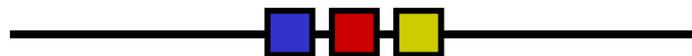
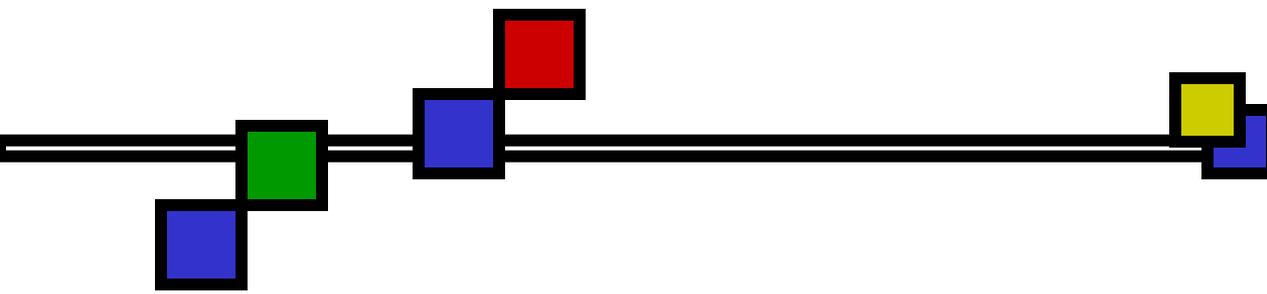


Geometria Descritiva III

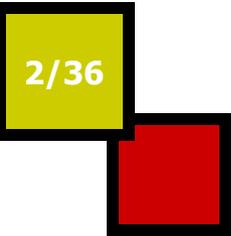
Planos



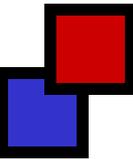
**PCC3100 Mecatrônica – Geometria
Gráfica para Projeto**



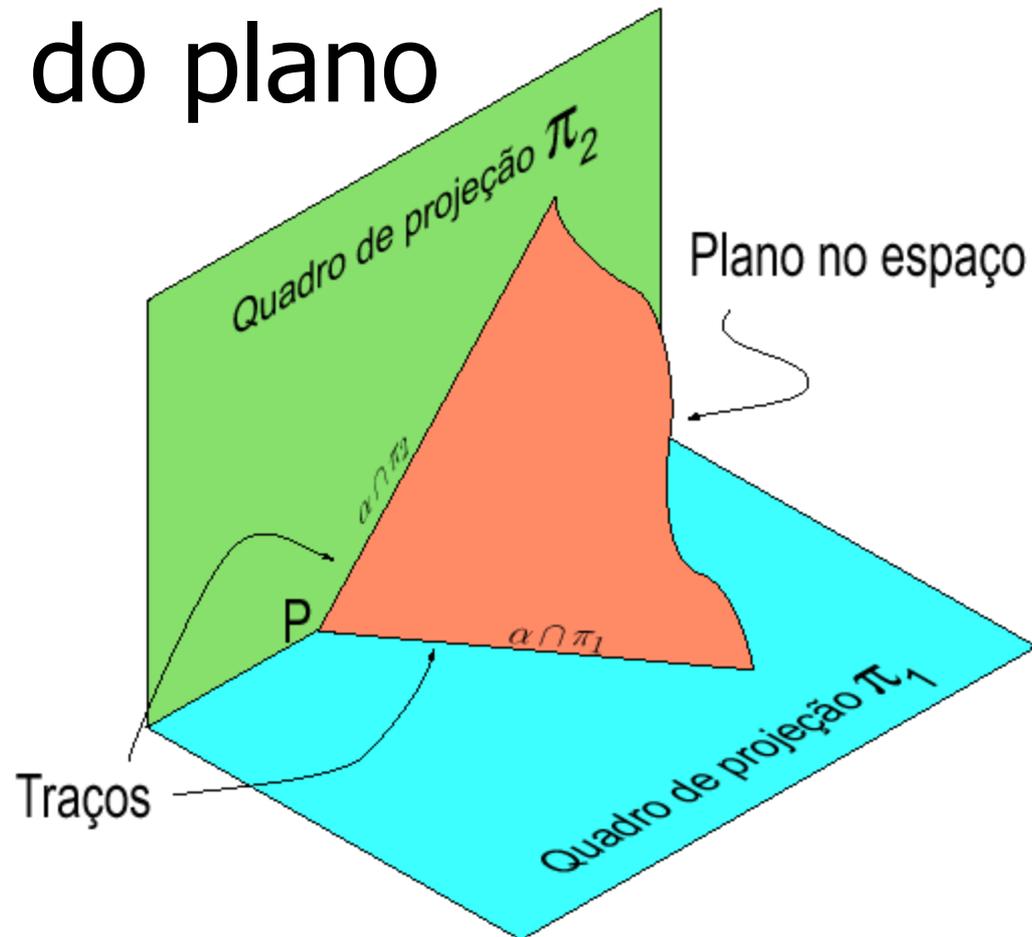
Representação de Planos



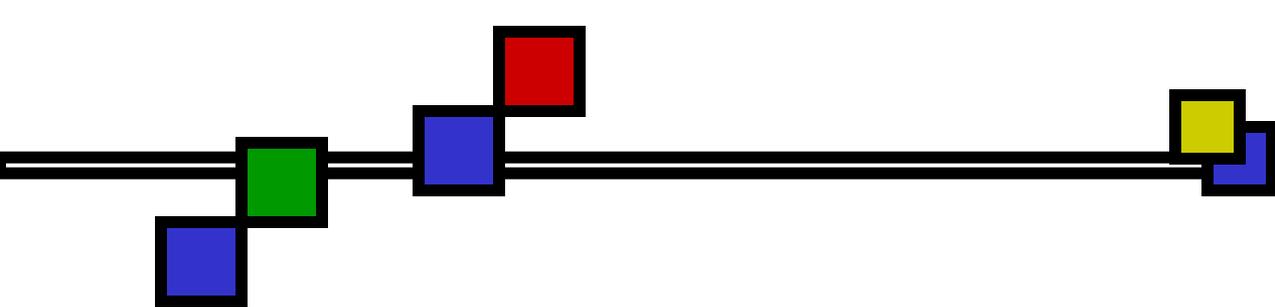
- *3 pontos;* ou
- *1 reta e 1 ponto externo a ela;* ou
- *2 retas paralelas;* ou
- ***2 retas concorrentes:***
 - Traço horizontal do plano +
 - Traço vertical do plano;



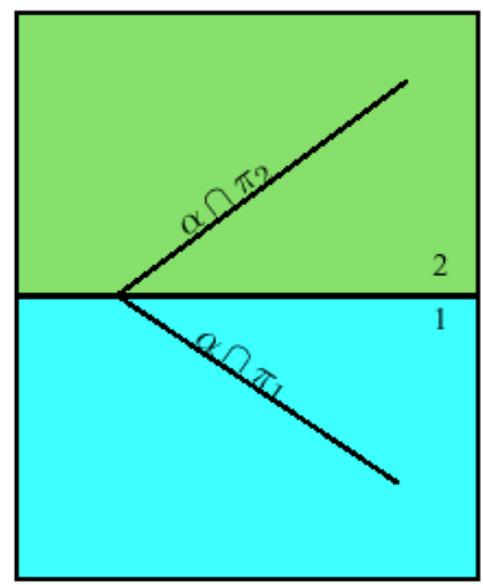
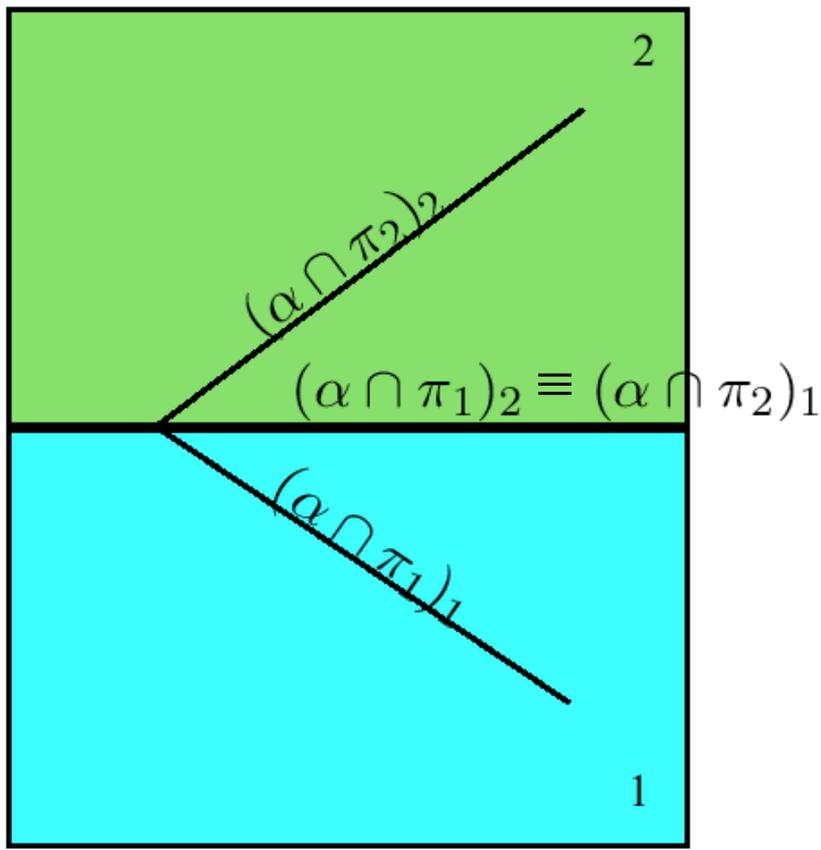
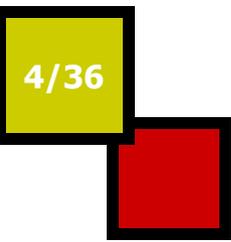
Traços do plano



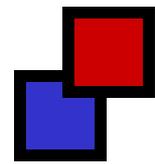
Lembrando: em GD, “traço” = intersecção com quadro

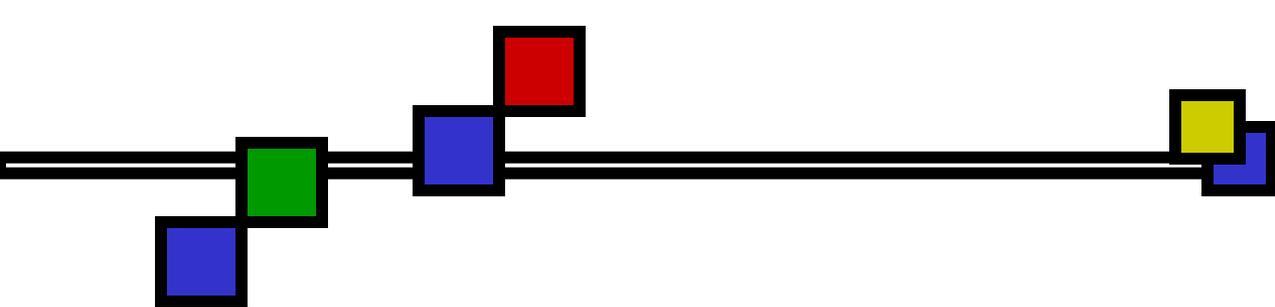


Traços em Épura

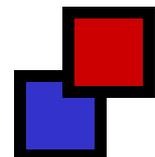
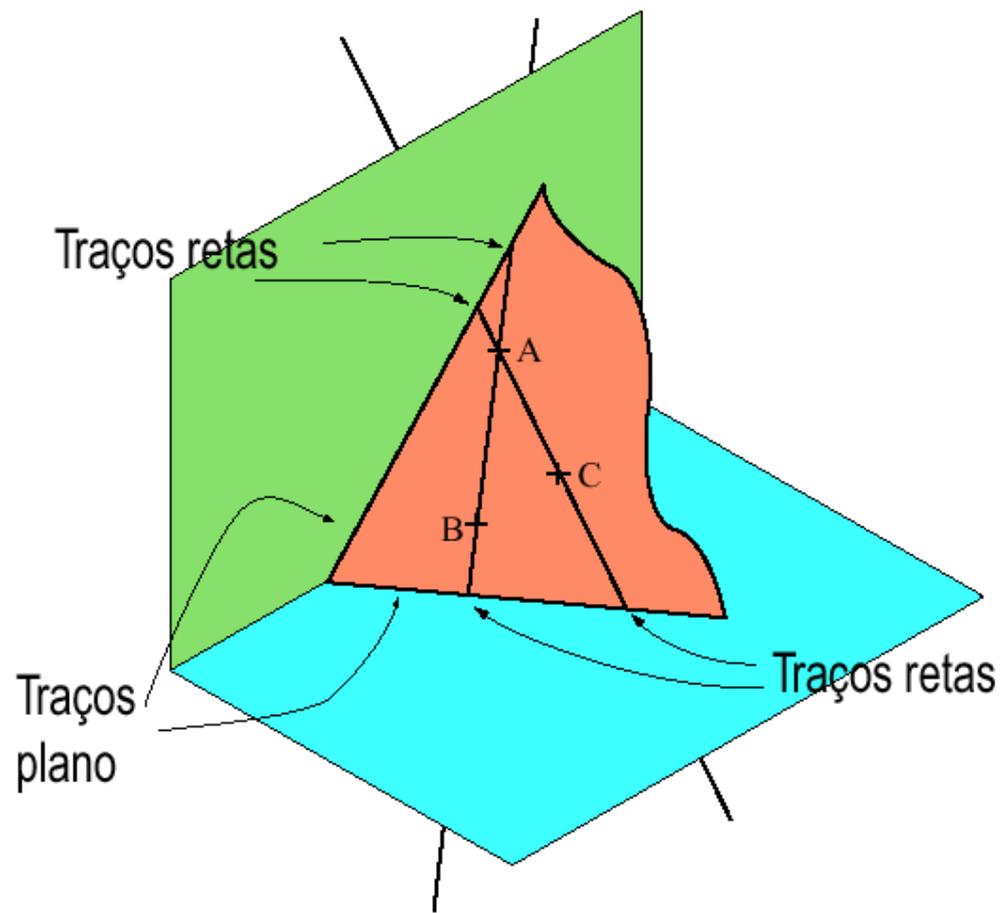
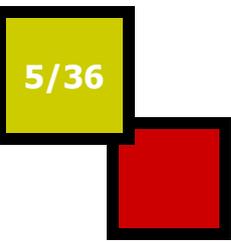


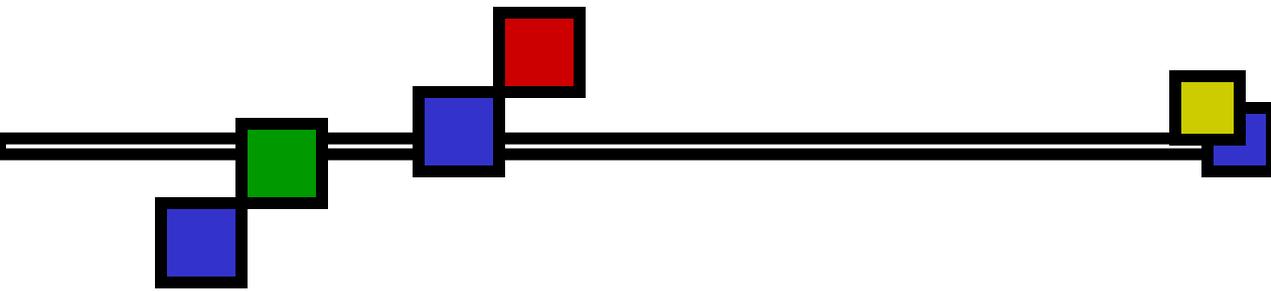
representação simplificada



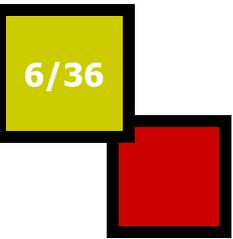


Traços do plano e de suas retas

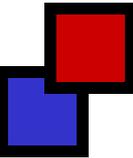


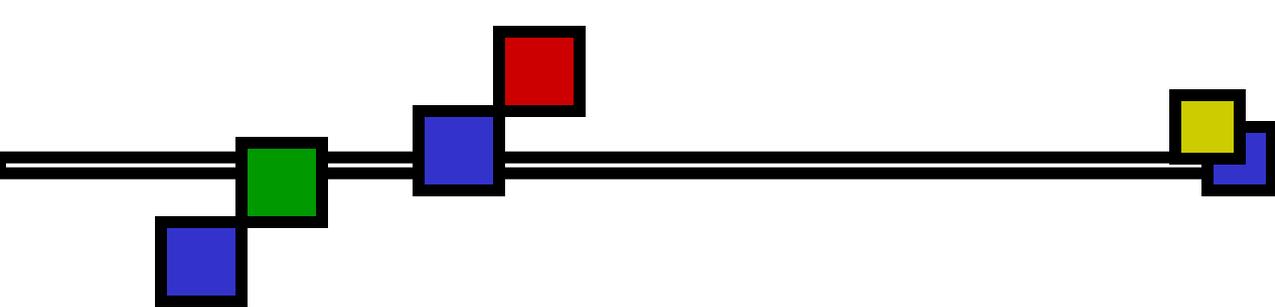


Traços do plano e de suas retas



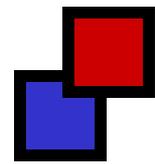
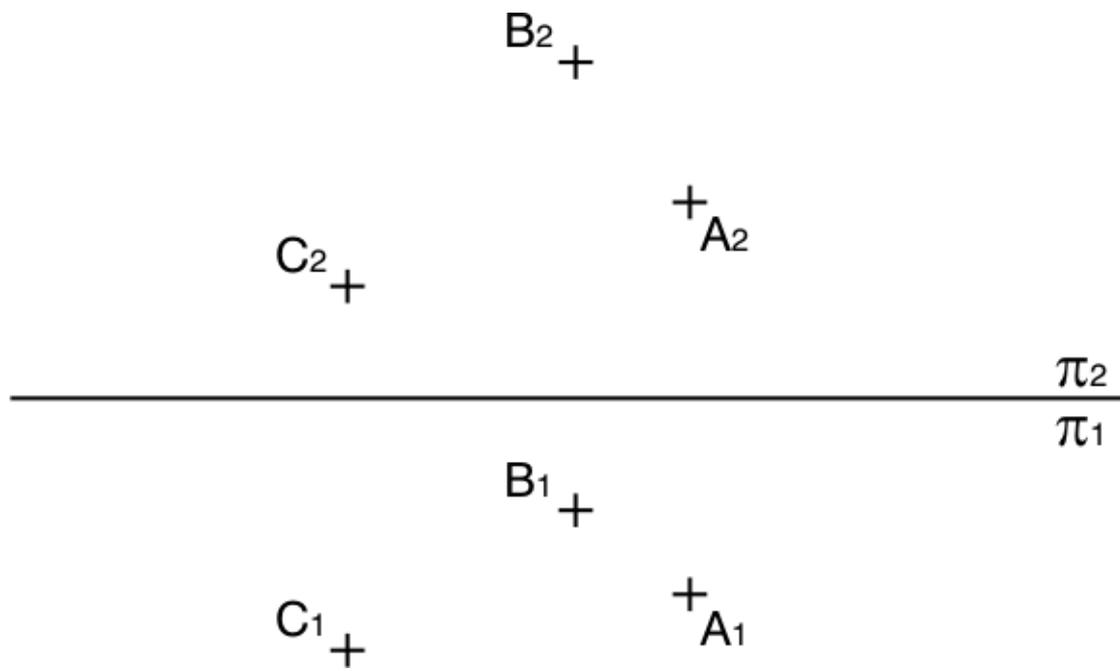
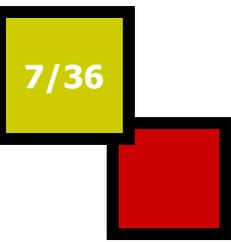
- *"Os traços de um plano são o lugar geométrico dos traços das retas contidas no plano"*
 - Determinação dos traços do plano:
 - Determine os traços de duas retas quaisquer contidas no plano.





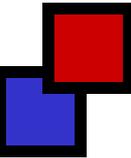
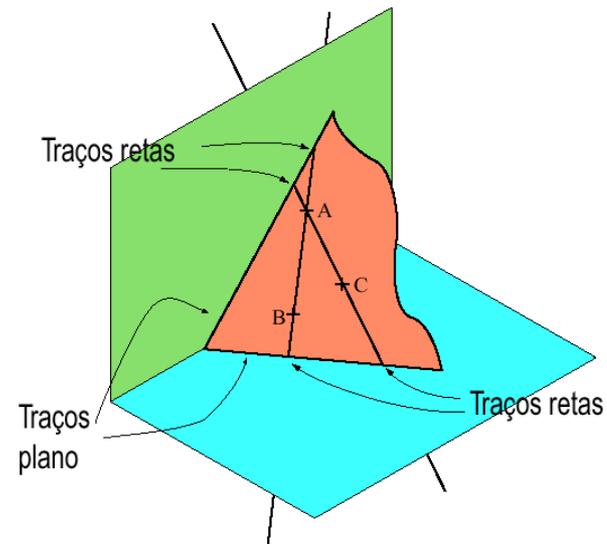
Exercício em sala de aula

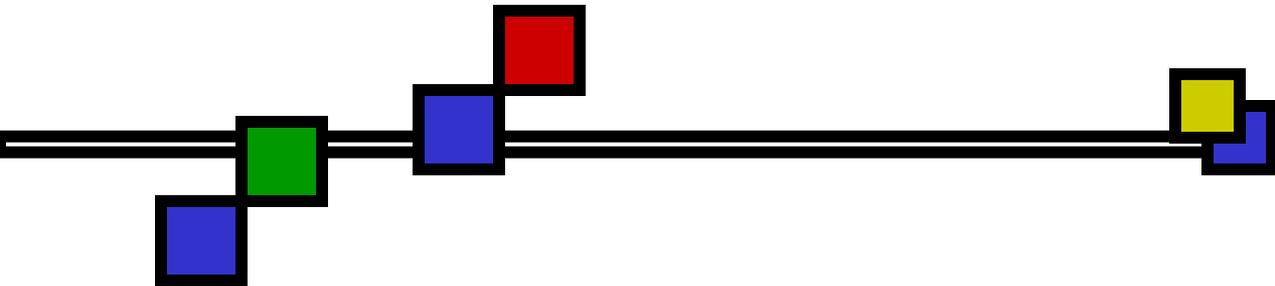
Determinar os Traços do plano α definido pelos pontos A, B e C indicados na Épura abaixo.



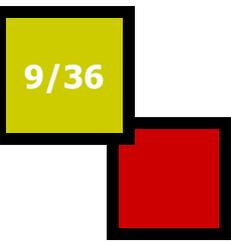
Pertinência reta – plano

- Condição de pertinência reta – plano:
 - Os traços das retas devem pertencer aos traços do plano.

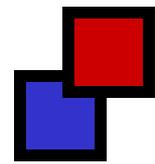
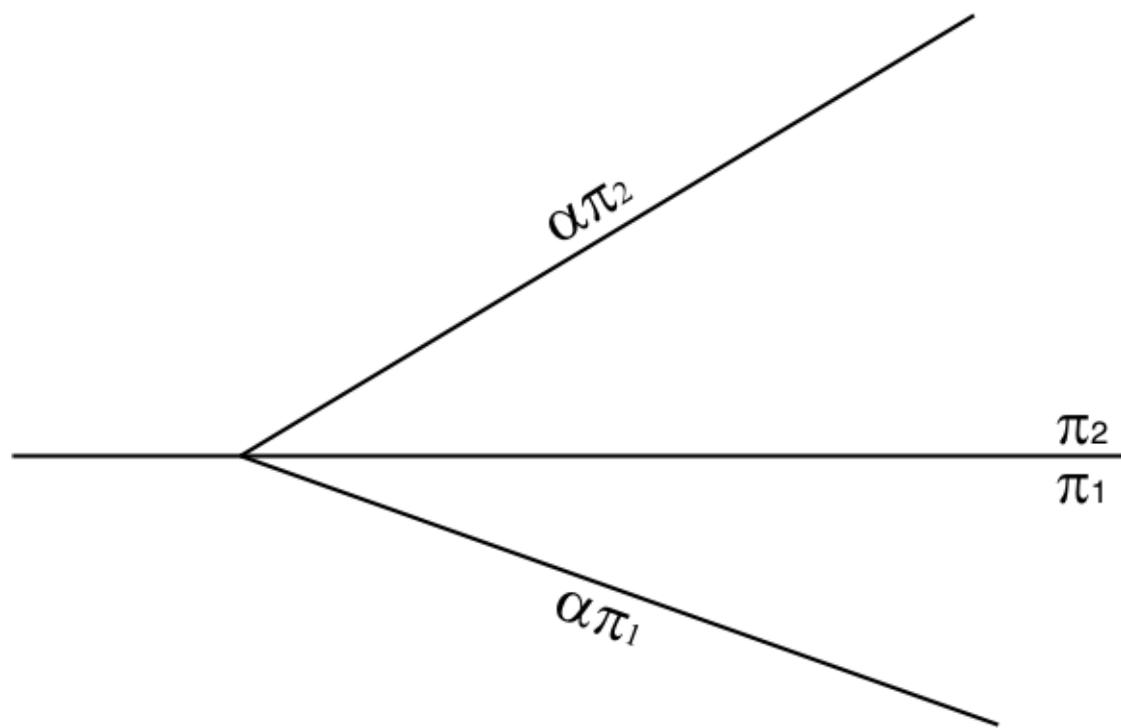


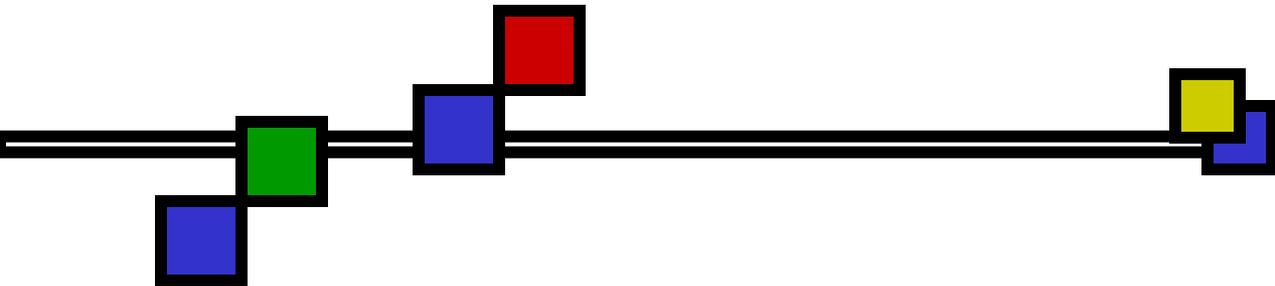


Exercício em sala de aula

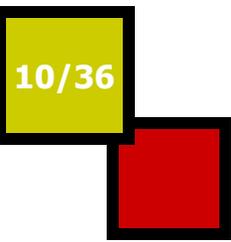


Seja α dado pelos seus Traços nos Planos de Projeção. Forneça uma reta qualquer r contida em α e destaque os seus Traços.

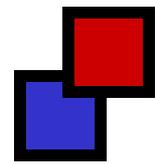
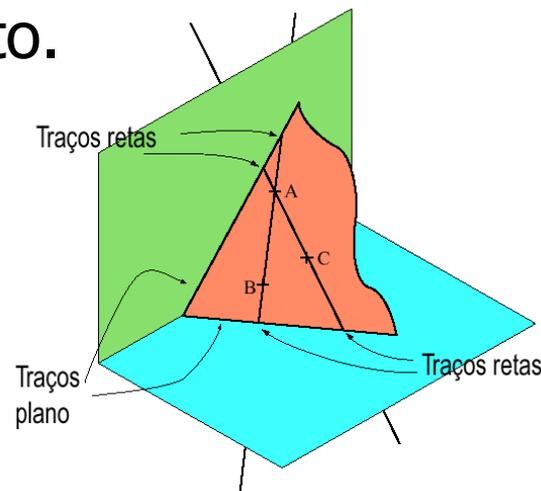


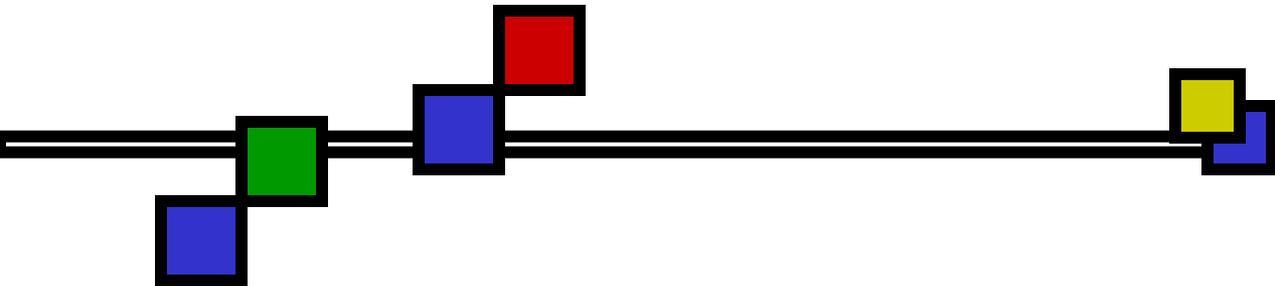


Pertinência ponto - plano

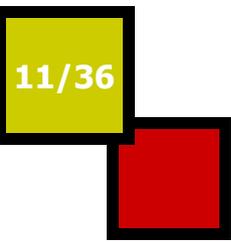


- Se um ponto pertence a uma reta de um plano, então ele pertence a este plano:
 - Tentar encontrar um reta pertencente ao plano que passe pelo ponto.

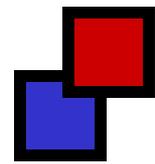
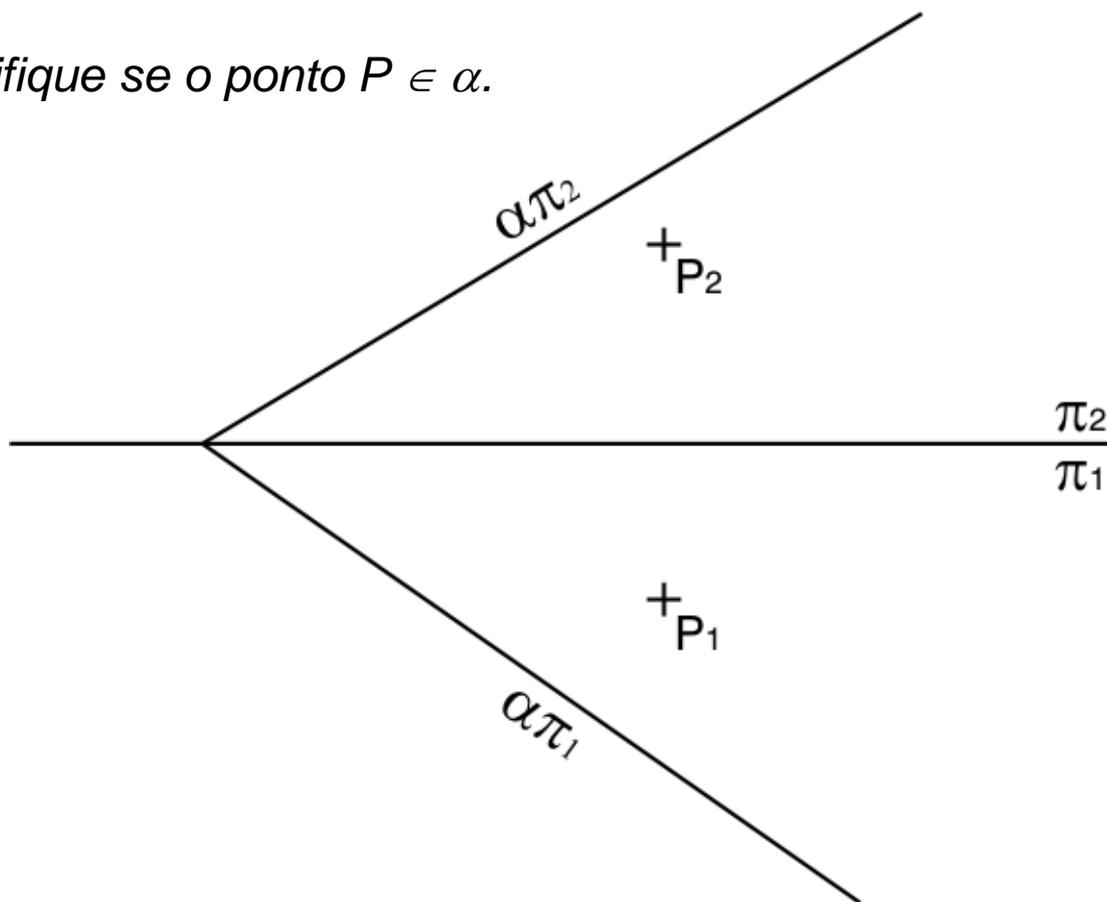


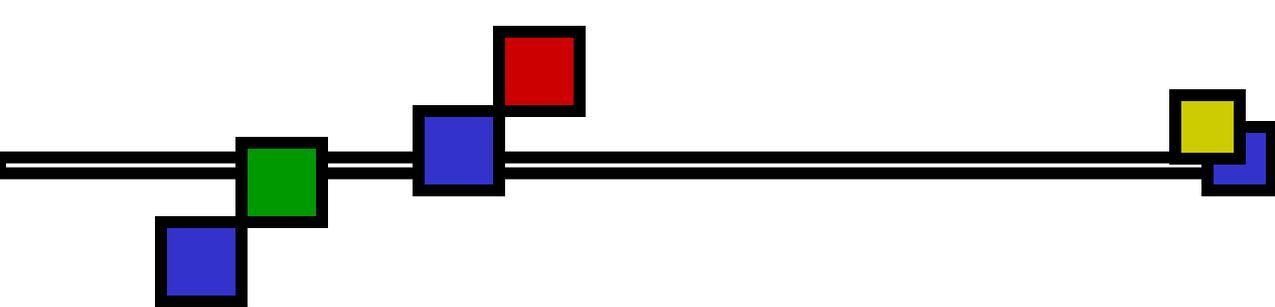


Exercício em sala de aula



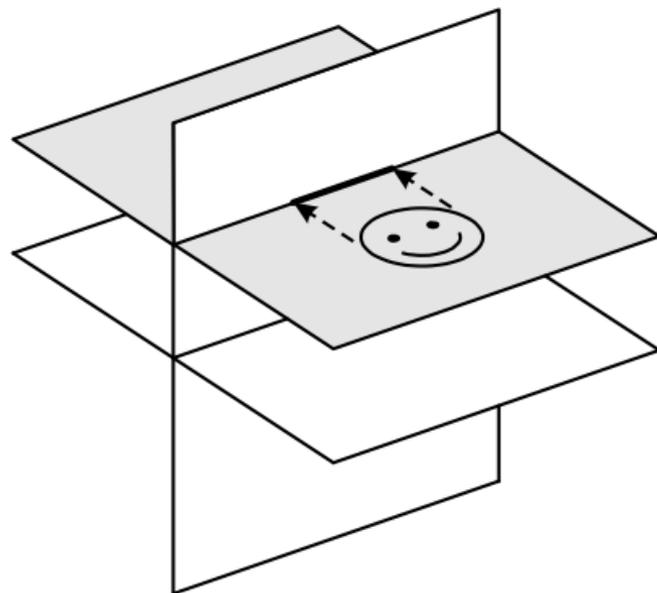
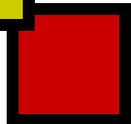
Verifique se o ponto $P \in \alpha$.



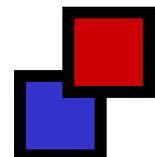
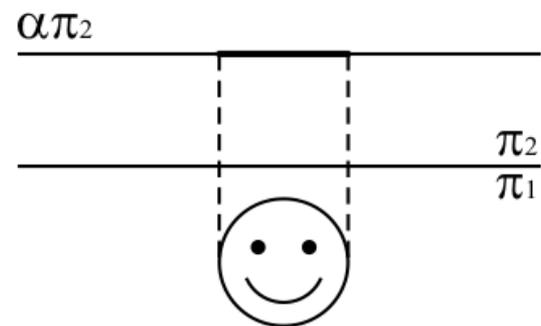


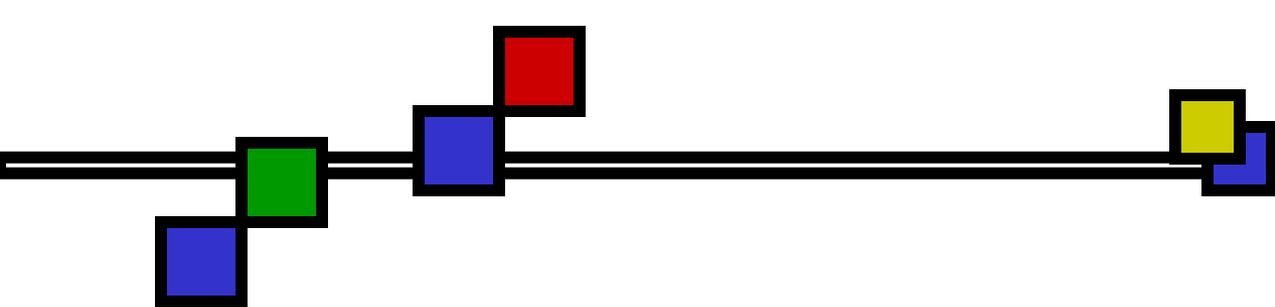
Planos em posições especiais

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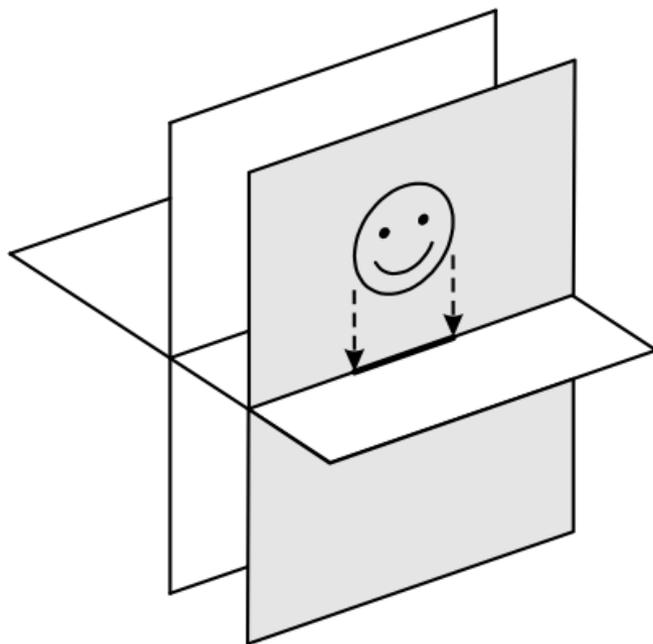
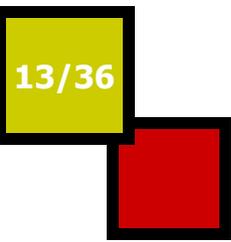


Plano Horizontal

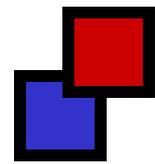
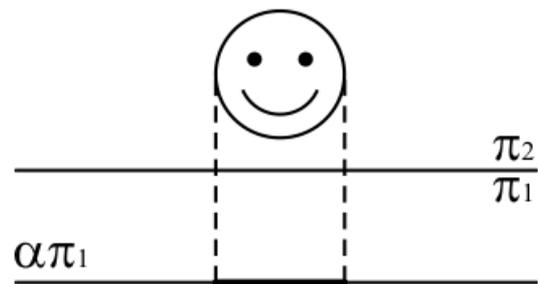


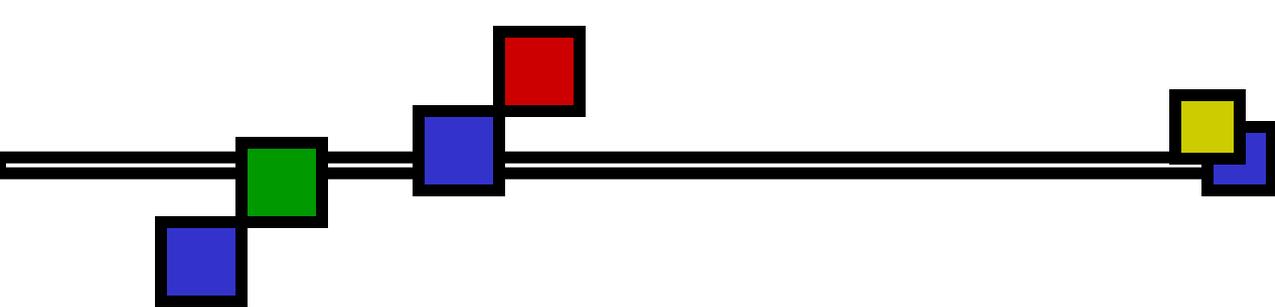


Planos em posições especiais

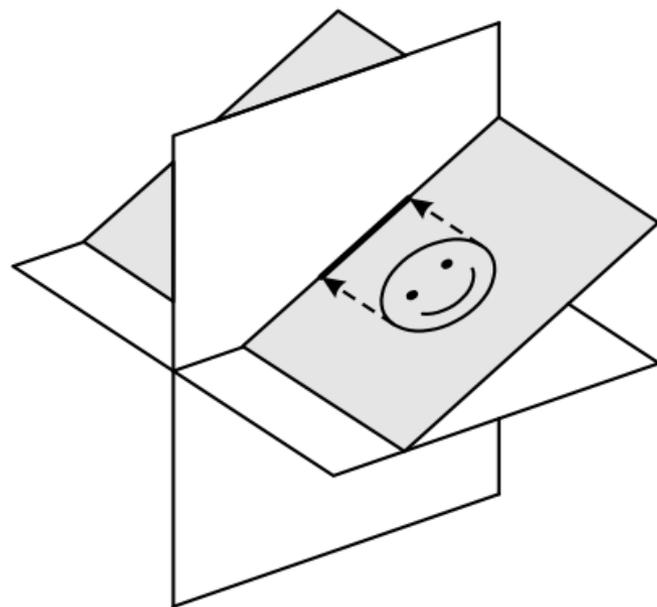
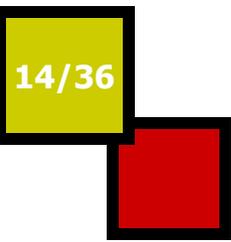


Plano Frontal

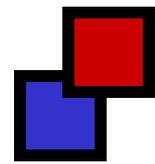
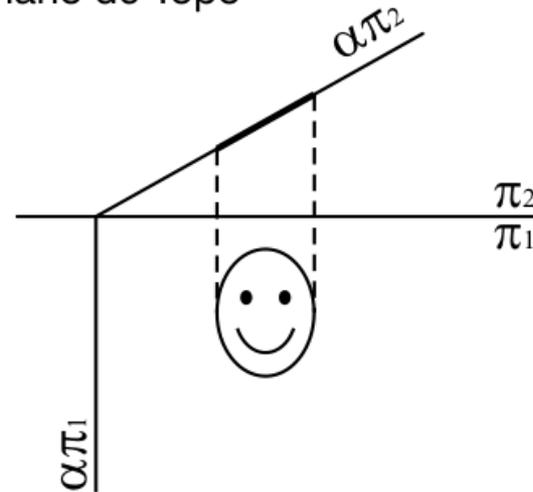


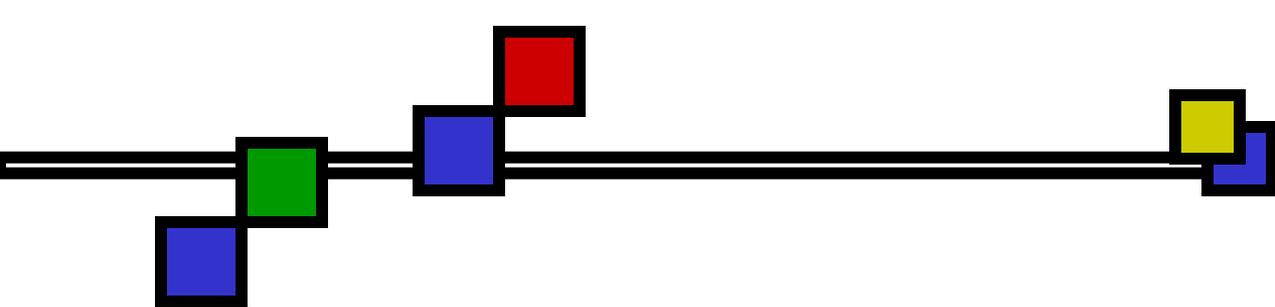


Planos em posições especiais



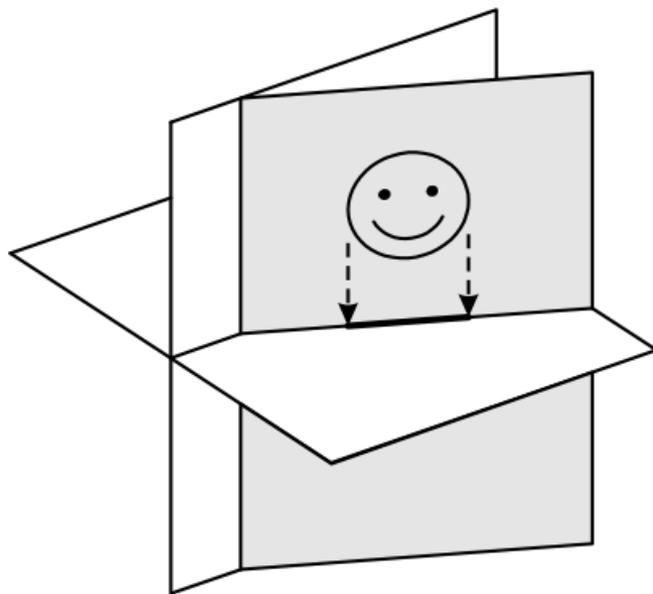
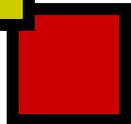
Plano de Topo



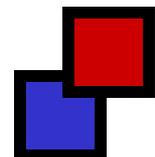
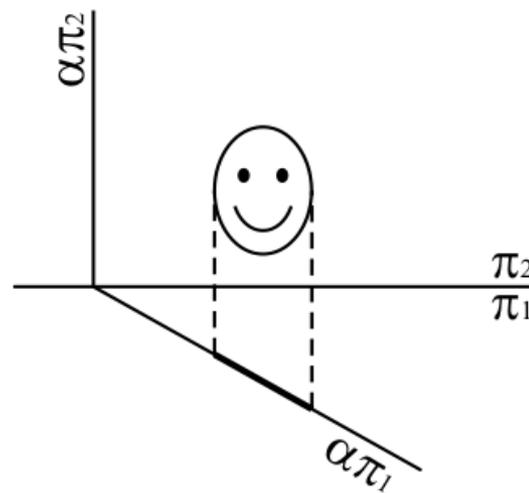


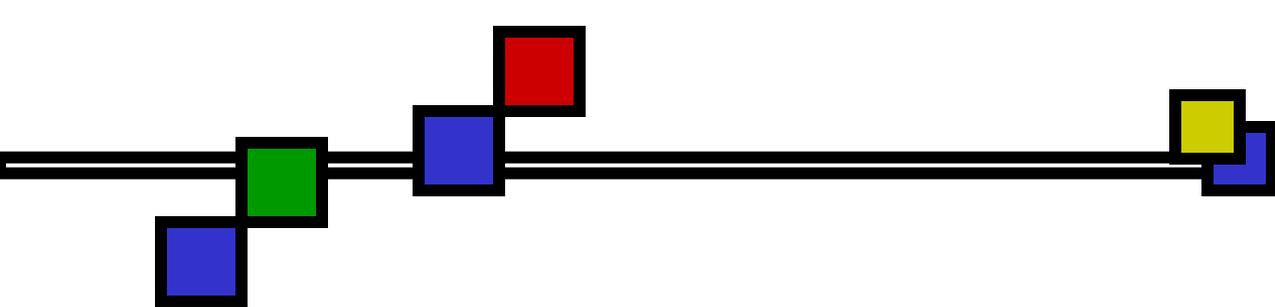
Planos em posições especiais

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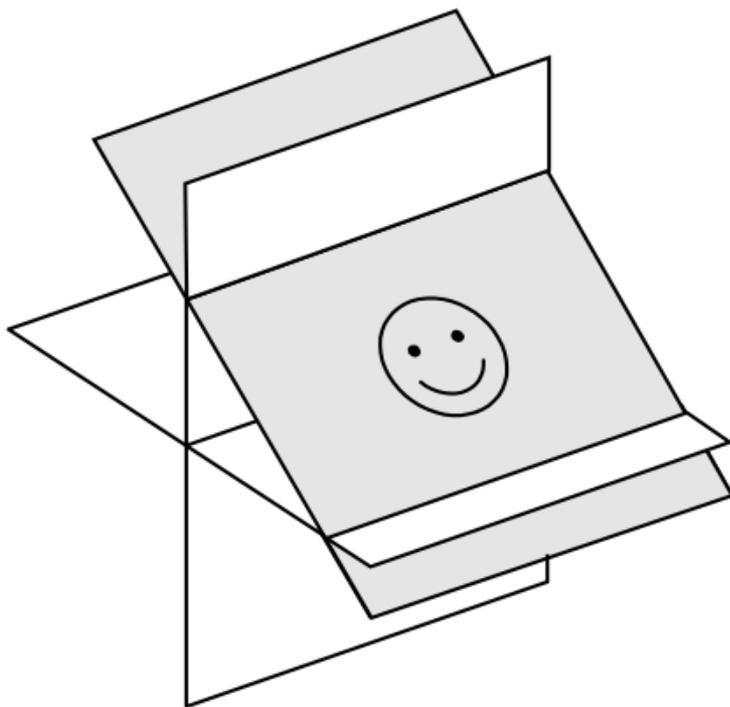
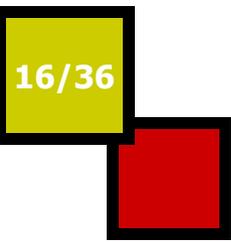


Plano Vertical

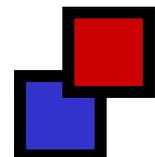
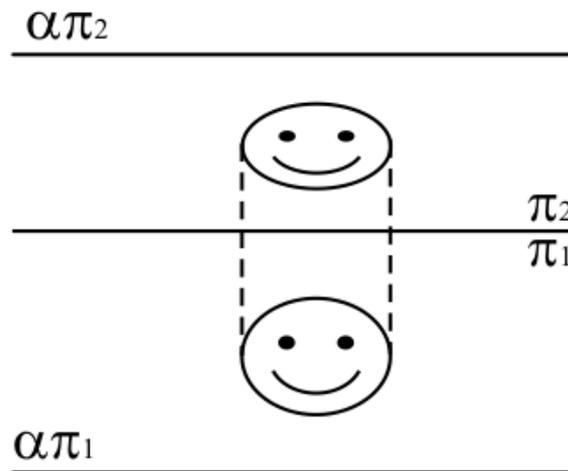


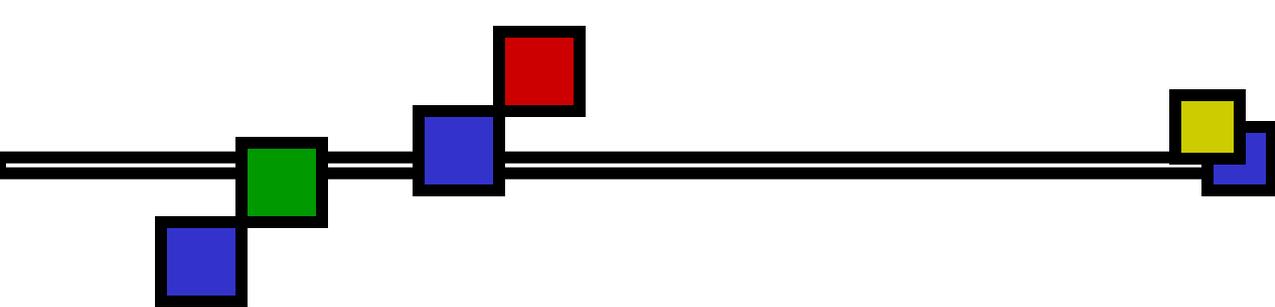


Planos em posições especiais

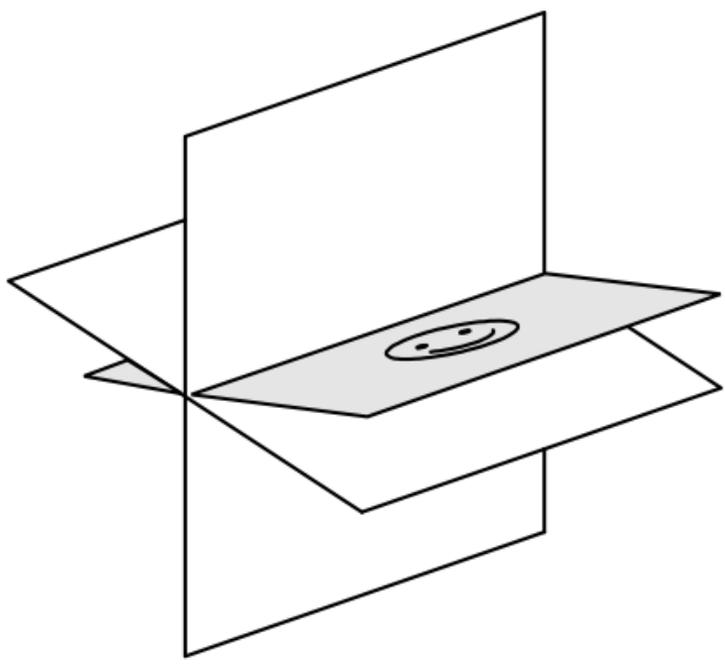
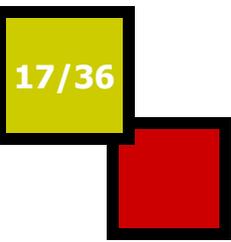


Plano paralelo à LT

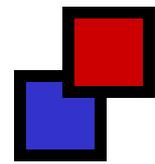
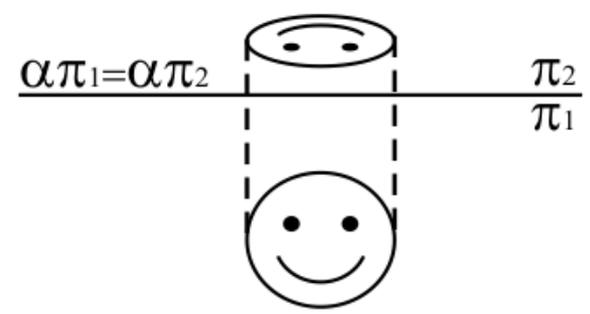


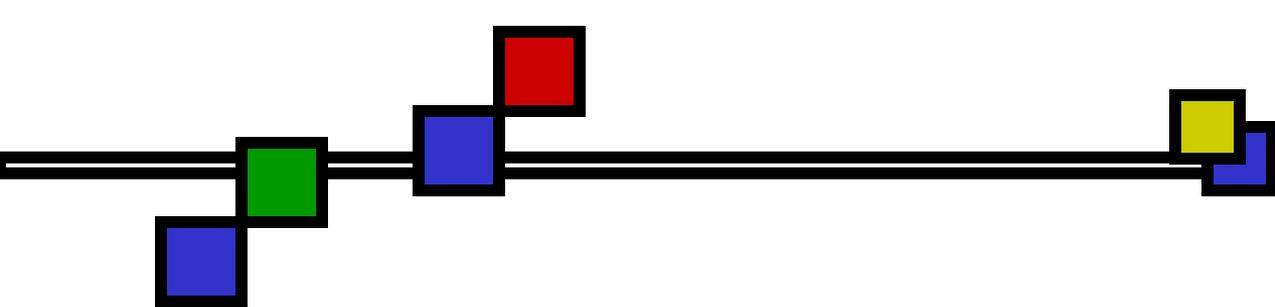


Planos em posições especiais



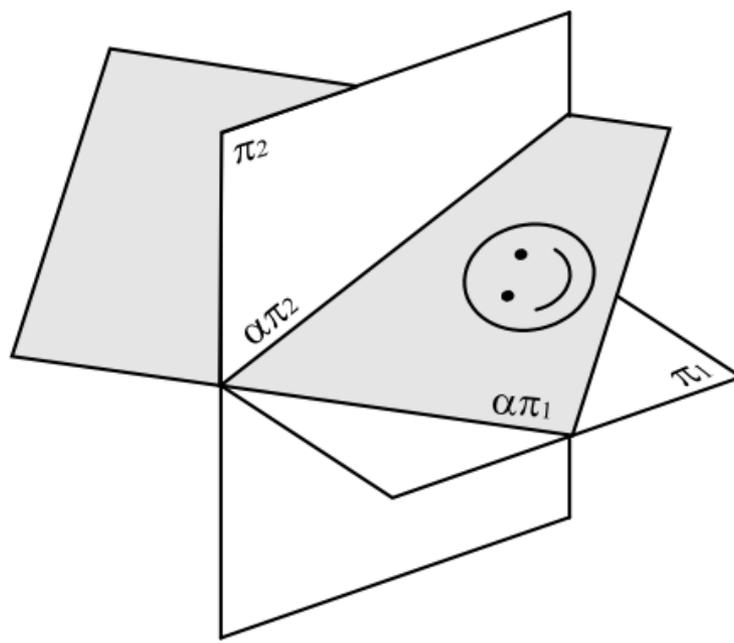
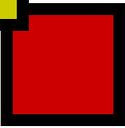
Plano que passa pela LT



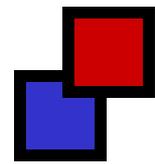
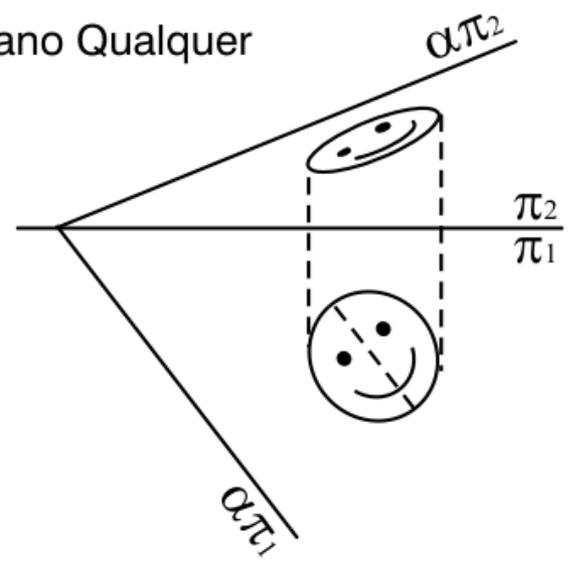


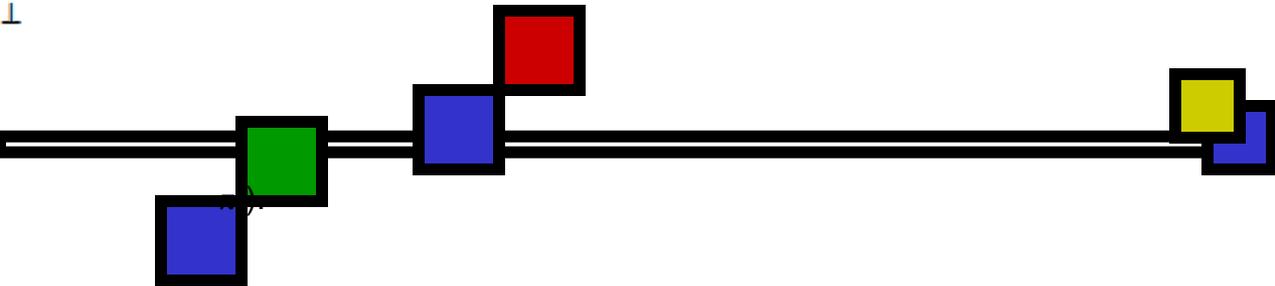
Planos em posições especiais

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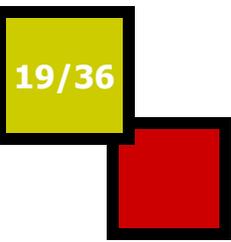


Plano Qualquer

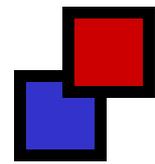




Resumindo:

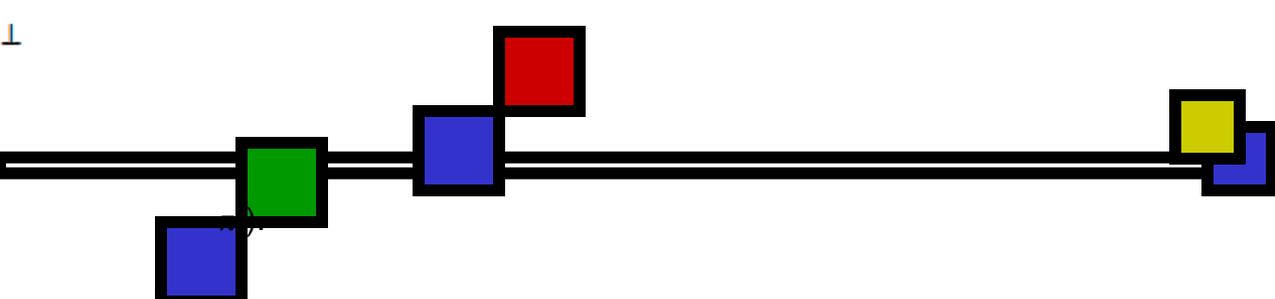


Plano α	Definição
Horizontal	$\alpha // \pi_1$
Frontal	$\alpha // \pi_2$
Vertical	$\alpha \perp \pi_1$
De Topo	$\alpha \perp \pi_2$
De Perfil	$\alpha // \pi_3$ ou $\alpha \perp \text{L.T.}$
Paralelo à Linha de Terra	$\alpha \perp \pi_3$ ou $\alpha // \text{L.T.}$
Contém a Linha de Terra	$\alpha \supset \text{L.T.}$

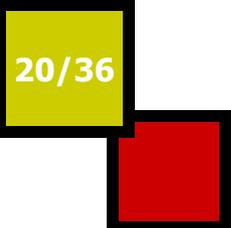


Onde:

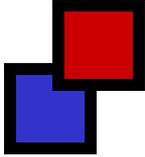
- α : plano particular;
- π_1 : plano de projeção horizontal;
- π_2 : plano de projeção vertical;
- π_3 : plano de projeção lateral ($\pi_3 \perp \pi_1$ e $\pi_3 \perp \pi_2$)



As retas especiais recebem os mesmos nomes que os planos:



Reta em posição particular	Definição
Horizontal	$h // \pi_1$
Frontal	$f // \pi_2$
Vertical	$v \perp \pi_1$
De Topo	$t \perp \pi_2$
De Perfil	$p // \pi_3$ ou $p \perp \text{L.T.}$
Paralela à Linha de Terra ou Reta Fronto-Horizontal	$\alpha \perp \pi_3$ ou $\alpha // \text{L.T.}$



Onde:

α : plano particular;

π_1 : plano de projeção horizontal;

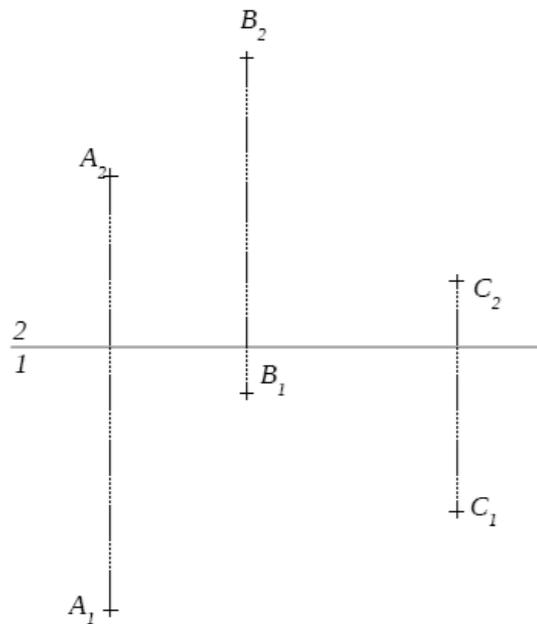
π_2 : plano de projeção vertical;

π_3 : plano de projeção lateral ($\pi_3 \perp \pi_1$ e $\pi_3 \perp \pi_2$)

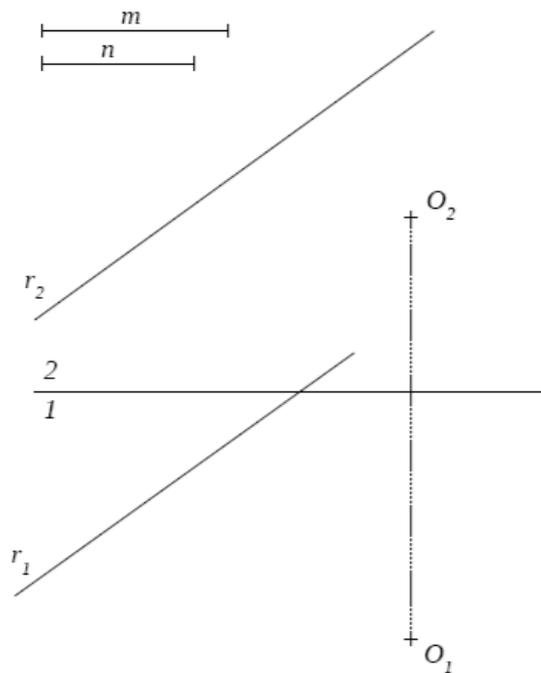
Exercício da apostila (em sala): 12

21/36

a. Dado o plano α determinado pelos pontos A , B e C traçar uma horizontal h do plano, passando pelo ponto A e uma frontal f do plano, passando pelo ponto C .



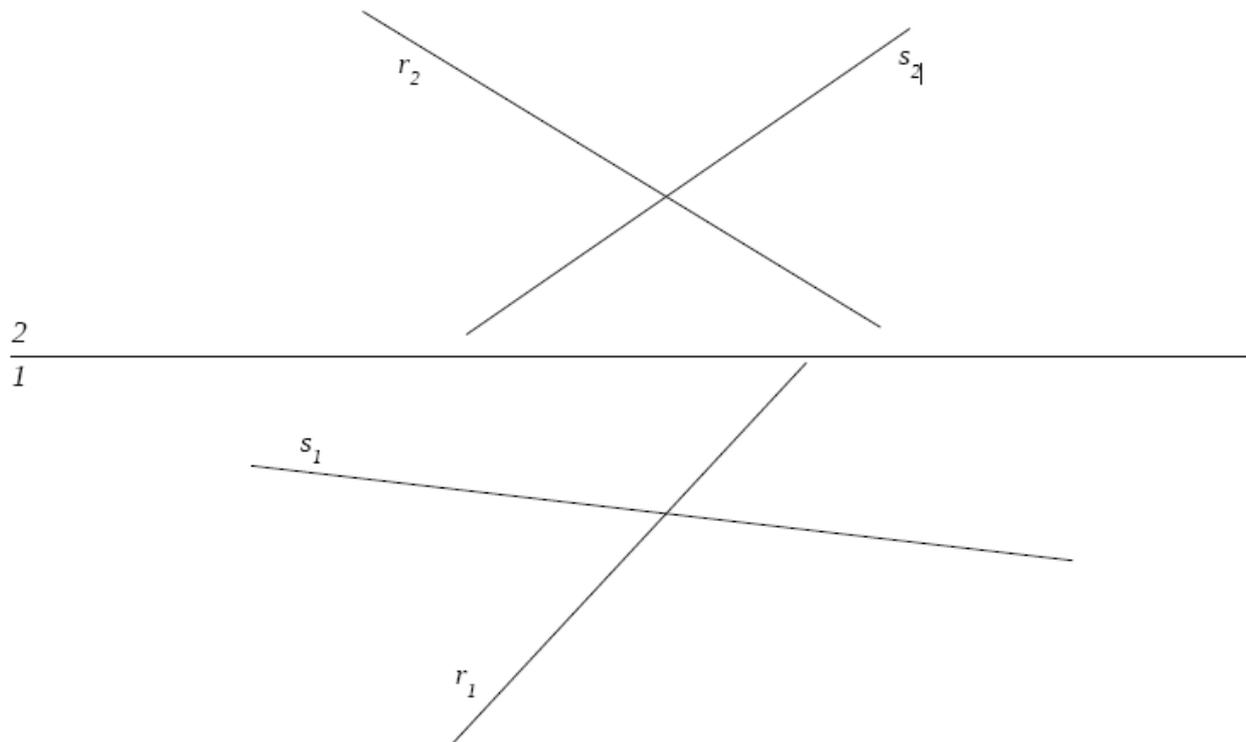
b. Dado o plano α determinado pela reta r e o ponto O traçar uma horizontal h do plano a uma distância m do π_1 e uma frontal f do plano a uma distância n do π_2 .

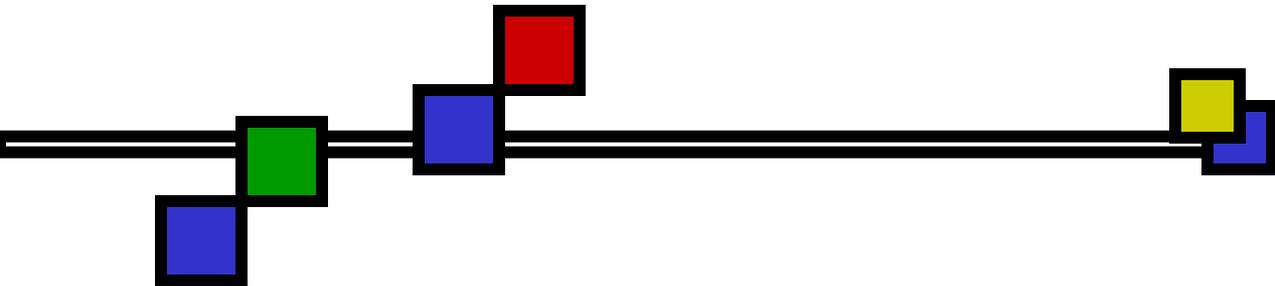


Exercício da apostila (em sala): 12

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- c. Dado o plano α formado pelas retas concorrentes r e s :
- Determine o ponto de intersecção I entre as retas r e s
 - Traçar a reta horizontal h do plano de cota igual a 10 mm
 - Traçar a reta frontal f do plano de afastamento igual a 15 mm



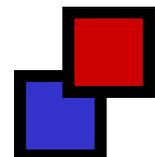
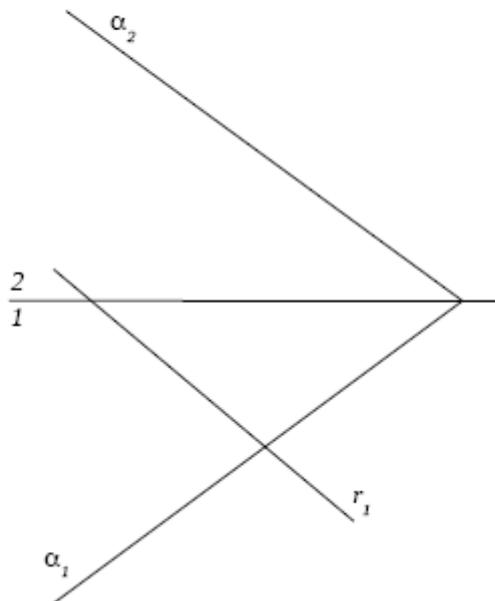


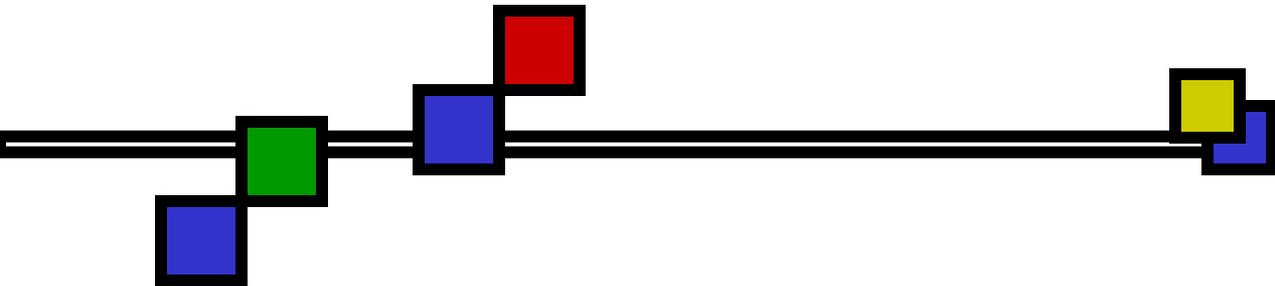
Exercício da apostila (em sala): 16

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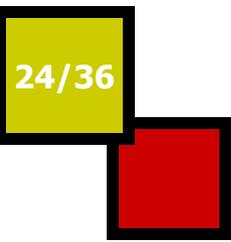
d. Dado o plano α pelos seus traços, obter a projeção que falta para que a reta esteja contida em α , sendo f uma reta frontal.

1)

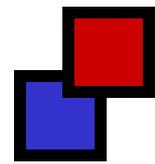
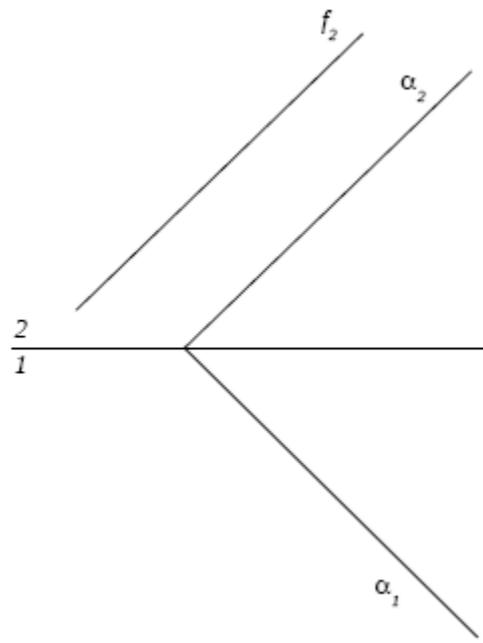


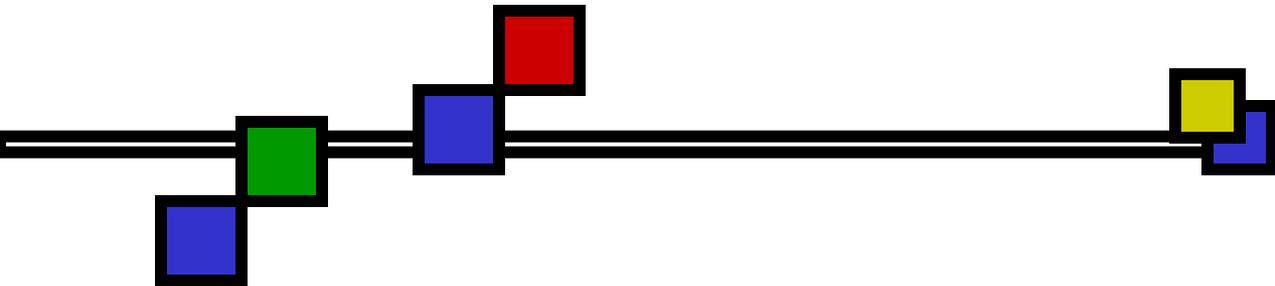


Exercício da apostila (em sala): 16



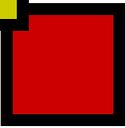
ii)



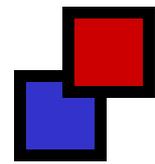


Exercício da apostila (em sala): 20

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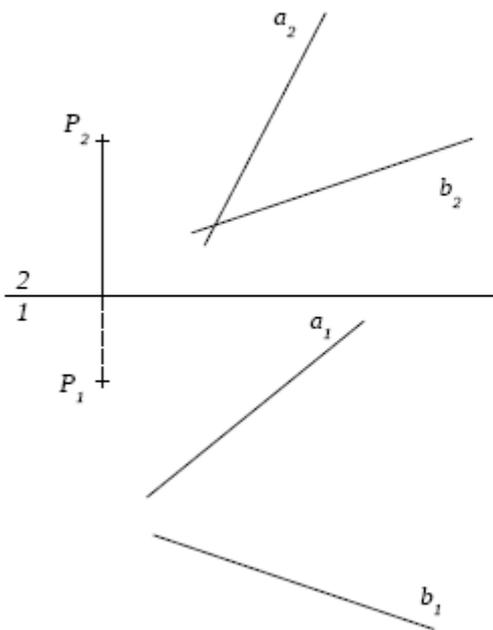
<p>a. Construir β contendo P, sendo β paralelo ao plano α.</p>	<p>b. Construir α contendo P, sendo α paralelo ao plano β.</p>
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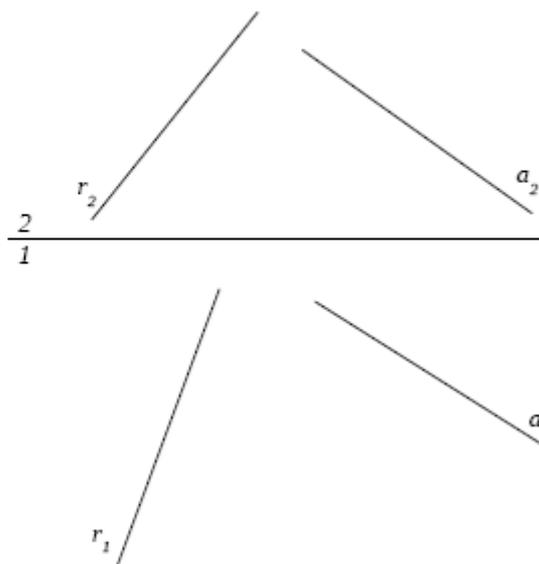
Exercício da apostila (em sala): 20

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c. Construir α , contendo P paralelo as retas reversas a e b .



d. Construir α contendo r , paralelo a reta a .

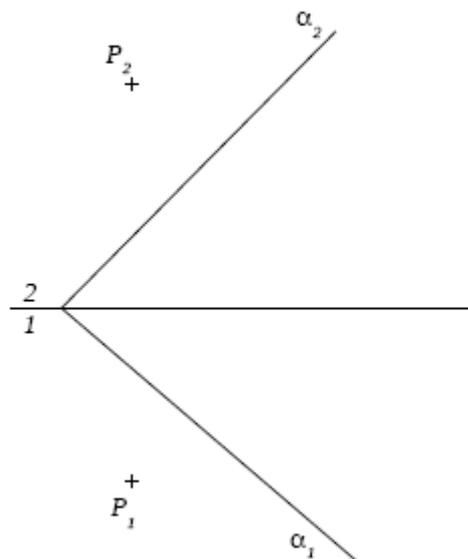


< Adaptado da Apostila de Exercícios do Professor Rubens Mamar >

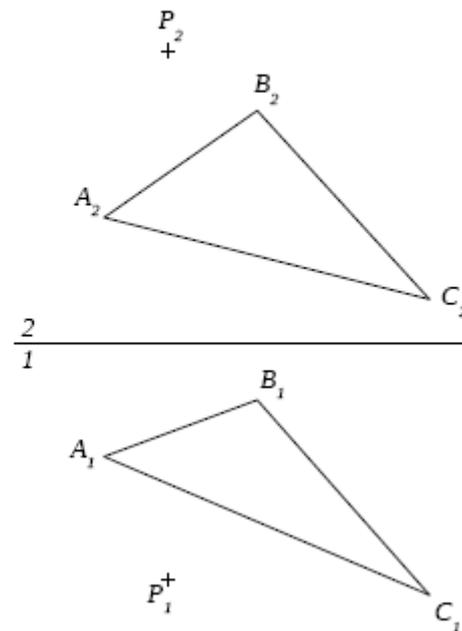
Exercício da apostila (em sala): 22

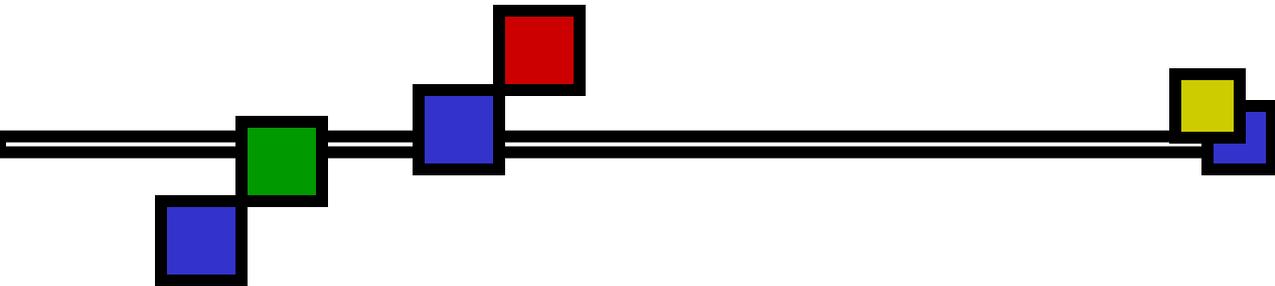
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a. Construir por P a reta r perpendicular a α .



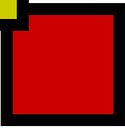
b. Construir por P a reta r perpendicular ao plano do triângulo A, B, C .



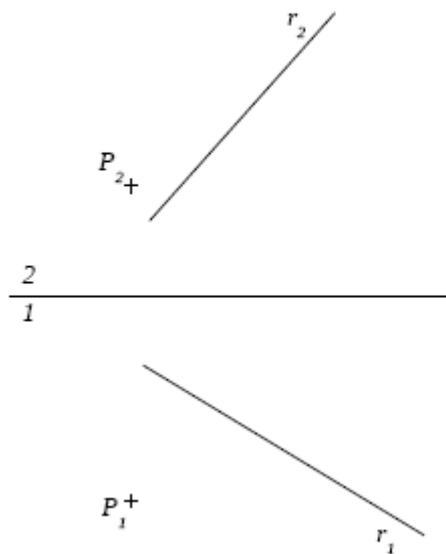


Exercício da apostila (em sala): 22

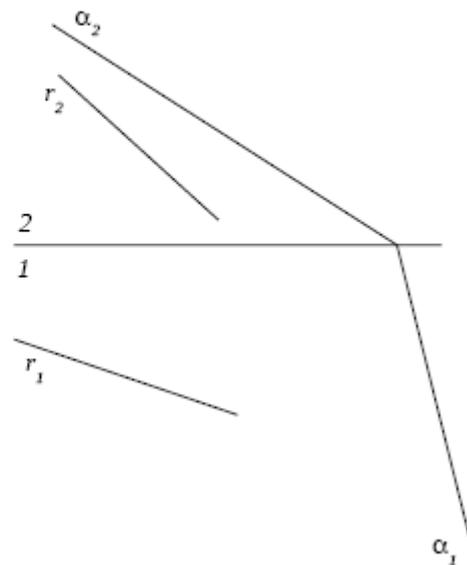
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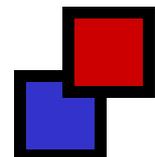
c. Determinar os traços de um plano β , passando por P , perpendicular a reta r .

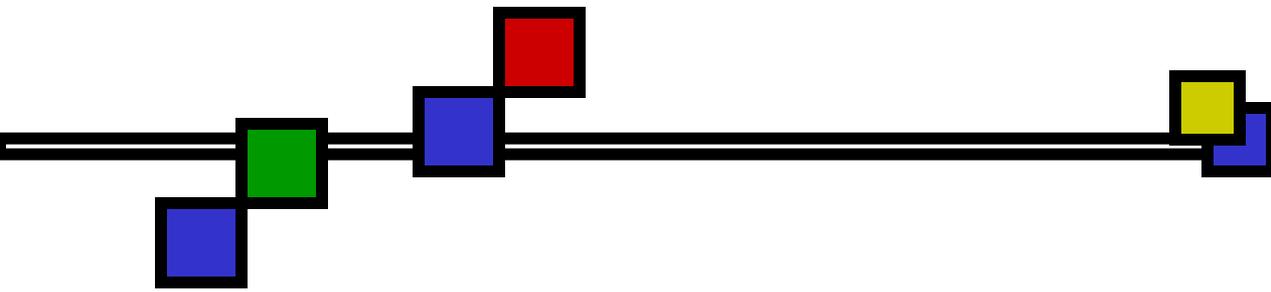


d. Construir uma reta s concorrente com a reta r , tal que o plano definido por r e s seja perpendicular ao plano α .



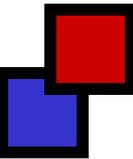
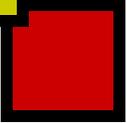
< Adaptado da Apostila de Exercícios do Professor Rubens Mamar >

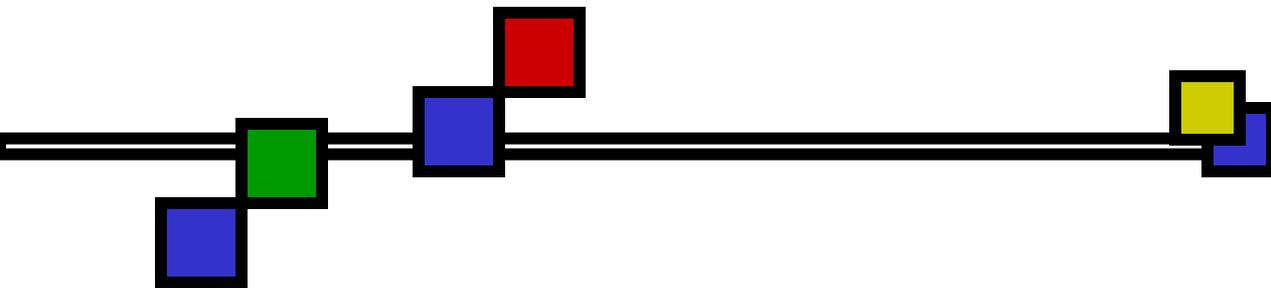




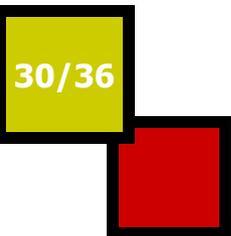
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Outros exercícios da apostila

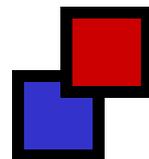


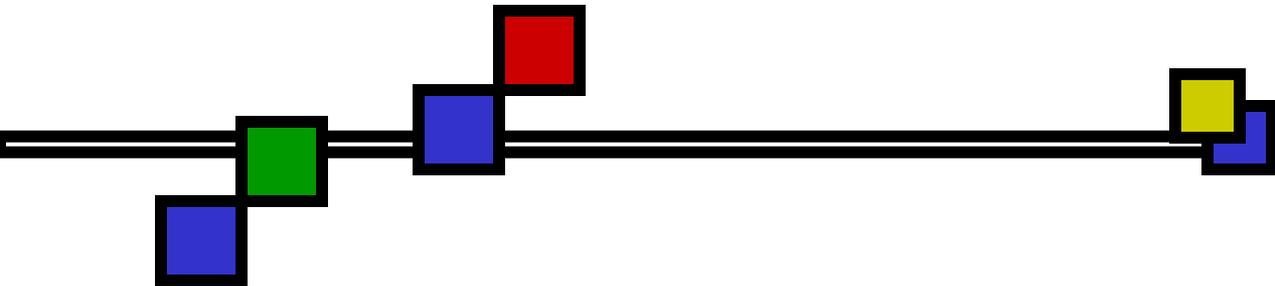


Exercício da apostila: 14a



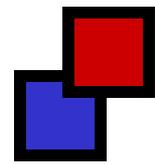
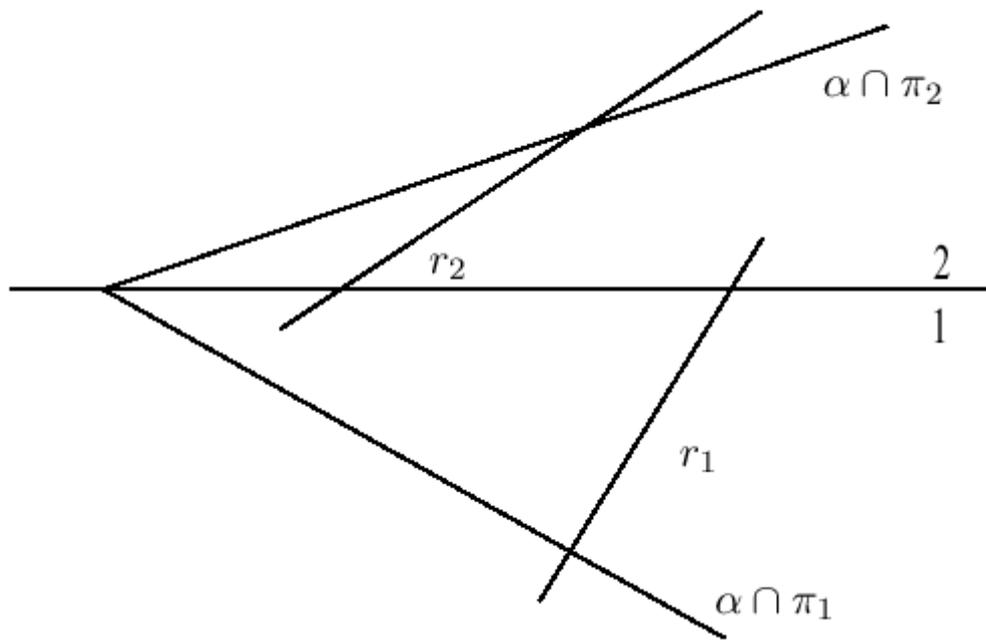
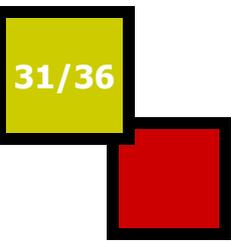
São dados três planos no espaço. Quantos e quais são os elementos resultantes das possibilidades para o resultado da intersecção entre eles? Dica: considere primeiro as possibilidades para dois planos.

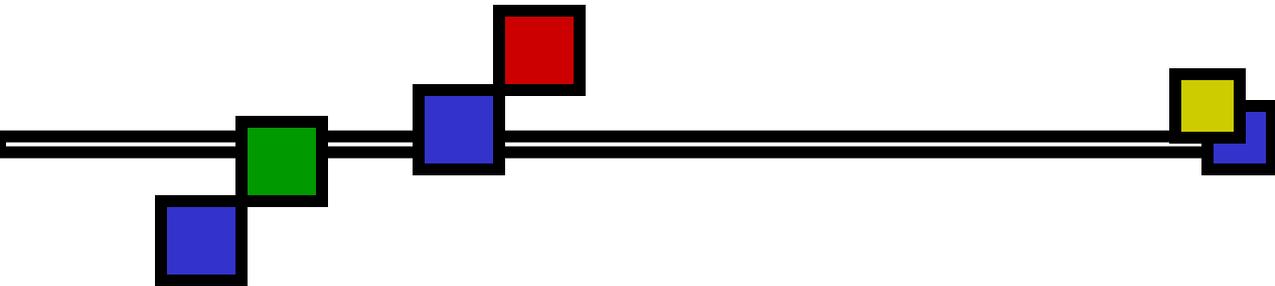




Exercício da apostila: 14b

Verifique se a reta r pertence ou não ao plano α dado por seus Traços.

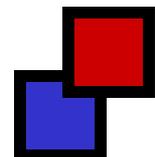
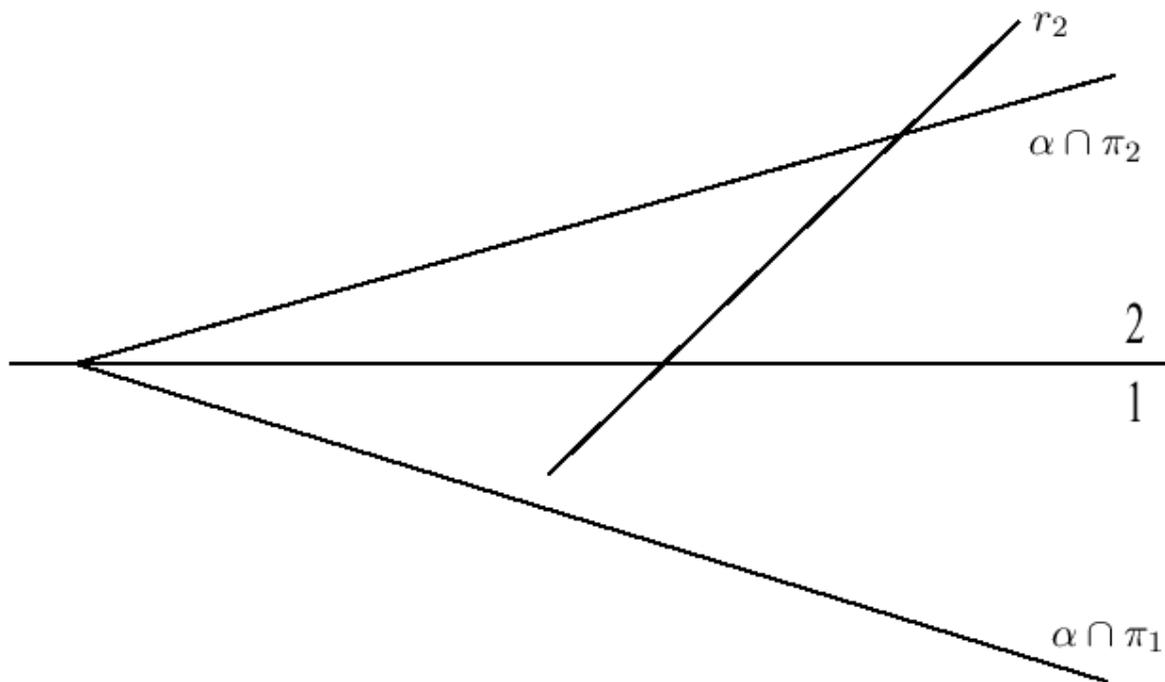


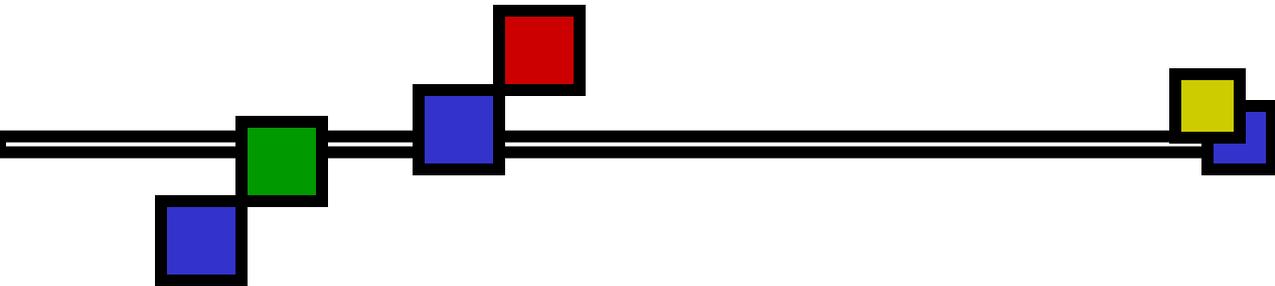


Exercício da apostila: 15a

São dados um plano α e a projeção em π_2 de $r \subset \alpha$. Determine a projeção de r em π_1 .

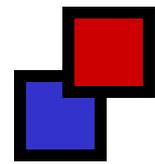
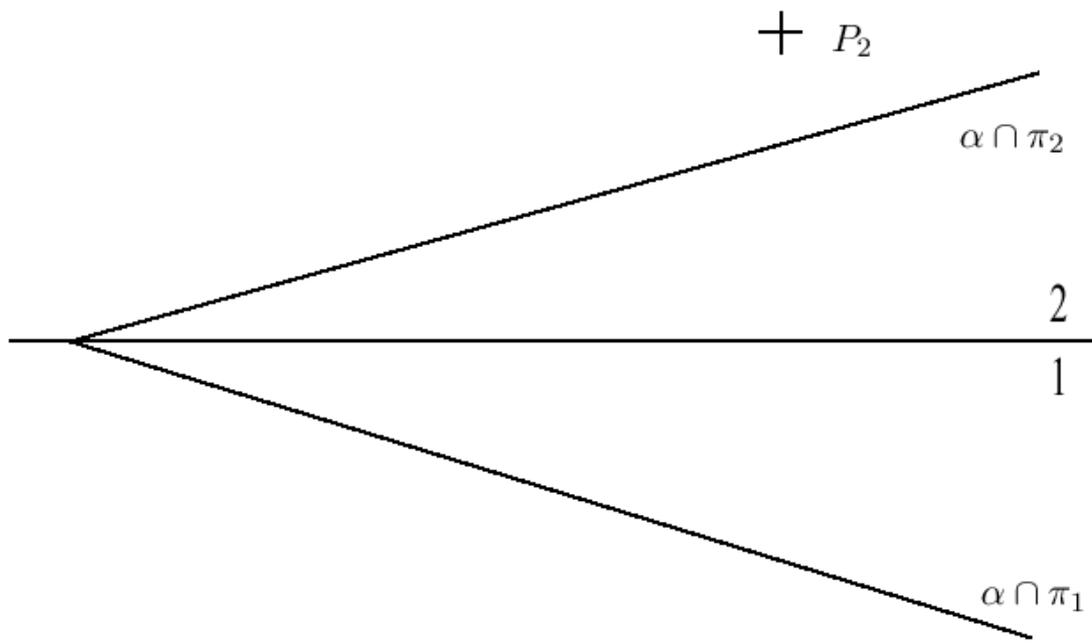
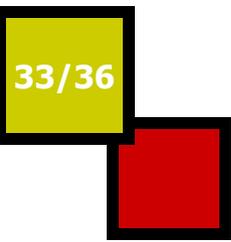
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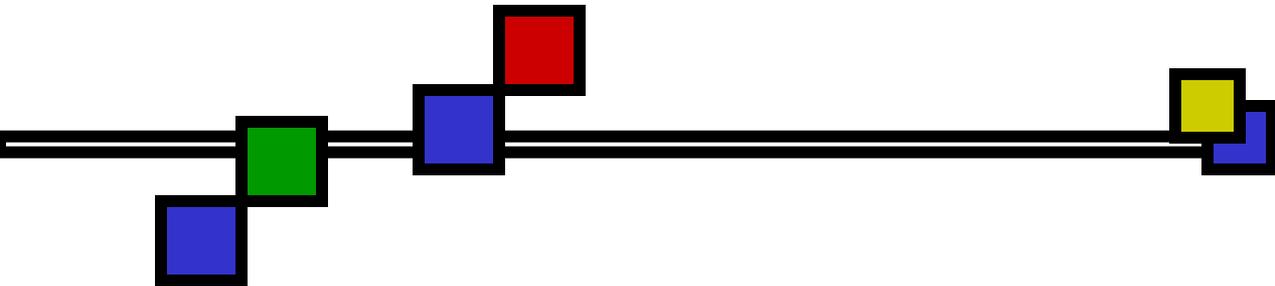




Exercício da apostila: 15b

São dados um plano α e a projeção em π_2 de $P \in \alpha$. Determine a projeção de P em π_1 .

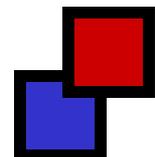
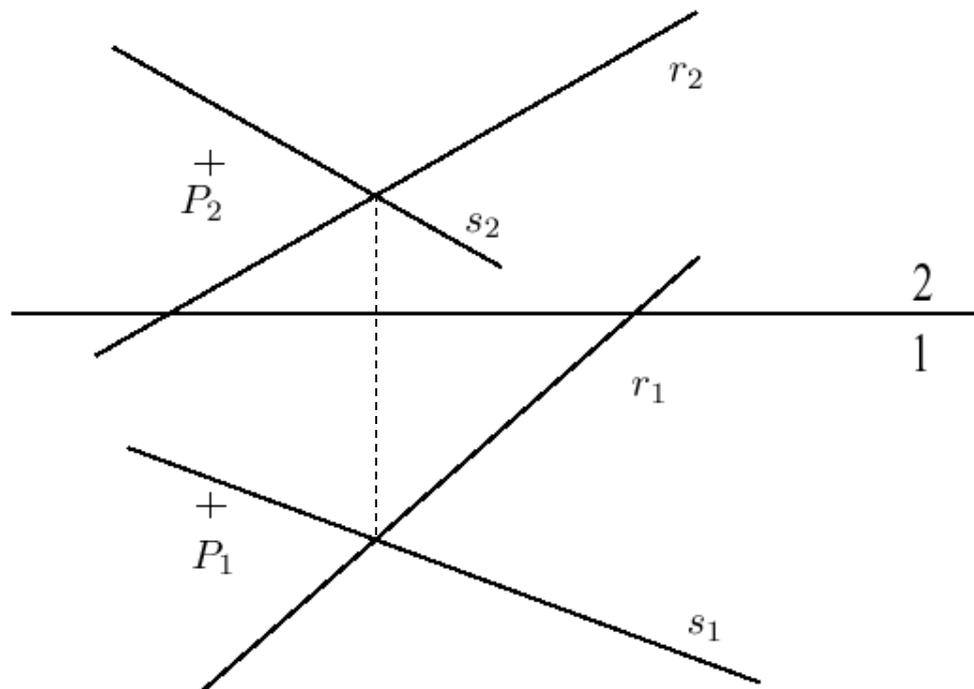


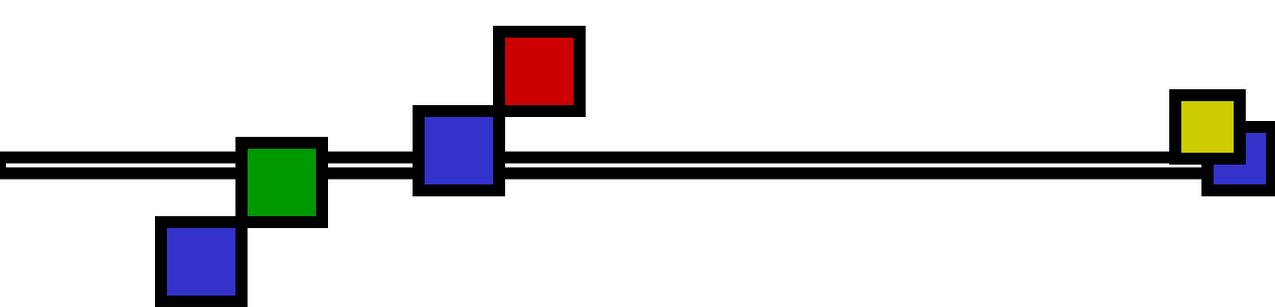


Exercício da apostila: 17a

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Verifique se o ponto P pertence ou não ao plano α definido pelas retas concorrentes r e s .





Exercício

Determinar a reta r , normal ao plano α , que passa por $P \in \alpha$.

