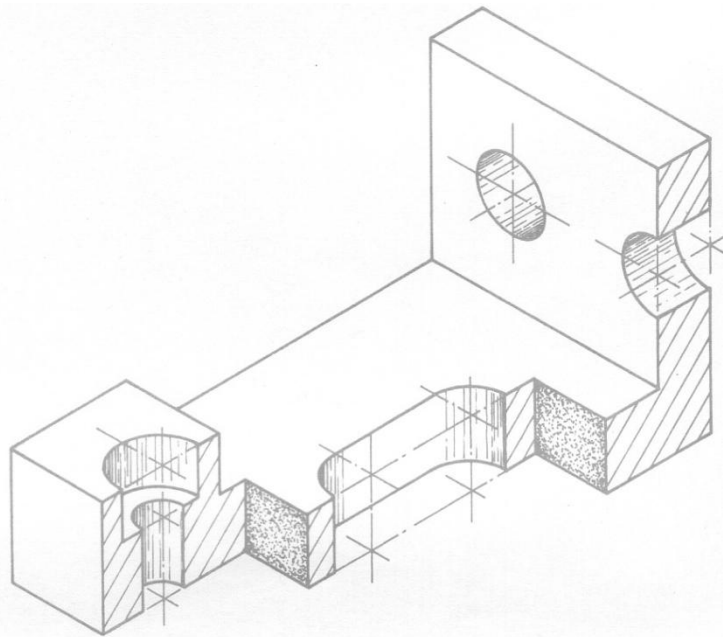


# Indicação do corte composto nas projeções

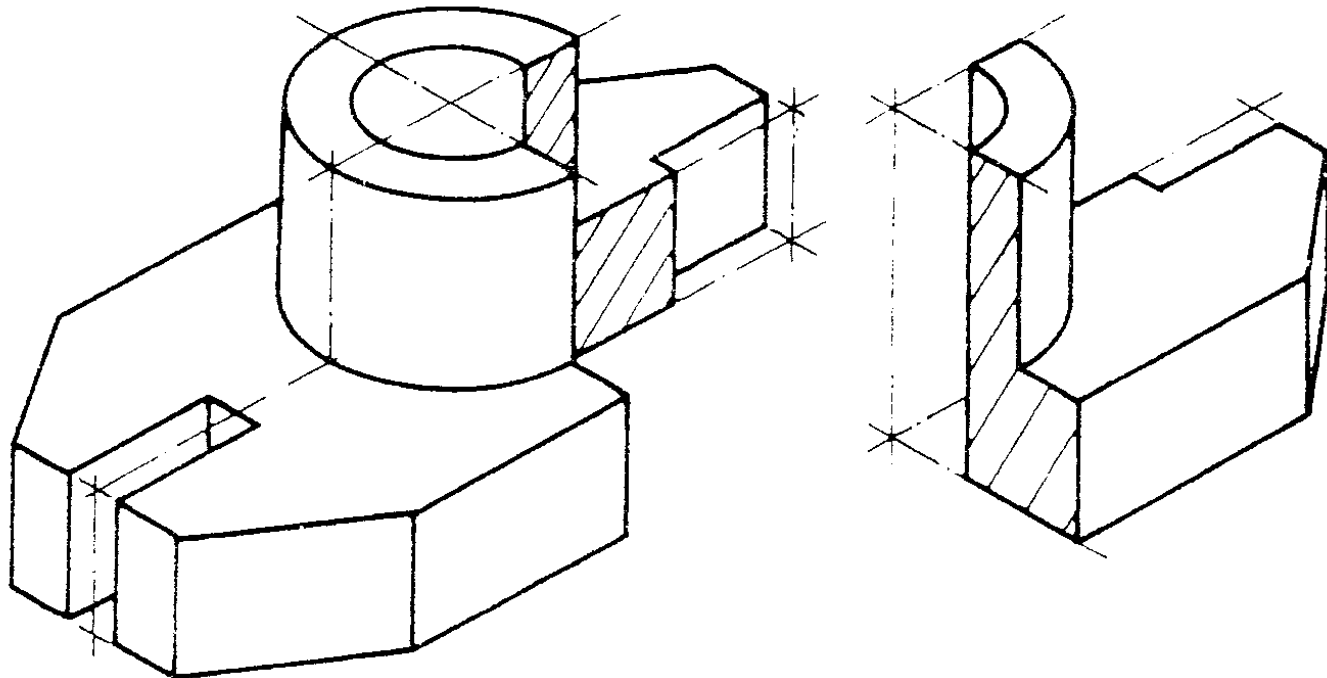


- O corte é indicado pela linha traço e ponto na vista adequada.
- Os traços são largos nas extremidades e na mudança de direção dos planos de corte.

# Visualização do corte



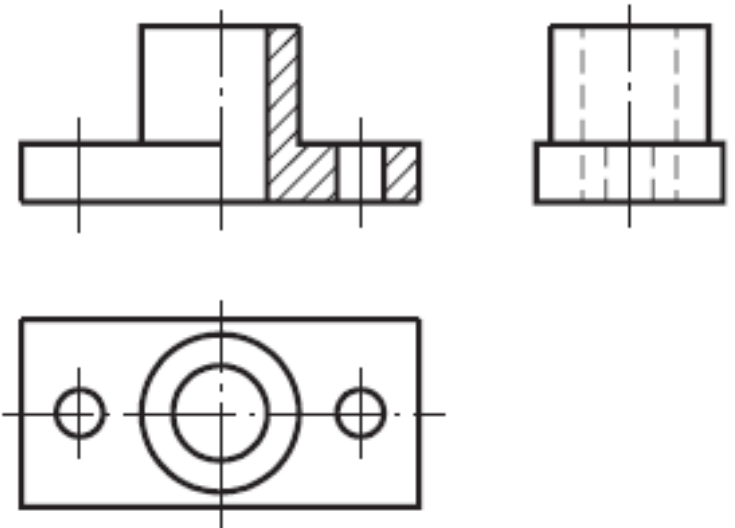
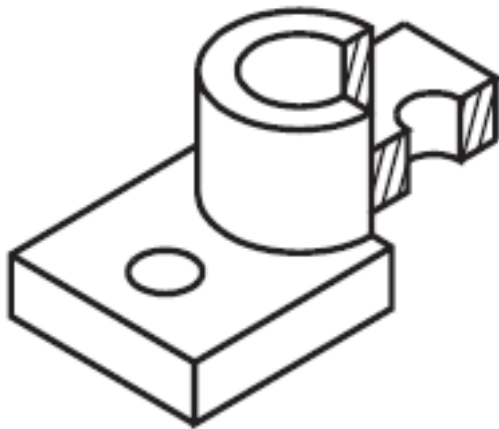
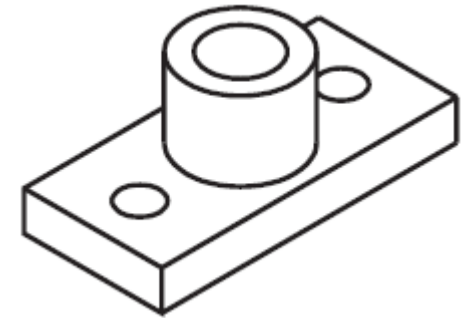
# Meio Corte



O meio corte somente deve ser aplicado em peças simétricas (longitudinal e transversal).

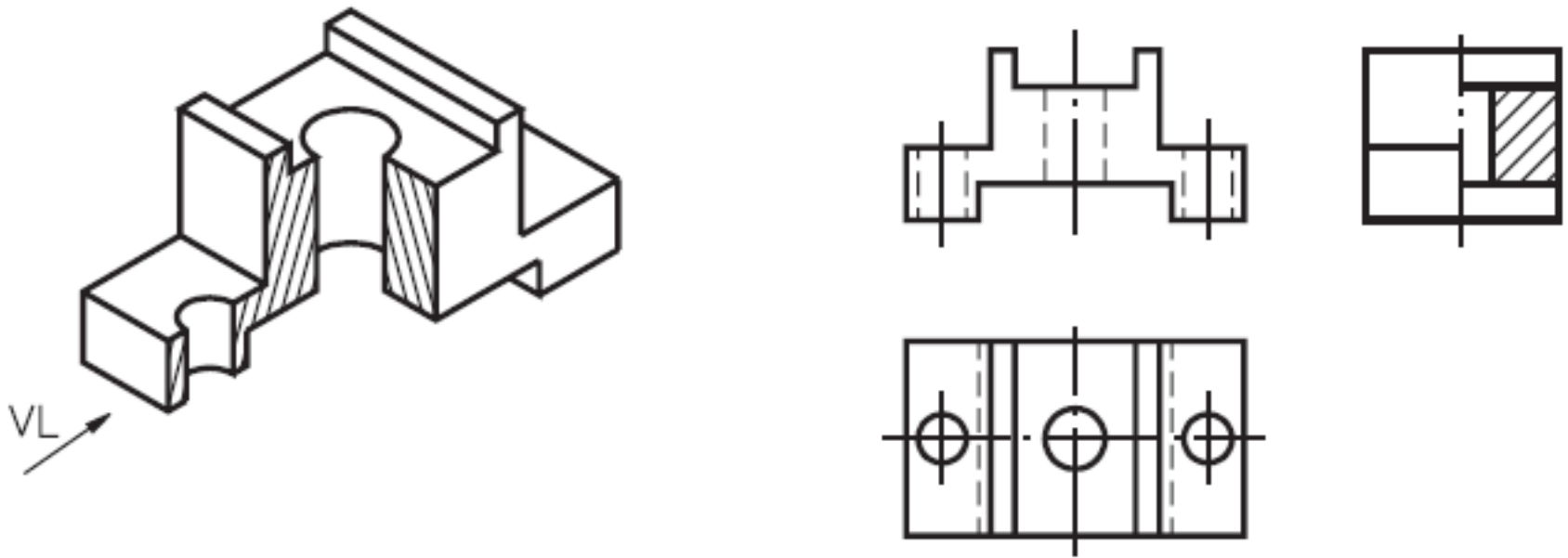
# Indicação do meio corte

❑ Quando a peça é representada com meio-corte, não é necessário indicar os planos de corte.



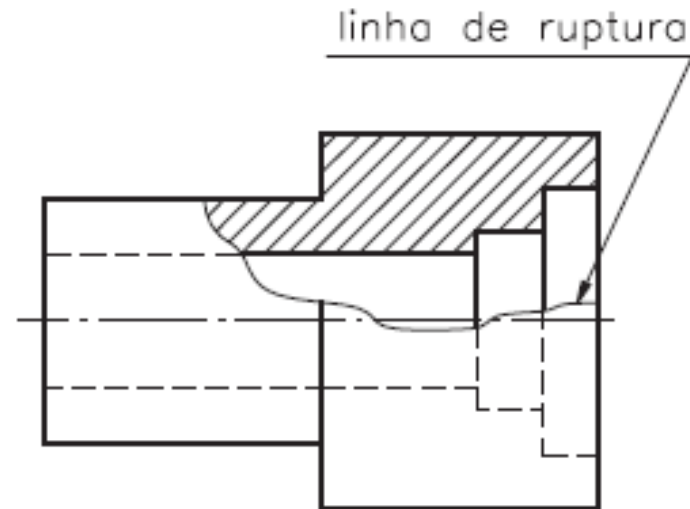
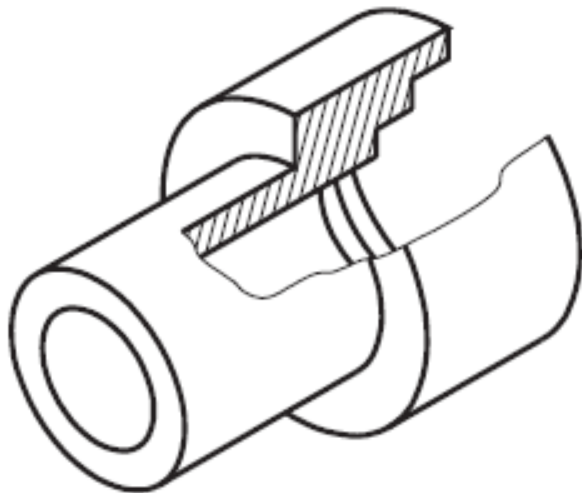


# Projeção em meio corte



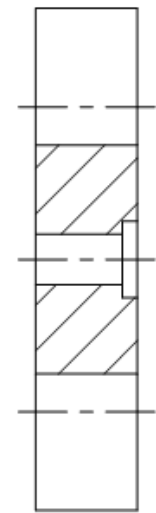
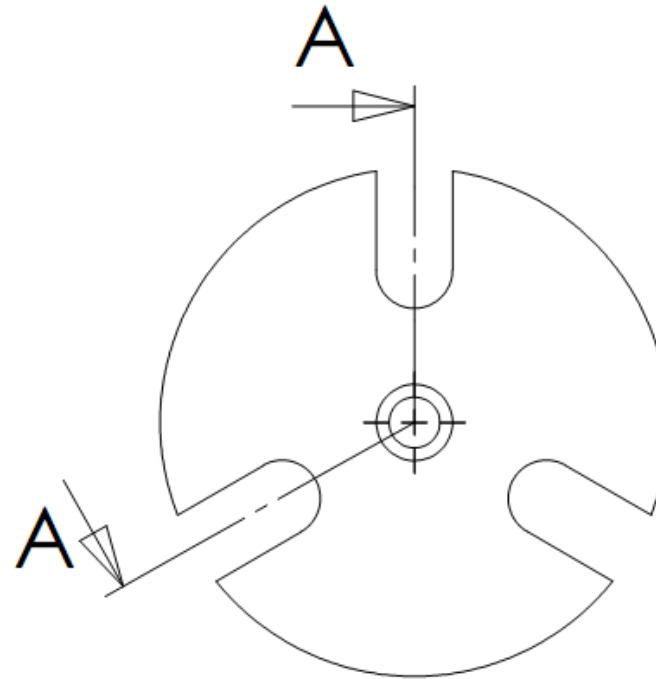
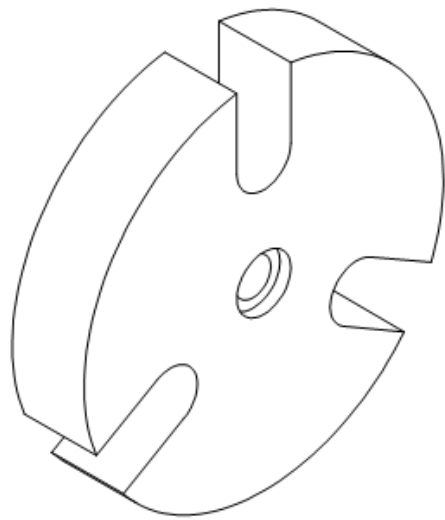
Sempre que a linha de simetria que atravessa a vista em corte for vertical, a parte representada em corte deve ficar à direita, conforme recomendação da ABNT.

# Corte Parcial



A linha de ruptura mostra o local onde o corte está sendo imaginado, deixando visíveis os elementos internos da peça.

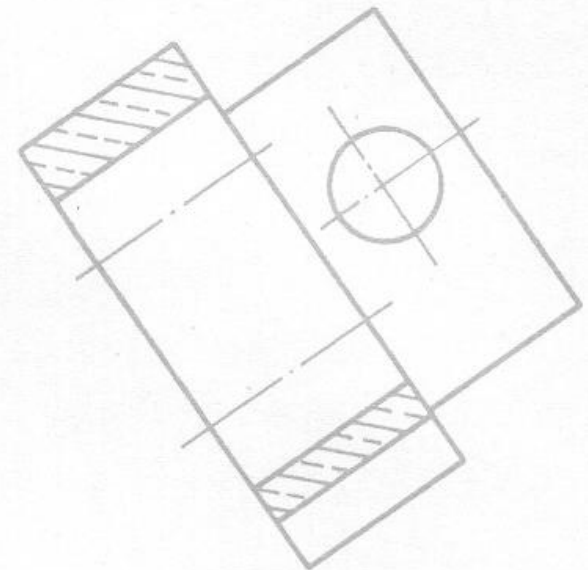
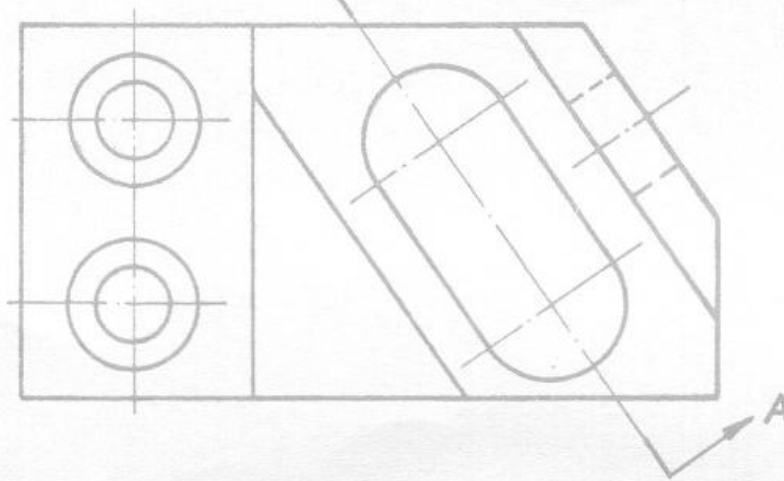
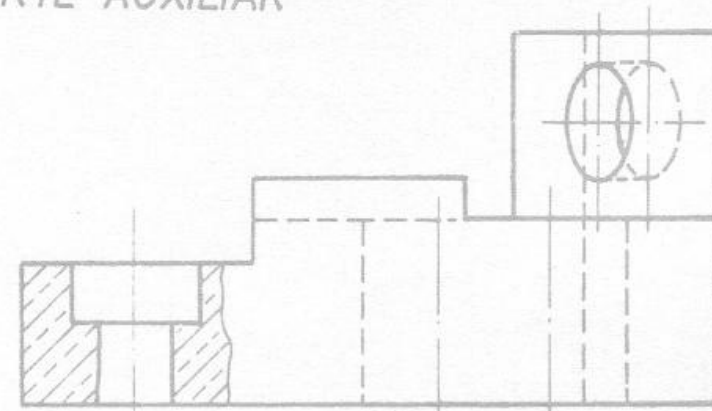
# Corte Rebatido



CORTE A-A

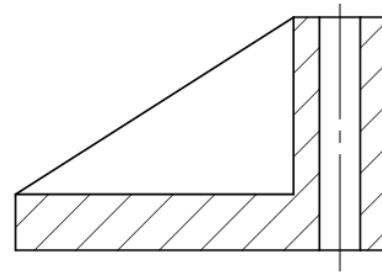
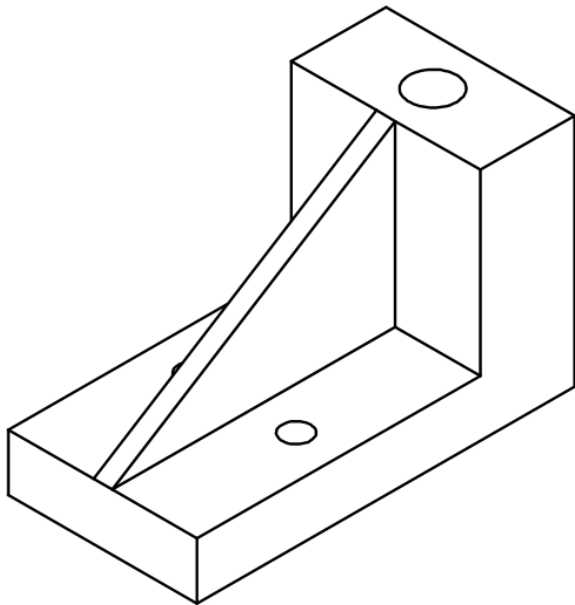
# Corte Auxiliar

CORTE AUXILIAR

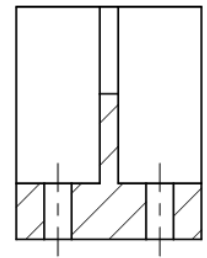


CORTE AA

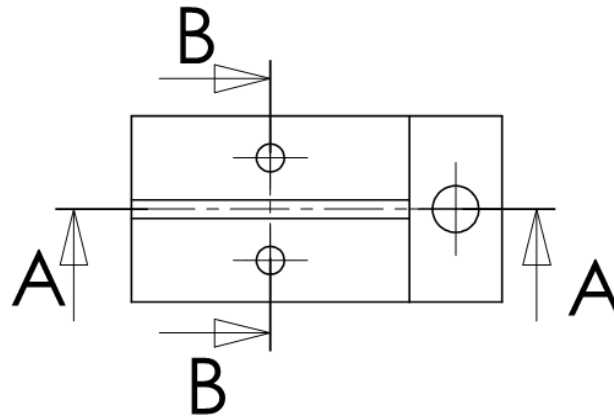
# Corte de Nervuras



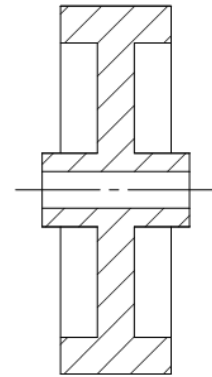
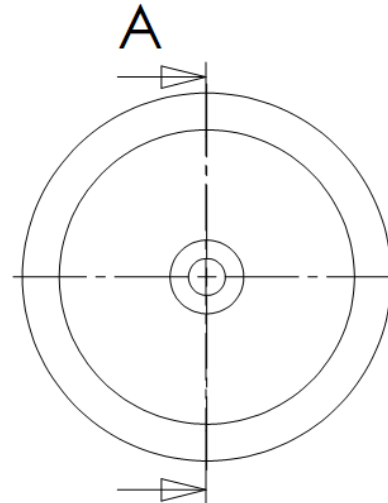
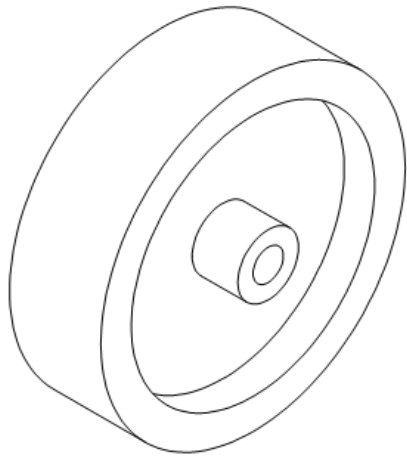
CORTE A-A



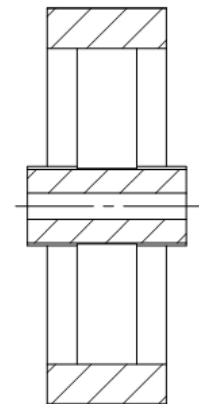
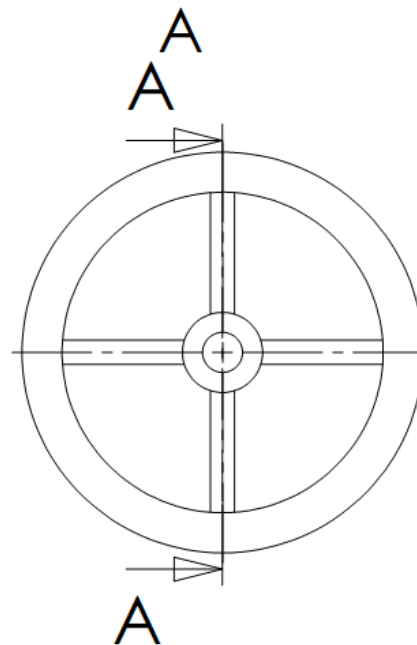
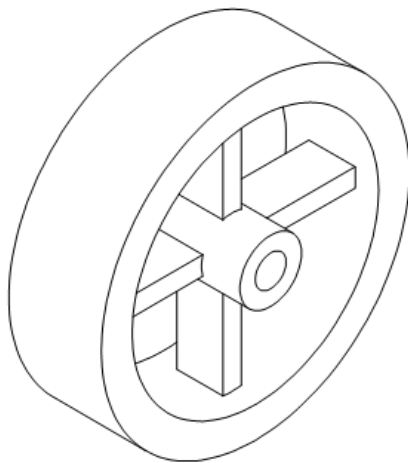
CORTE B-B



# Omissão de corte

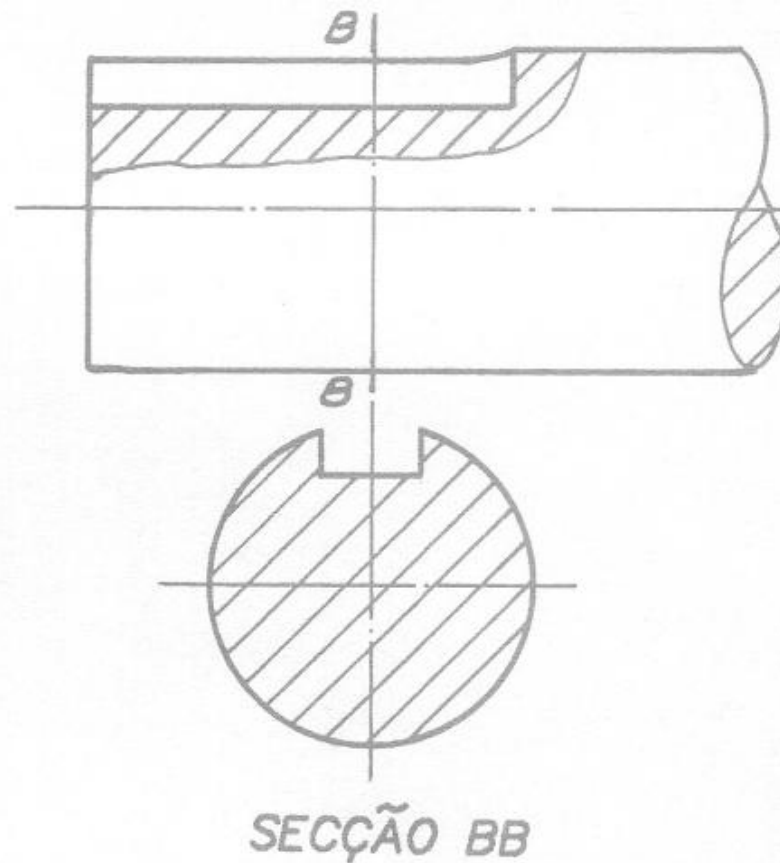
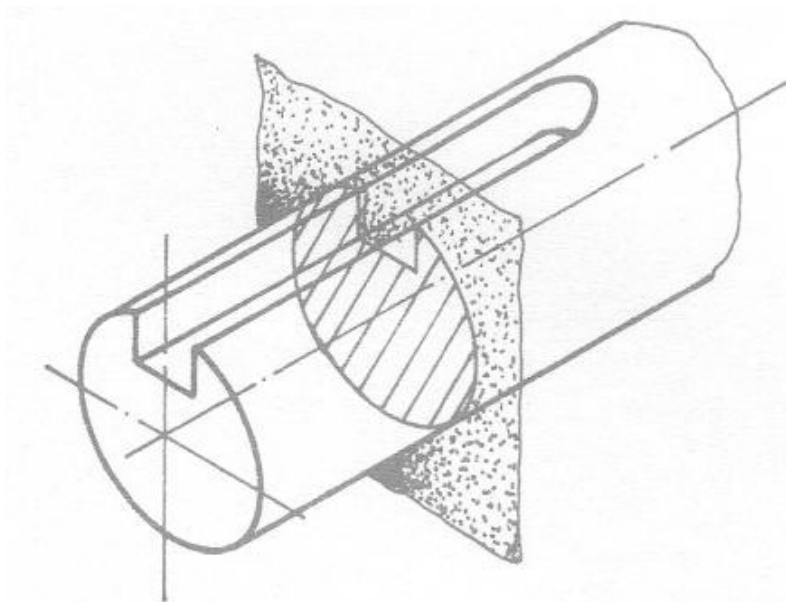


CORTE A-A

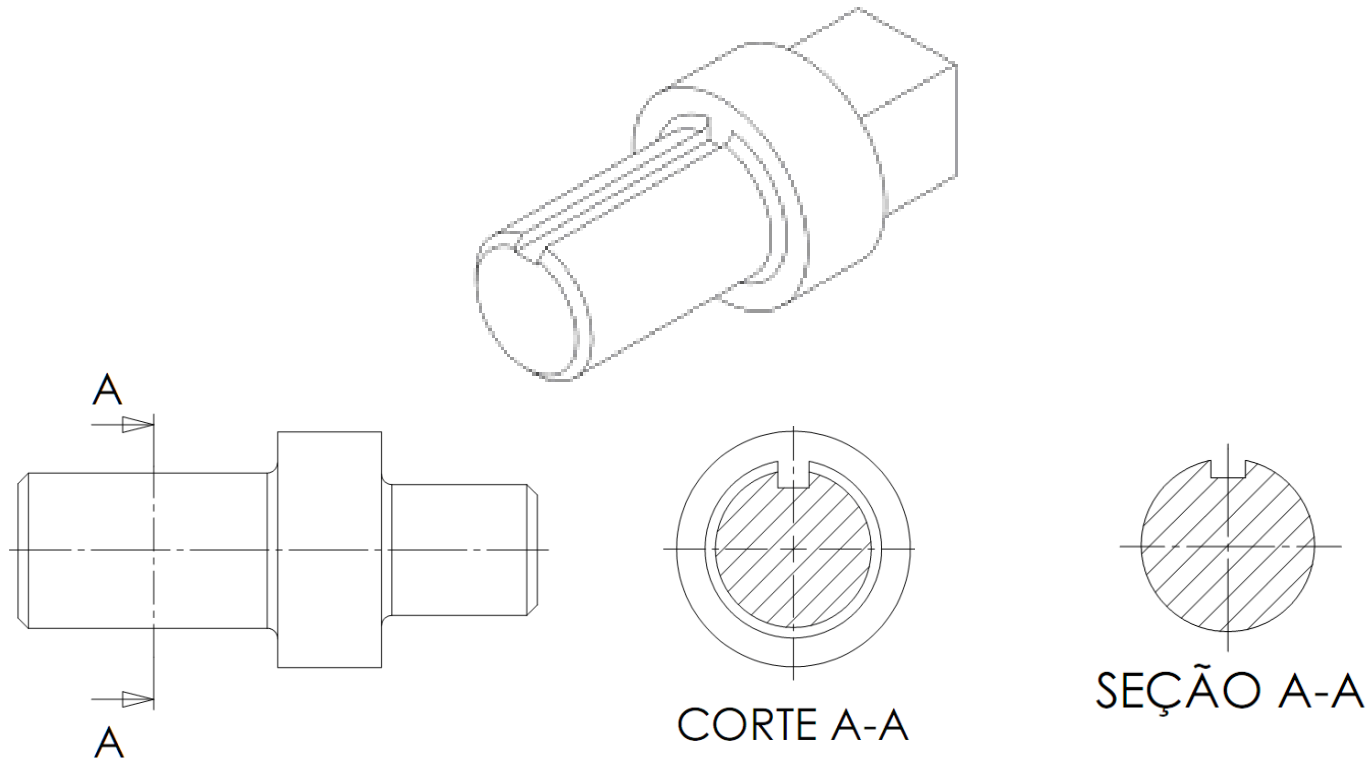


CORTE A-A

# Desenho em Seção



# Diferença: corte x seção



O desenho em corte mostra outros elementos da peça, além da parte maciça atingida pelo corte, enquanto que o desenho em seção mostra apenas a parte cortada.



# Múltiplas Seções

