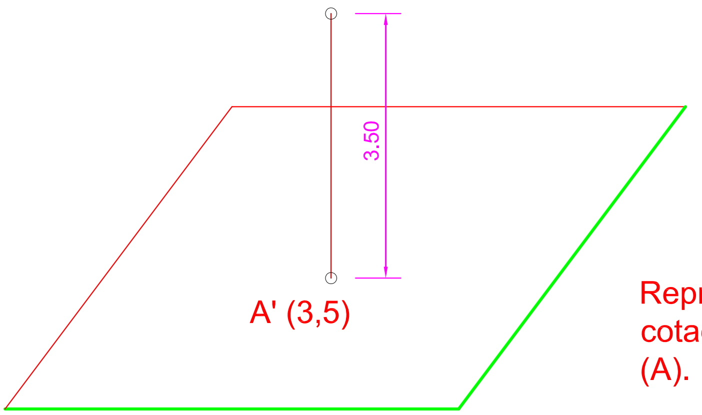
UNIDADE I - MÉTODO DAS PROJEÇÕES COTADAS.

(Fellipe Büache - 1737)

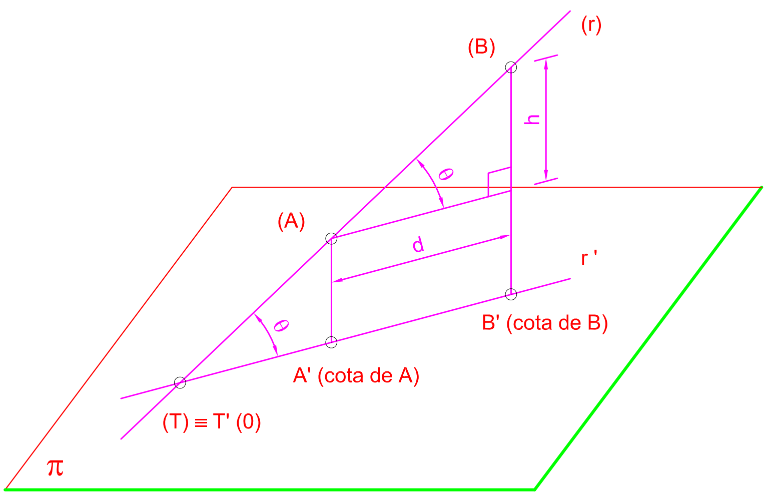


A' (3,5)

Representação plana, projeção cotada do ponto (A) ou épura de (A).

REPRESENTAÇÃO ESPACIAL:

π - plano de projeção
(A) - ponto objetivo
A' (3,5) - projeção cotada de (A)



$p = h/d = tg\ \theta$
$i = d/h = cotg\ \theta$

θ - ângulo de inclinação de (r)
h - distância vertical entre (A) e (B)
d - distância horizontal entre (A) e (B)
p - declividade de (r)
i - intervalo de (r)

quando h=1, temos :

$p = 1/i$ e $i = 1/p$,
$p = 1/d$ e $i = d$

1) Representar:
a) (A), sabendo-se que sua cota é de 4 m;
b) (B), sabendo-se que (B) $\in \pi$;
c) (C), sabendo-se que (C) tem cota igual a -15 m.
Unidade gráfica; 0,01 m.

2) Representar:
a) (D) [2; 4; -5]
b) (E) [- 1; -2; 5]
c) (F) [0; 2; 3]
Escala gráfica: 1/100

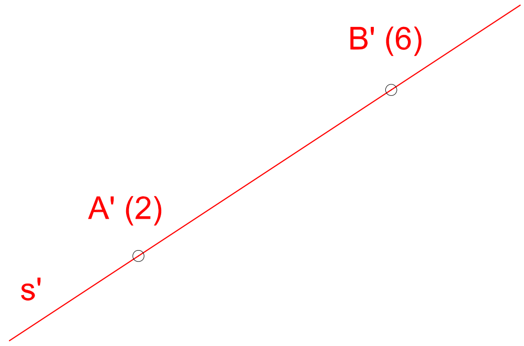
3) Representar (R) e (S), sabendo-se que as distâncias horizontal e vertical entre os dois pontos medem, respectivamente, 30 m e 20 m. Determine a distância objetiva entre (R) e (S).
Escala gráfica: 1/1000.

4) Representar:
a) (h), sabendo-se que p(h) = 0;
b) (v), sabendo-se que i(v) = 0;
c) (s), sabendo-se que p(s) = 25 %;
d) (t), sabendo-se que p(t) = 2/3.
Escala gráfica: 1/100.

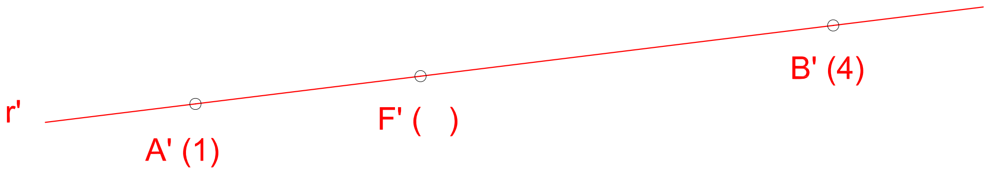
5) Determinar:
a) $\theta(m)$ =
b) i (m) =
c) p(m) =
Escala gráfica: 1/100.

6) Representar (E) $\in$ (s), sabendo-se que (E) tem cota 4,7 m.

7) Determinar o ângulo de inclinação, o intervalo e a declividade de (s).
Escala gráfica: 1/100.

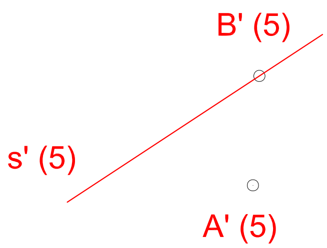


8) Determinar a cota de (F) $\in$ (r). Unidade gráfica: 0,01 m.

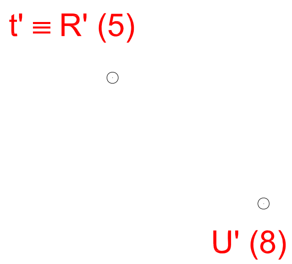


9) 10) 11) Fazer a leitura simbólica da posição das retas em relação a π e da pertinência dos pontos às retas representadas. Escala gráfica: 1/100.

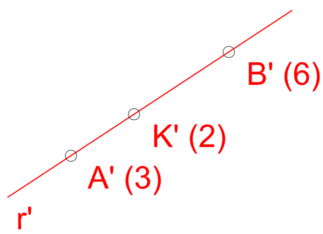
9)



10)



11) (A) $\in$ (r)
(B) $\in$ (r)



12) Representar (m), sabendo-se que o ângulo de inclinação de (m) é de 60°.
Unidade gráfica: 0,01 m.

13) Representar (s), sabendo-se que o ângulo de inclinação de (s) é de 45°.
Unidade gráfica: 0,03 m.

14) Definir:

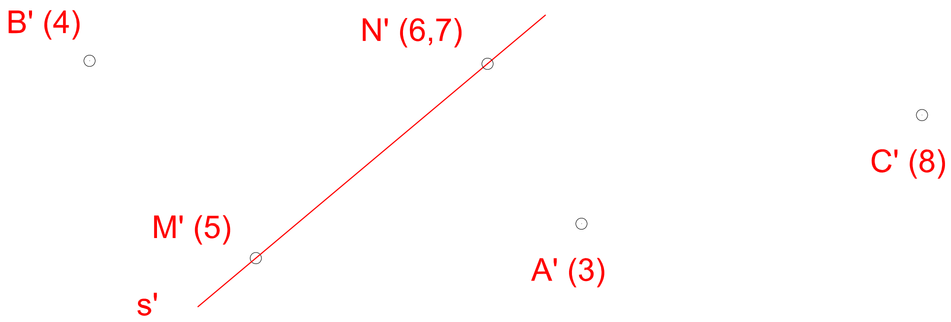
a) Escala, Escala numérica, escala gráfica e unidade de escala.

b) Distância horizontal, distância vertical e distância objetiva entre dois pontos.

c) Cota de um ponto.

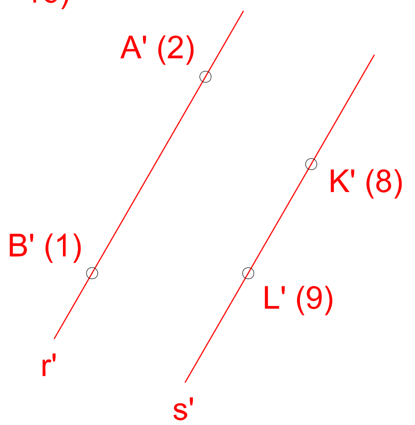
d) Ângulo de inclinação, declividade e intervalo de uma reta.

15) Representar: a) (s1) // (s), sabendo-se que (A) ∈ (s1);
b) (r) ⊥ (s), sabendo-se que (B) ∈ (r);
c) (t) ⊥ (s), sabendo-se que (C) ∈ (t). Escala: 1/100



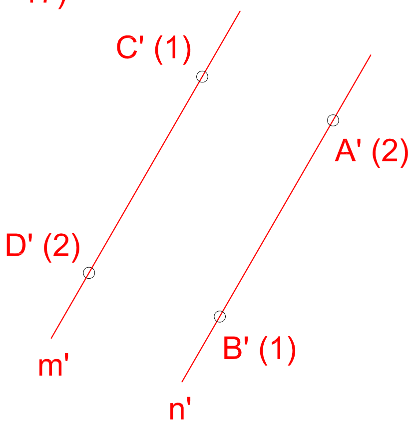
Verificar nas questões 16 à 24 as posições relativas das retas representadas.
Escala: 1/50.

16)



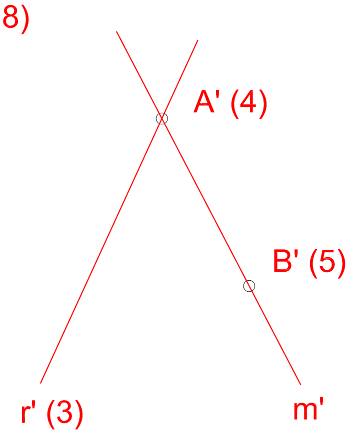
(r) (s)

17)



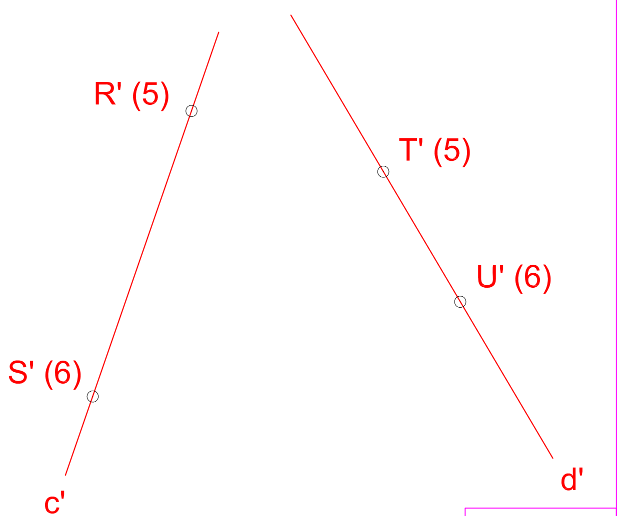
(m) (n)

18)



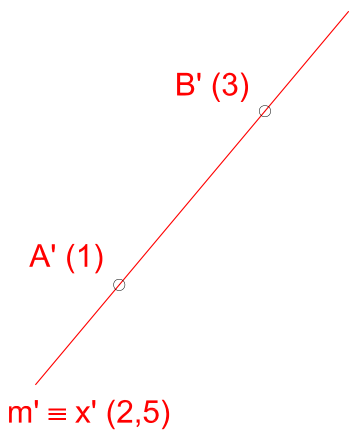
(m) (r)

19)



(c) (d)

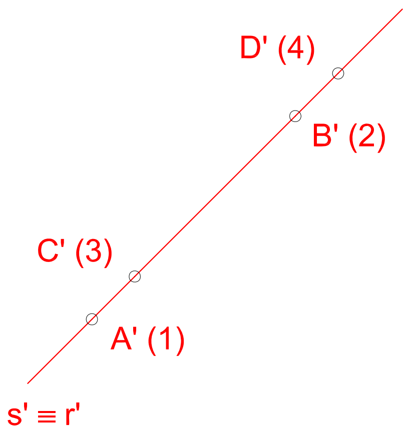
20) (A) ∈ (m)
(B) ∈ (m)



(x) (m)

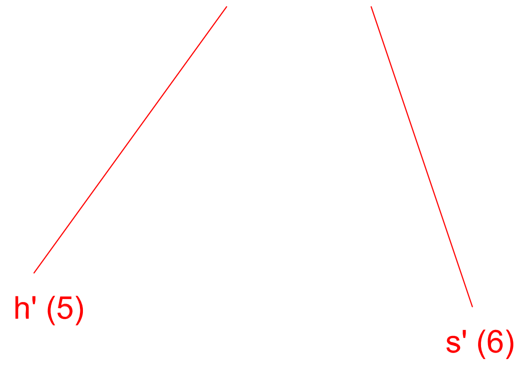
21)

(A) ∈ (s)
(B) ∈ (s)
(C) ∈ (r)
(D) ∈ (r)



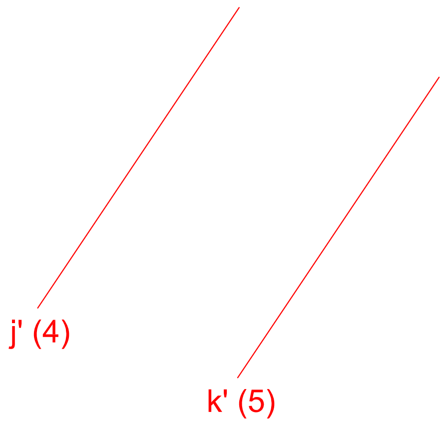
(s) (r)

22)



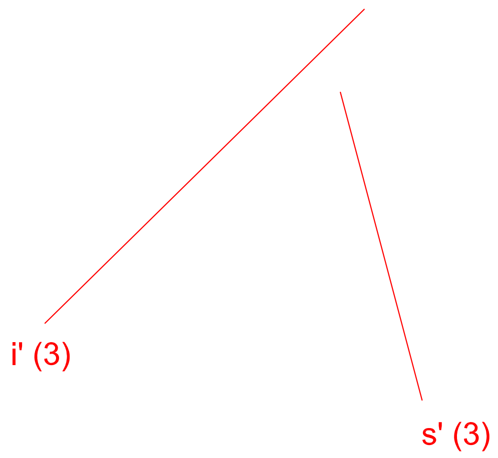
(h) (s)

23)



(j) (k)

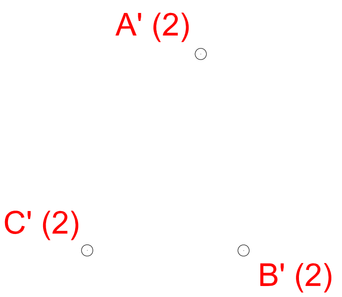
24)



(s) (i)

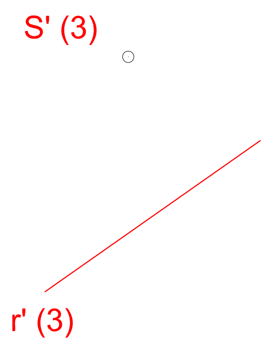
Fazer a leitura simbólica da posição dos planos em relação à π nas questões 25 à 42.
Escala: 1/100.

25) $\alpha \equiv$ plano (A; B ; C)



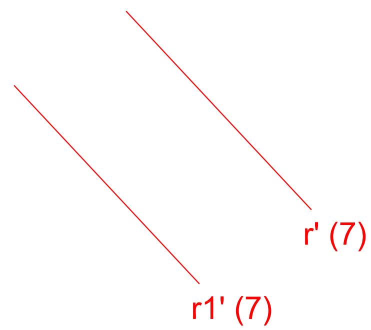
(α) (π)

26) $\beta \equiv$ plano (r; S)



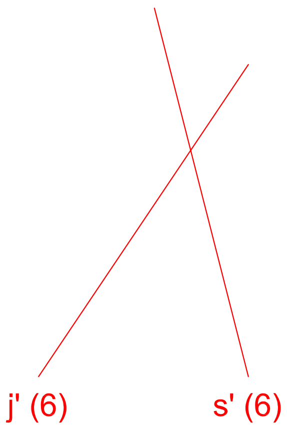
(β) (π)

27) $\delta \equiv$ plano (r; r1)



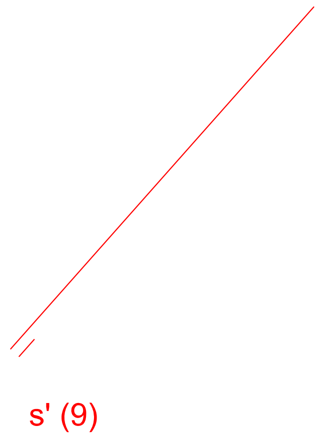
(δ) (π)

28) $\gamma \equiv$ plano (j ; s)



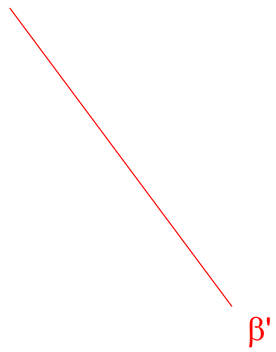
(γ) (π)

29) $\alpha \equiv$ plano (s)



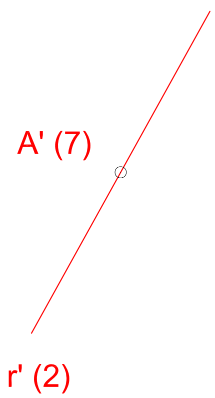
(α) (π)

30)



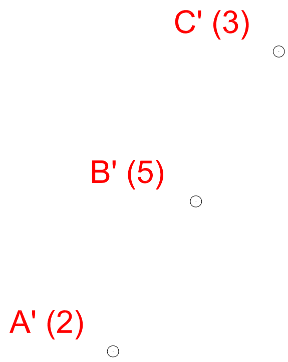
(β) (π)

31) $\lambda \equiv$ plano (A; r)



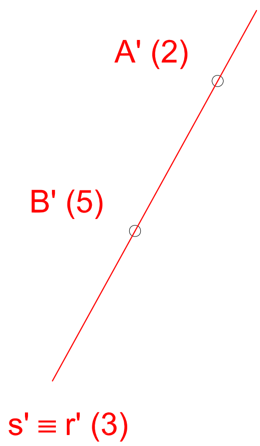
(λ) (π)

32) $\omega \equiv$ plano (A; B; C)



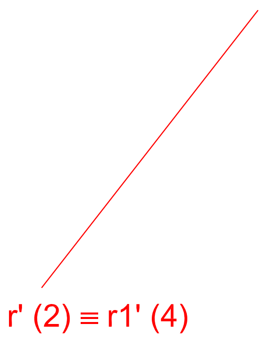
(ω) (π)

33) $\delta \equiv$ plano (r; s)



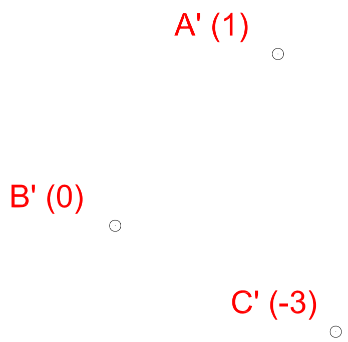
(δ) (π)

34) $\gamma \equiv$ plano (r; r1)



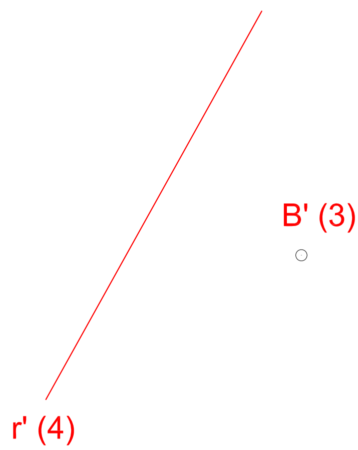
(γ) (π)

35) $\alpha \equiv$ plano (A; B; C)



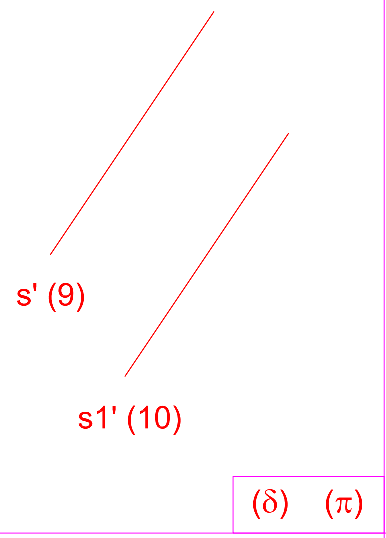
(α) (π)

36) $\beta \equiv$ plano (r; B)

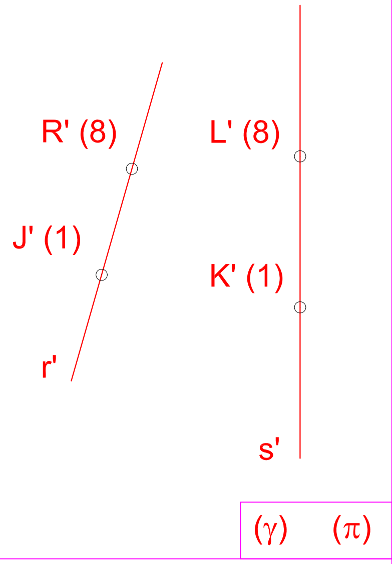


(β) (π)

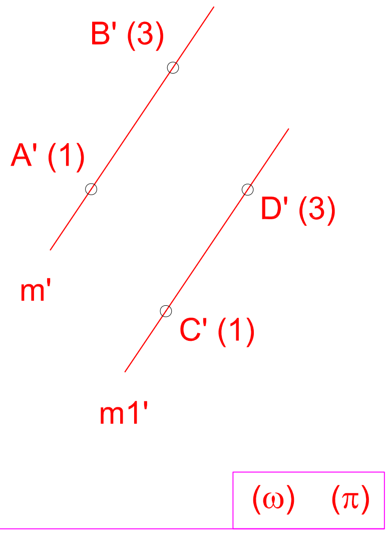
37) $\delta \equiv$ plano (s ; s1)



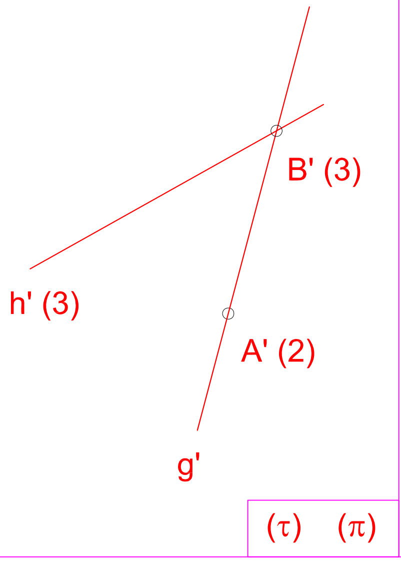
38) $\gamma \equiv$ plano (r; s)



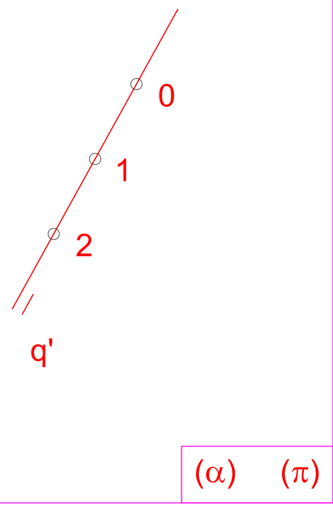
39) $\omega \equiv$ plano (m ; m1)



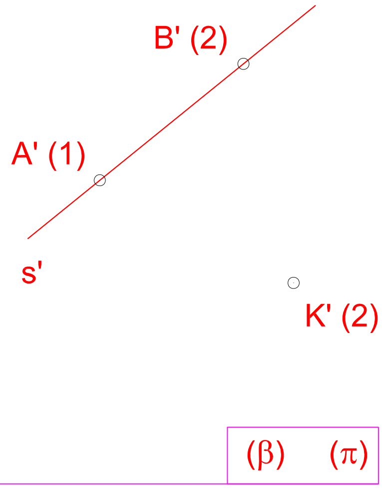
40) $\tau \equiv$ plano (g; h)



41) $\alpha \equiv$ plano (q)



42) $\beta \equiv$ plano (K; s)



43) Representar δ, sabendo-se que $p\delta = 0$, e possui cota igual a 5 m.

Escala: 1/125

44) Representar α, sabendo-se que $i\alpha = 0$.

Escala: 1/50

45) Representar β, sabendo-se que $p\beta = 1/3$.

Escala: 1/125

46) Representar γ, sabendo-se que $p\gamma = 25$ %.

Escala: 1/200

47) Dado $\alpha \equiv$ plano (A;B;C):

a) representar a escala de declividade (q) de (α);

b) determinar θ (α), p (α) e i (α).

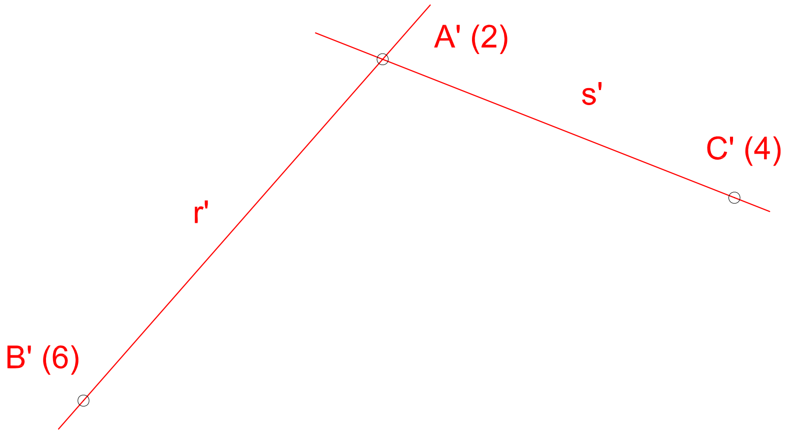
θ (α) =
p (α) =
i (α) =

Unidade gráfica: 0,005 m

48) Dado $\delta \equiv$ plano (r;s):

a) representar a escala de declividade (q) de (δ);

b) determinar θ (δ), p (δ) e i (δ).



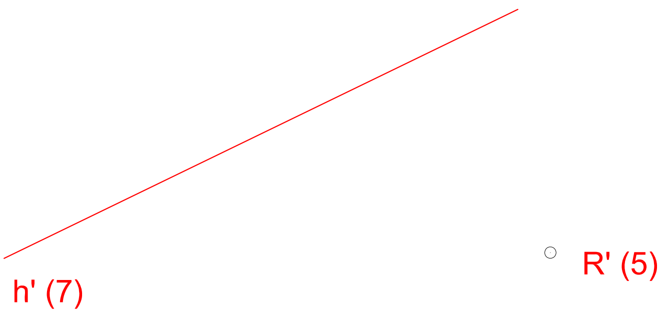
θ (δ) =
p (δ) =
i (δ) =

Escala: 1/50

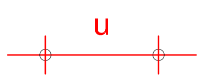
49) Dado $\beta \equiv$ plano (R;h):

a) representar a escala de declividade (q) de (β);

b) determinar θ (β), p (β) e i (β).



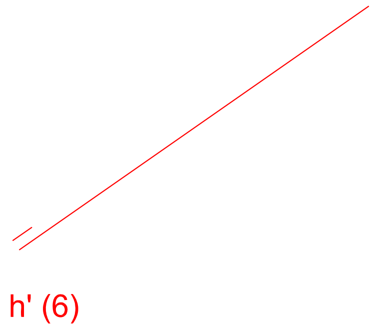
θ (β) =
p (β) =
i (β) =



50) Dado $\alpha \equiv$ plano (h):

a) representar (A) $\in$ (α);

b) (s) $\subset$ (α).



Unidade gráfica: 0,01 m

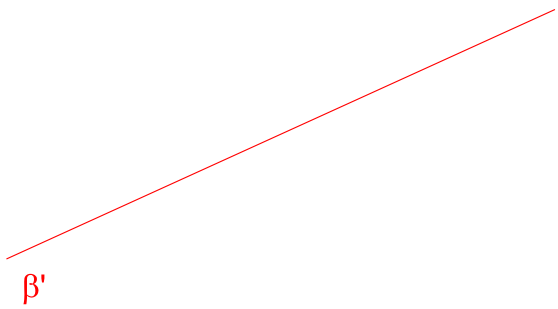
51) Representar:

a) (B) $\in$ (β), sabendo-se que (B) possui cota -8 m;

b) (r) $\in$ (β), sabendo-se que (r) possui cota 3 m;

c) (s) $\in$ (β), sabendo-se que i (s) = 1/2;

d) (t) $\in$ (β), sabendo-se que (t) $\perp$ (π).

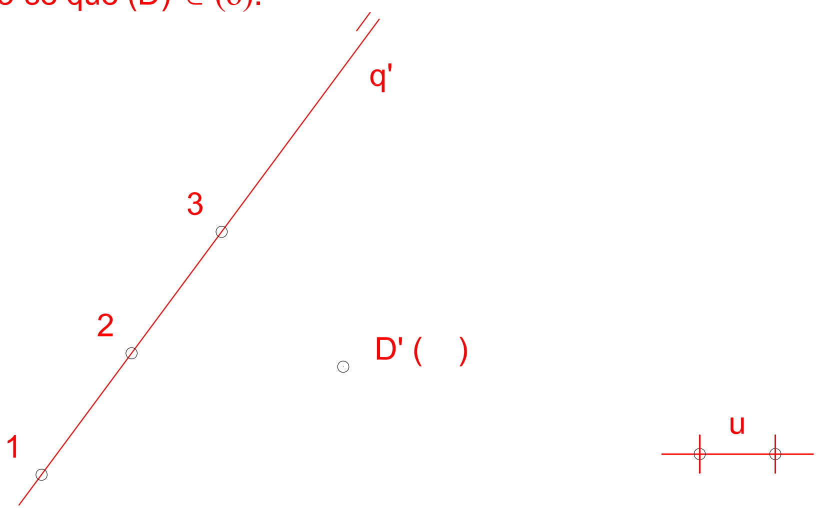


Unidade gráfica: 2 cm

52) Dado $\delta \equiv$ plano (q):

a) representar (C) $\in$ (δ), sabendo-se que (C) possui cota 3,5 m e que (C) $\notin$ (q);

b) ler a cota de (D), sabendo-se que (D) $\in$ (δ).



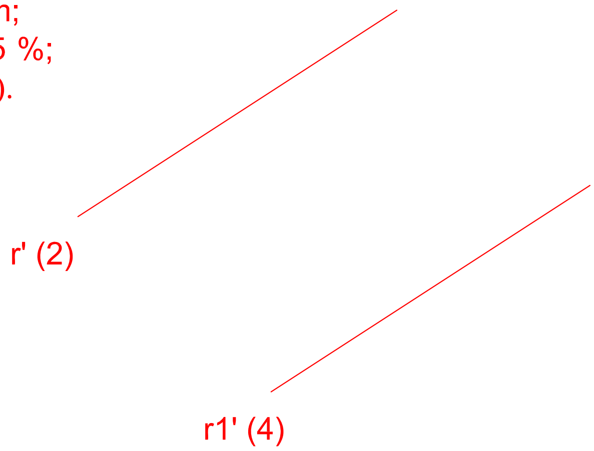
53) Dado α ≡ plano (r ; r1), representar;

a) (s) ∈ (α), sabendo-se que (s) possui cota 2,7;

b) (x) ∈ (α), sabendo-se que i (x) = 3 m;

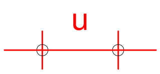
c) (u) ∈ (α), sabendo-se que p (u) = 25 %;

d) (t) ∈ (α), sabendo-se que i (t) = i (α).

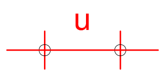


Escala: 1/100

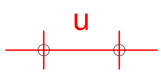
54) Representar (α), sabendo-se que o ângulo de inclinação de (α) é 30°.



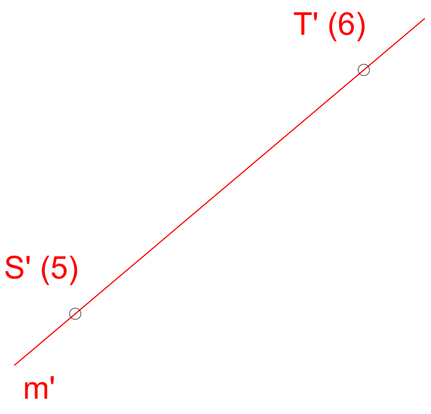
55) Representar (β), sabendo-se que o ângulo de inclinação de (β) é 75°.



56) Representar (γ), sabendo-se que o ângulo de inclinação de (γ) é 45°.

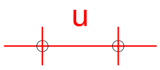


57) Representar (δ), sabendo-se que (m) ∈ (δ) e que p (δ) = 1/4.



Escala: 1/200

58) Dado $\alpha \equiv$ plano (h), representar (r)$\perp$(α), sabendo-se que (A) $\in$ (r).

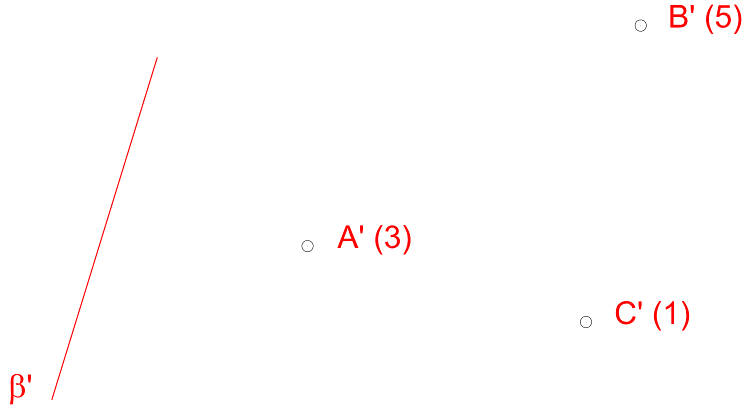


59) Representar:

a) (r) // β, sabendo-se que (A) $\in$ (r) e que p(r) = 0;

b) (s) // β, sabendo-se que (B) $\in$ (s) e que i(s) = 3;

c) (t) // β, sabendo-se que (t) $\perp$ (π) e que (C) $\in$ (t).



Escala: 1/100

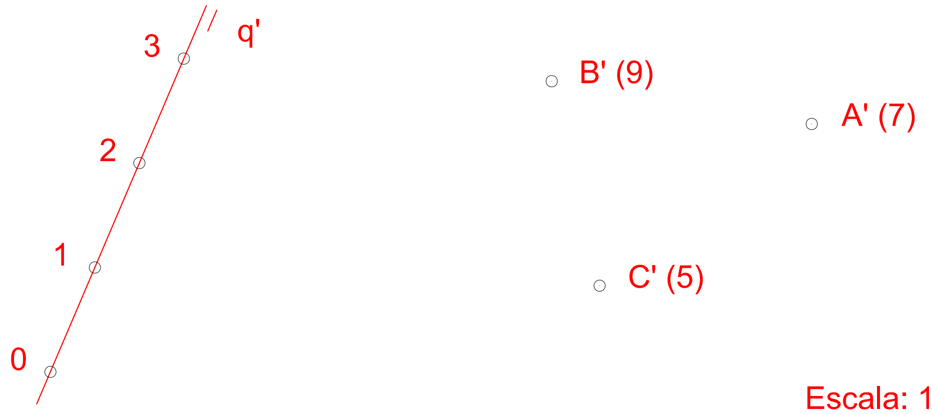
60) Dado $\delta \equiv$ plano (q), representar:

a) (r) // δ, sabendo-se p (r) = 1/3 e que (A) $\in$ (r);

b) (s) // δ, sabendo-se que (B) $\in$ (s) e que (s) // (π);

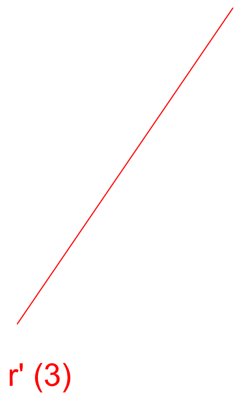
c) (t) // δ, sabendo-se que (t)$\perp$(π);

d) (u) // δ, sabendo-se que (C) $\in$ (u) e que p (δ) = p (u).



Escala: 1/100

61) Representar (α) // (r).

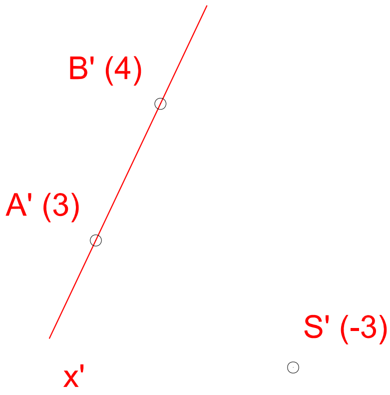


Escala: 1/100

62) Representar (β) // (s), sabendo-se que (R) $\in (\beta)$.

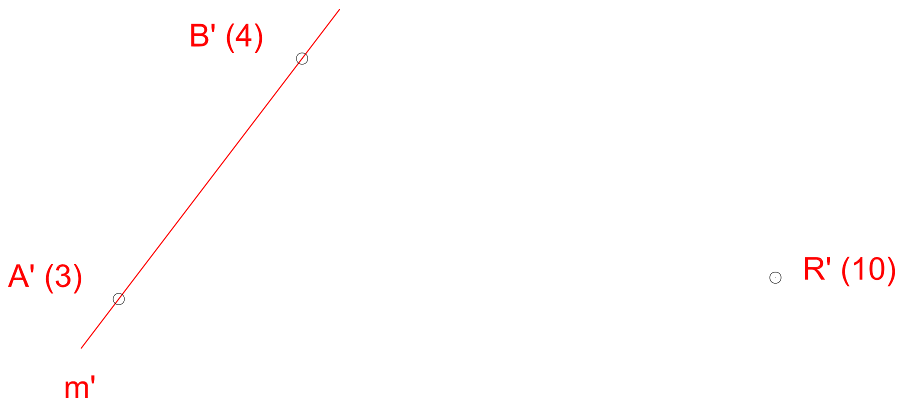
Escala: 1/100

63) Representar (γ) // (x), sabendo-se que $(\gamma) \perp (\pi)$ e (S) $\in (\gamma)$.



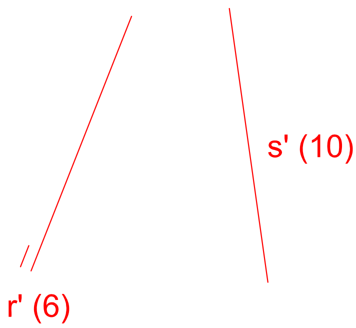
Escala: 1/100

59) Representar (δ) // (m), sabendo-se que p (δ) = 1/2 e que (R) $\in (\delta)$.



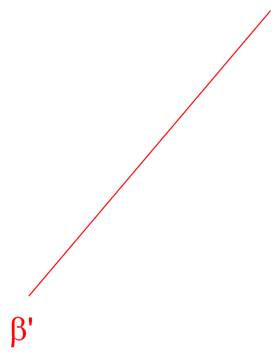
Escala: 1/100

65) Representar $\alpha 1$ // α, sabendo-se que (s) $\in \alpha 1$.



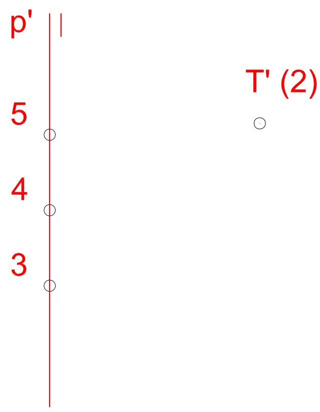
Escala: 1/100

66) Representar $\beta 1$ // β.



Escala: 1/125

67) Representar $\delta 1$ // δ, sabendo-se que (T) $\in \delta 1$.

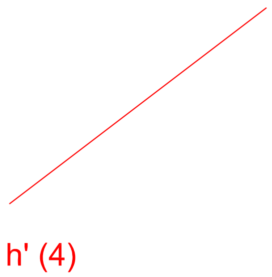


Escala: 1/50

68) Representar:

a) (s) $\perp$ (h), sabendo-se que (s) // (π);

b) (x) $\perp$ (h), sabendo-se que (x) // (π).

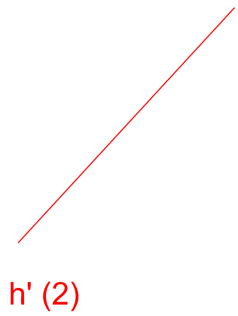


Escala: 1/100

69) Representar:

a) (t) $\perp$ (h), sabendo-se que p (t) = 1/5;

b) (u) $\perp$ (h), sabendo-se que i (u) = 3.

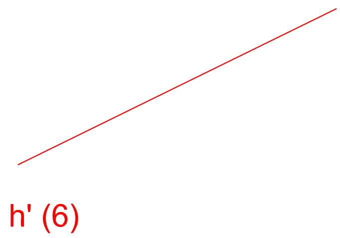


Escala: 1/125

70) Representar:

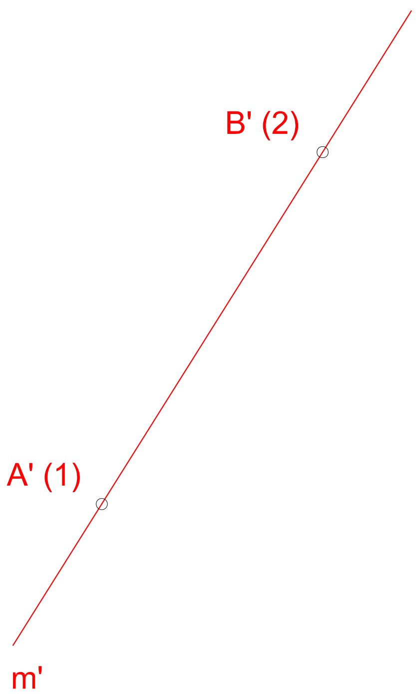
a) (v) $\perp$ (h), sabendo-se que i (v) = 0;

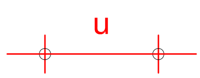
b) (t) $\perp$ (h), sabendo-se que i (t) = 0.



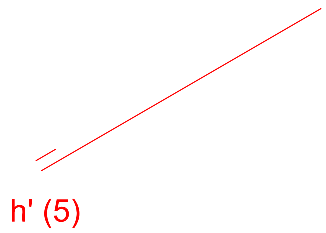
Escala: 1/50

71) Representar: a) (s) $\perp$ (m), sabendo-se que (s) $\angle$ (π);
b) (x) $\perp$ (h), sabendo-se que (x) $\angle$ (π).



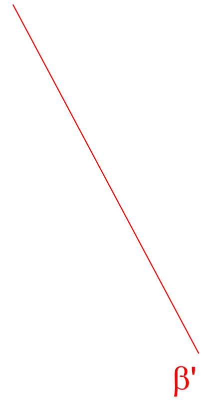


72) Dado $(\alpha) \equiv$ plano (h), representar (s) $\perp$ (α).



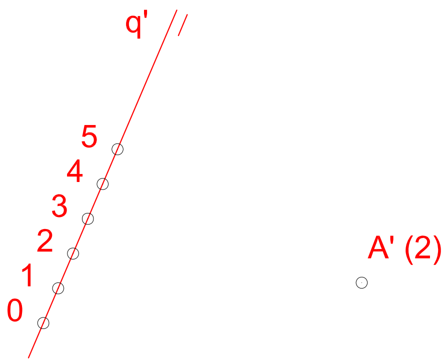
Escala: 1/100

73) Representar (m) $\perp$ (β).



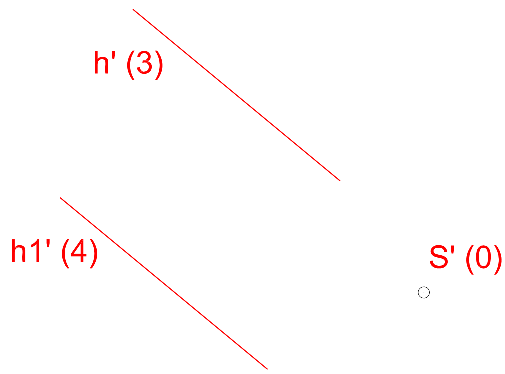
Escala: 1/50

74) Dado $(\alpha) \equiv$ plano (q), representar (m) $\perp$ (α), sabendo-se que (A) $\in$ (m).



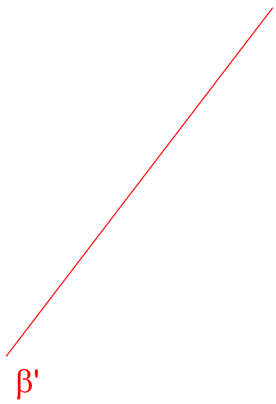
Unidade gráfica: 0,01 m

75) Dado $(\delta) \equiv$ plano (h; h1), representar (n) $\perp$ (δ), sabendo-se que (S) $\in$ (n).



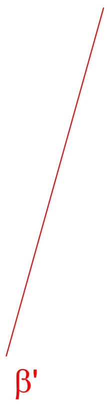
Escala: 1/100

76) Representar $(\alpha) \perp (\beta)$, sendo $(\alpha) \perp (\pi)$.



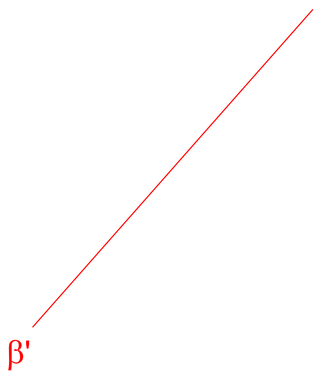
Escala: 1/100

77) Representar $(\delta) \perp (\beta)$, sendo $(\delta) // (\pi)$.



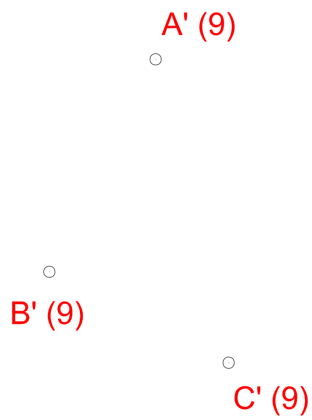
Escala: 1/200

78) Representar $(\gamma) \perp (\beta)$, sendo $(\gamma) \not\perp (\pi)$.



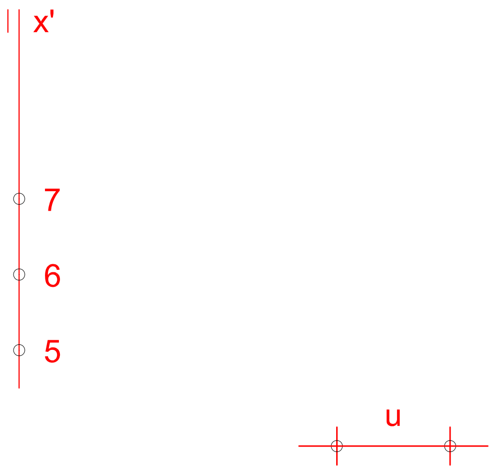
Escala: 1/100

79) Dado $(\alpha) \equiv$ plano (A; B; C), representar $(\beta) \perp (\alpha)$.

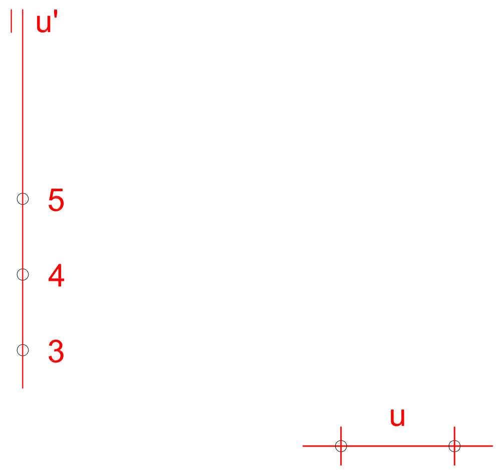


Escala: 1/100

80) Dado $(\alpha) \equiv$ plano (x), representar $(\delta) \perp (\alpha)$, sabendo-se que p (δ) =1.

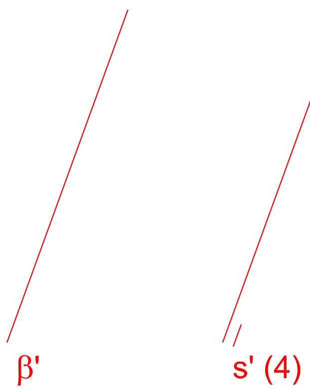


81) Dado $(\gamma) \equiv$ plano (u), representar $(\gamma) \perp (\delta)$, sabendo-se que $(\delta) \not\perp (\pi)$.

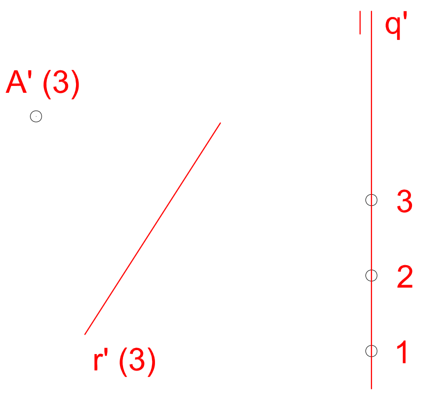


82 a 91) Determinar a reta de intersecção (i) entre os planos dados. (i) $\equiv$ $(\alpha) \cap (\beta)$.
Unidade gráfica: 0,01 m.

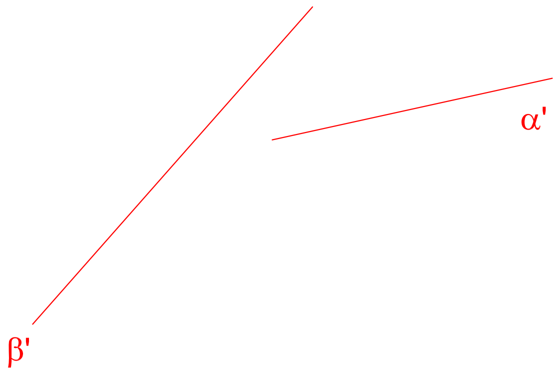
82) $(\alpha) \equiv$ plano (s)



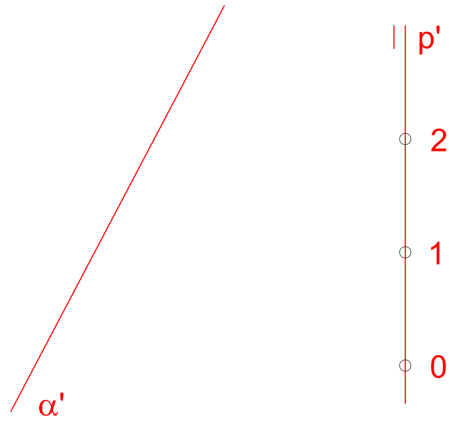
83) $(\alpha) \equiv$ plano (A; r) e $(\beta) \equiv$ plano (q)



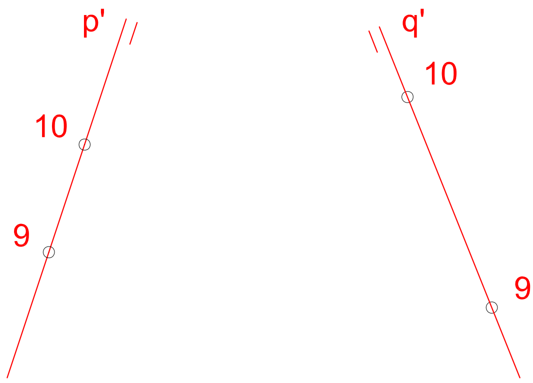
84)



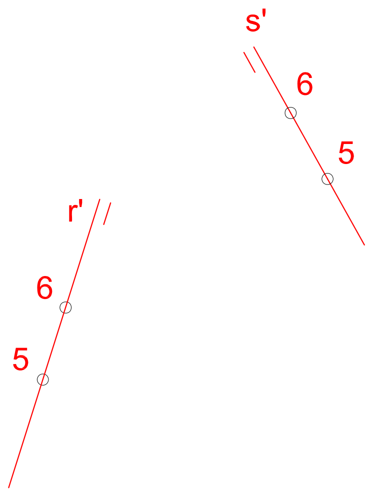
85) (α) ≡ plano (p)



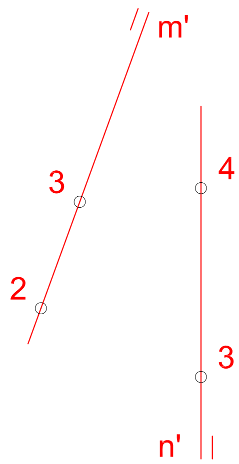
86) (α) ≡ plano (p) e (β) ≡ plano (q)



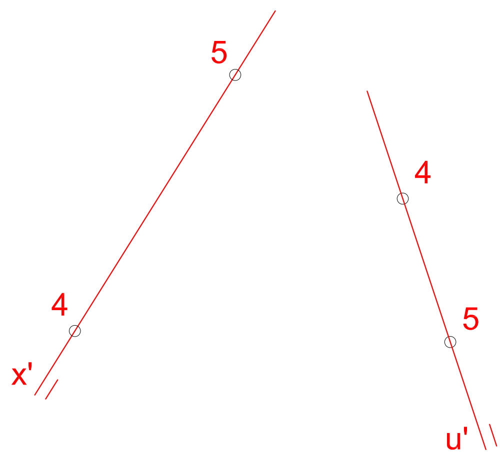
87) (α) ≡ plano (r) e (β) ≡ plano (s)



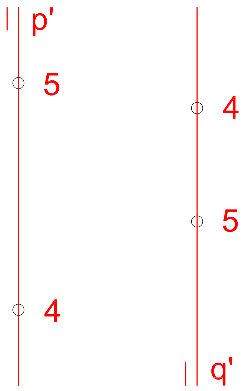
88) (α) ≡ plano (m) e (β) ≡ plano (n)



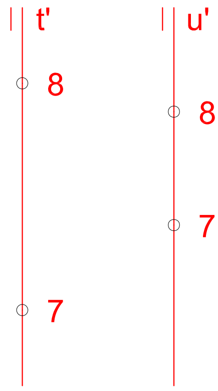
89) (α) ≡ plano (x) e (β) ≡ plano (u)



90) $(\alpha) \equiv$ plano (p) e $(\beta) \equiv$ plano (q)

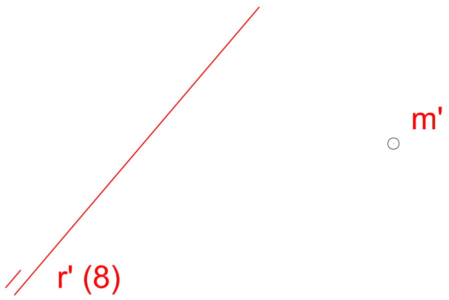


91) $(\alpha) \equiv$ plano (t) e $(\beta) \equiv$ plano (u)

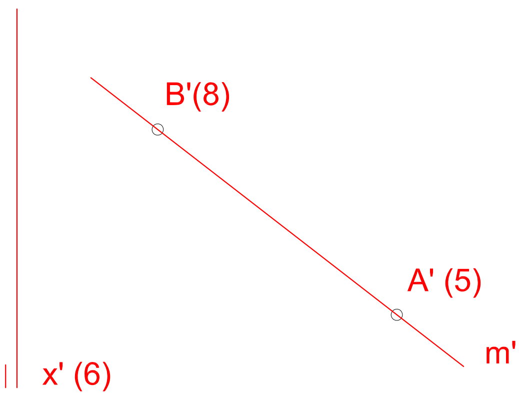


92 a 99) Determinar o traço (T) da reta (m) com o plano (α). $(T) \equiv (m) \cap (\alpha)$.
Escala: 1/100

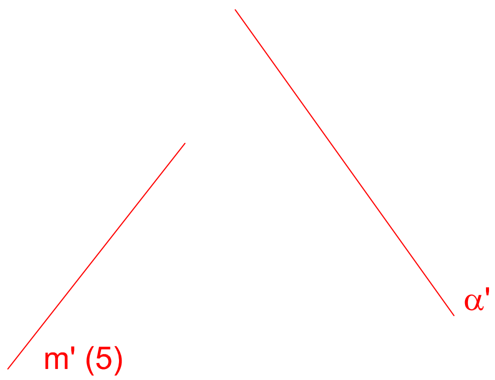
92) $(\alpha) \equiv$ plano (r)



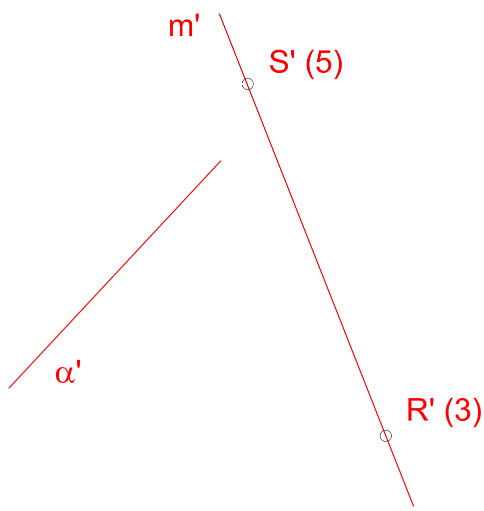
93) $(\alpha) \equiv$ plano (x)



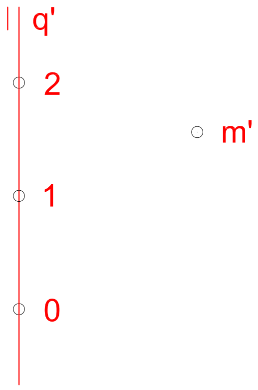
94)



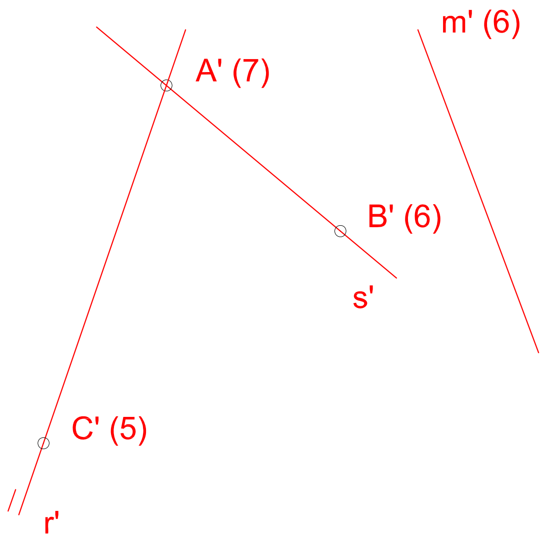
95)



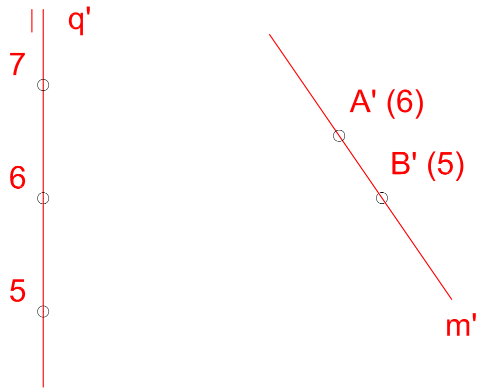
96) $(\alpha) \equiv$ plano (q)



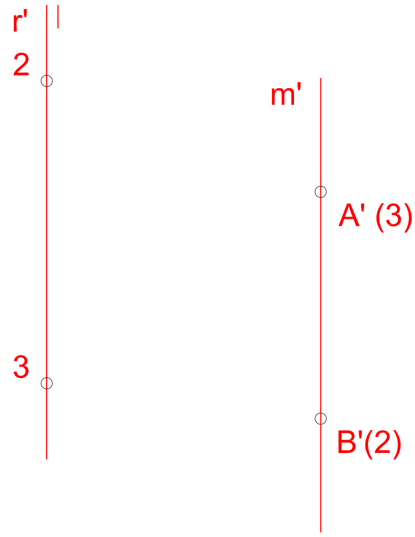
97) $(\alpha) \equiv$ plano (r; s)



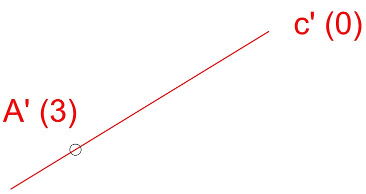
98) $(\alpha) \equiv$ plano (q)



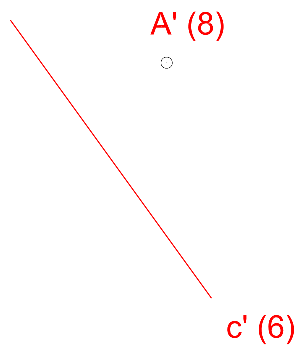
99) $(\alpha) \equiv$ plano (r)



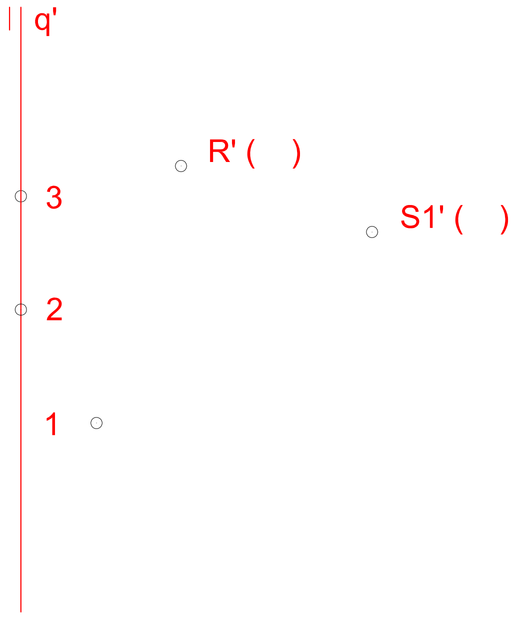
100) Rebater (A), utilizando (c) como charneira. Escala 1/100.



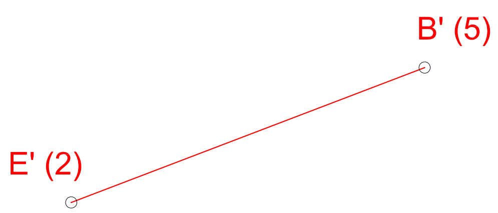
101) Rebater (A), utilizando (c) como charneira. Escala 1/100.



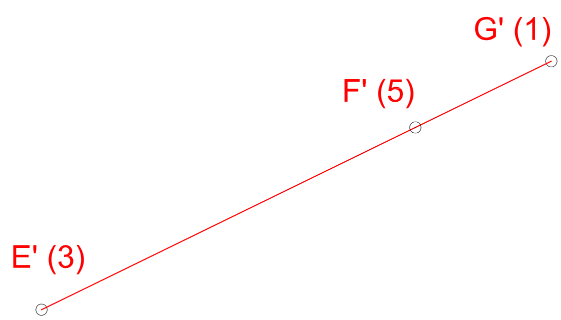
102) Dado (α) ≡ plano (q):
- a) rebater (R) ∈ (α), sem ler a sua cota;
- b) alçar (S1) para (α), sendo (S1) o rebatimento de (S) ∈ (α).



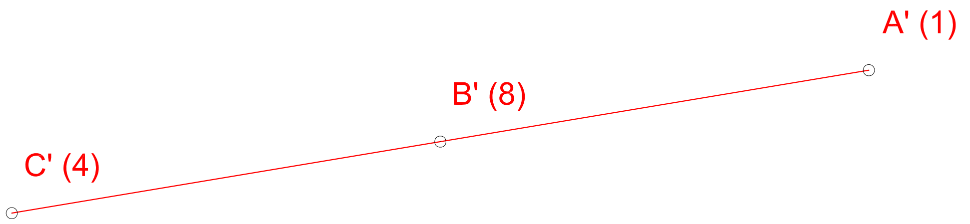
103) Determinar a verdadeira grandeza do segmento ($\overline{EB}$).
Unidade gráfica: 0,01 m.



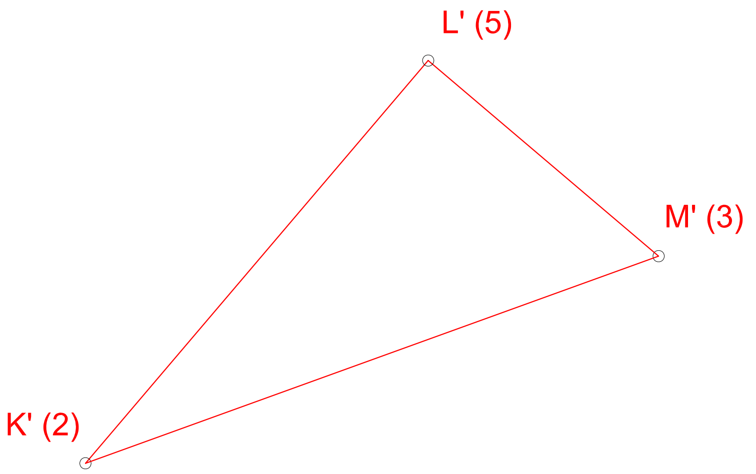
104) Determinar a verdadeira grandeza do triângulo (E)(F)(G). Utilizar (π) para plano de rebatimento.
Unidade gráfica: 0,01 m.



105) Determinar a verdadeira grandeza do triângulo (A)(B)(C), rebatendo-o para o plano horizontal de cota três. Escala: 1/100.

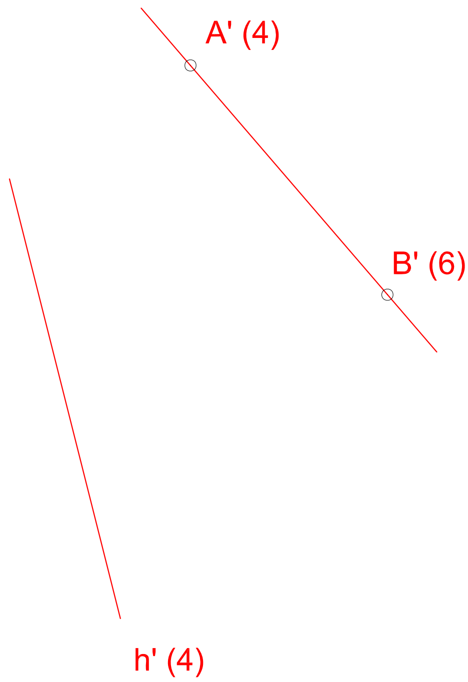


106) Rebater o triângulo (K)(L)(M), para o plano horizontal de cota dois, sem determinar a escala de declividade de seu plano suporte. Unidade gráfica: 0,01 m.

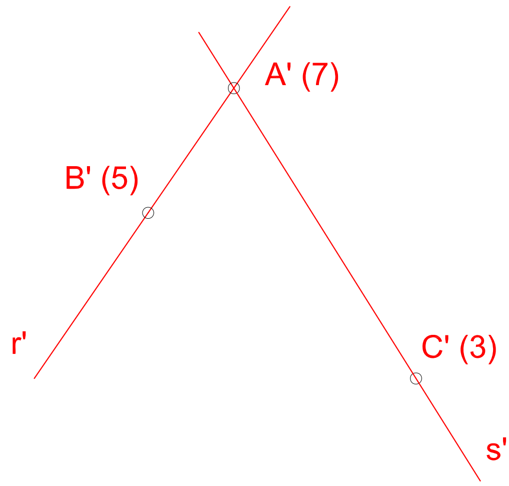


Nas questões 107 a 114 determinar, em verdadeira grandeza, o ângulo formado pelas retas dadas. Escala: 1/100.

107) (h)^(s) =

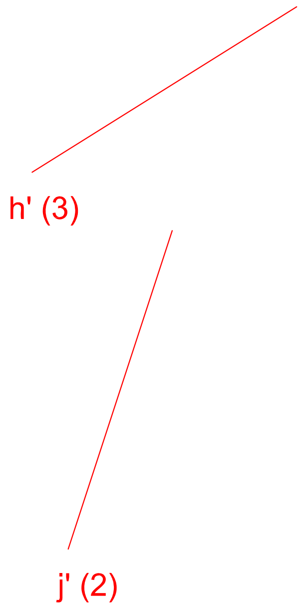


108) (r)^(s) =

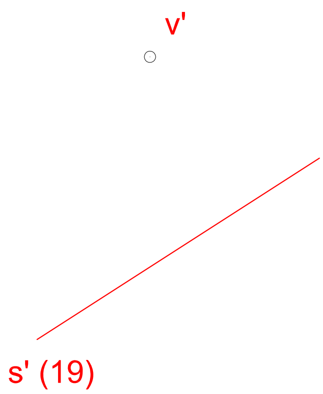


109) (m)^(v)=

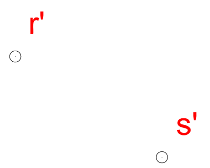
110) (h)^(j) =



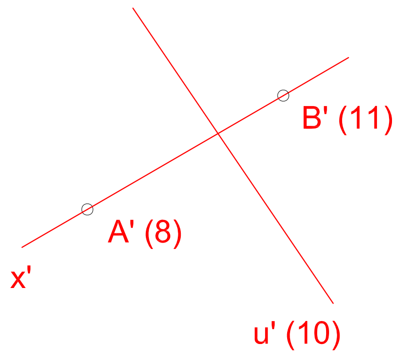
111) (v)^(s) =



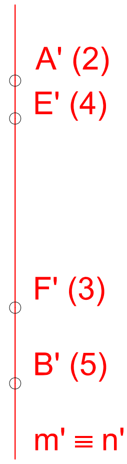
112) (r)^(s)=



113) (x)^(u) =



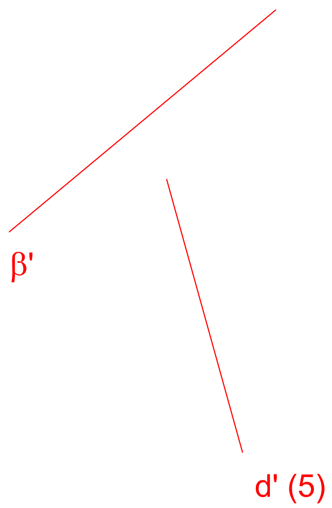
114) (m)^(n) =



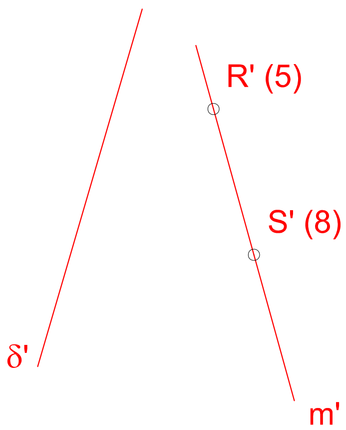
(A) ∈ (m)
(B) ∈ (m)
(E) ∈ (n)
(F) ∈ (n)

Nas questões 115 a 123 determinar o ângulo formado pelas retas e pelos planos dados. Escala: 1/100.

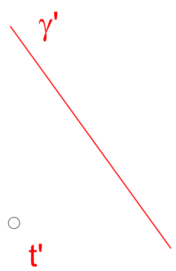
115) (d)^(β)=



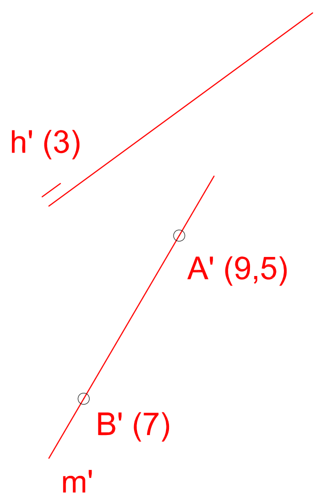
116) (m)^(δ) =



117) (t)^(γ) =

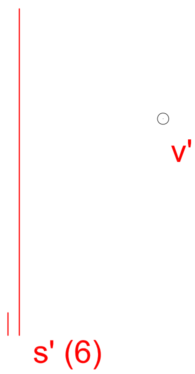


118) (m)^(α)=



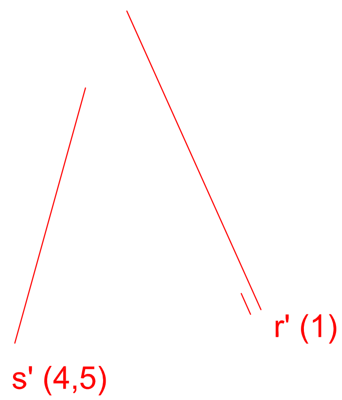
(α) ≡ plano (h)

119) (v)^(β) =



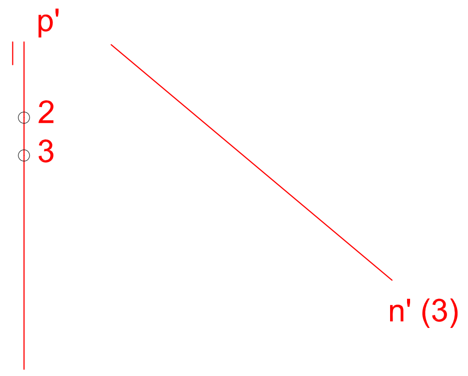
(β) ≡ plano (s)

120) (s)^(δ) =



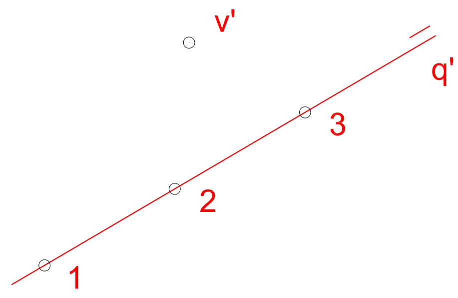
(δ) ≡ plano (r)

121) (n)^(α)=



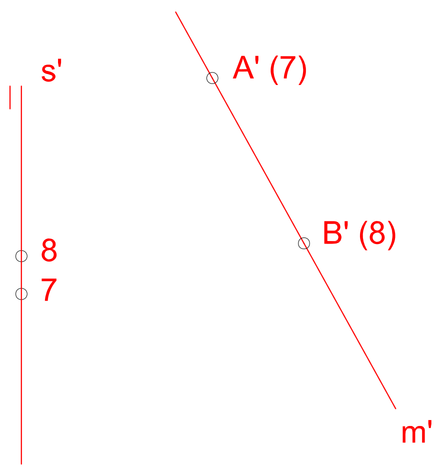
(α) ≡ plano (p)

122) (v)^(β)=



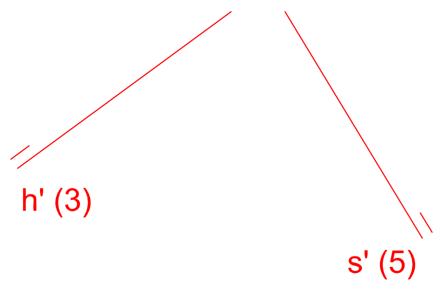
(β) ≡ plano (q)

123) (m)^(δ)=



(δ) ≡ plano (s)

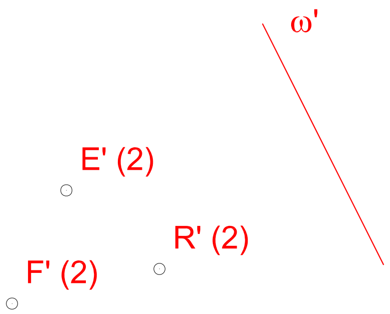
124) (γ)^(λ)=



(γ) ≡ plano (s)
(λ) ≡ plano (h)

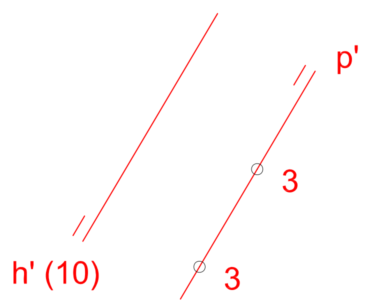
Nas questões 124 a 129 determinar, em verdadeira grandeza, o ângulo formado pelos planos dados. Escala: 1/50.

125) (β)^(ω)=



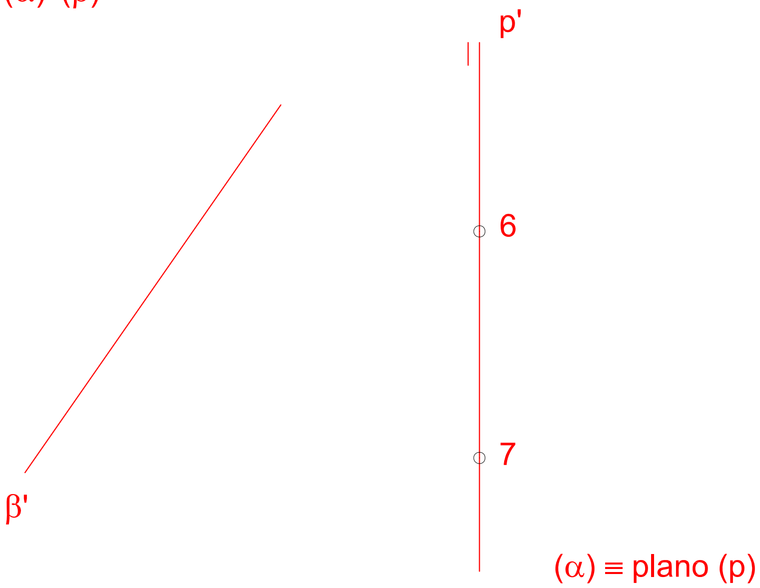
(β) ≡ plano (E; F; R)

126) (α)^(δ)=

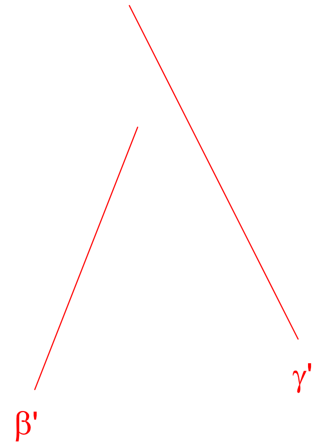


(α) ≡ plano (p)
(δ) ≡ plano (h)

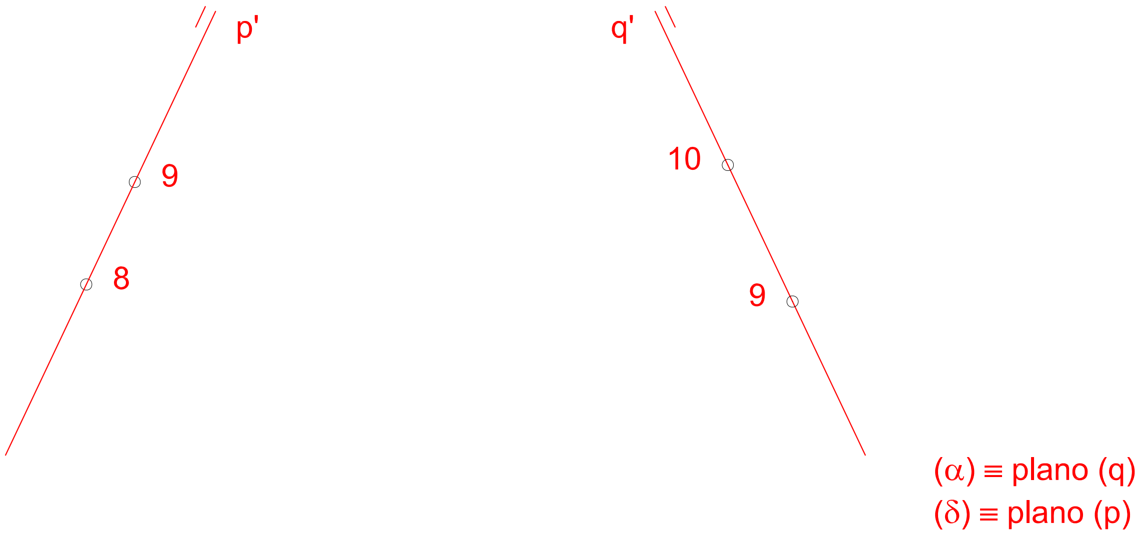
127) (α)^(β)=



128) (β)^(γ)=

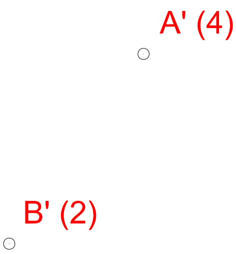


129) (α)^(δ)=



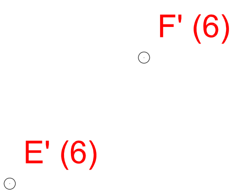
Nas questões 130 a 132 determinar, em verdadeira grandeza, a distância entre os pontos dados. Escala: 1/50.

130)



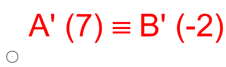
d =

131)



d =

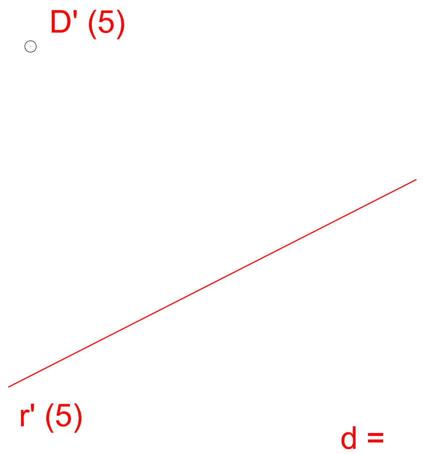
132)



d =

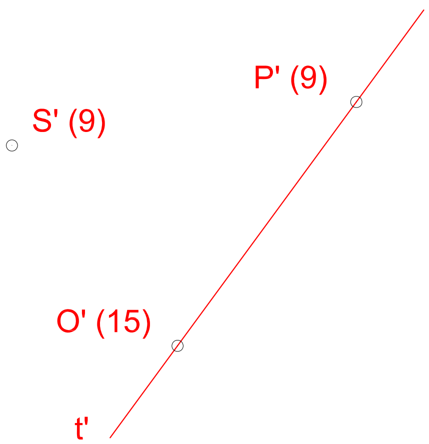
Nas questões 133 a 135 determinar, em verdadeira grandeza, a distância entre o ponto e a reta dada. Escala: 1/200.

133)



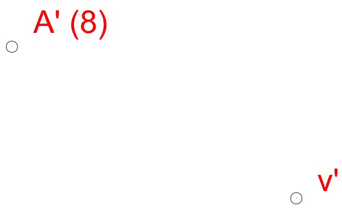
d =

134)



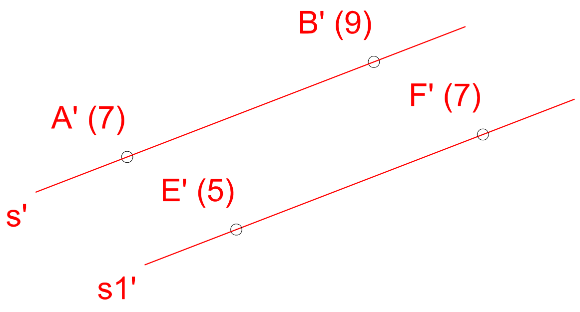
d =

135)



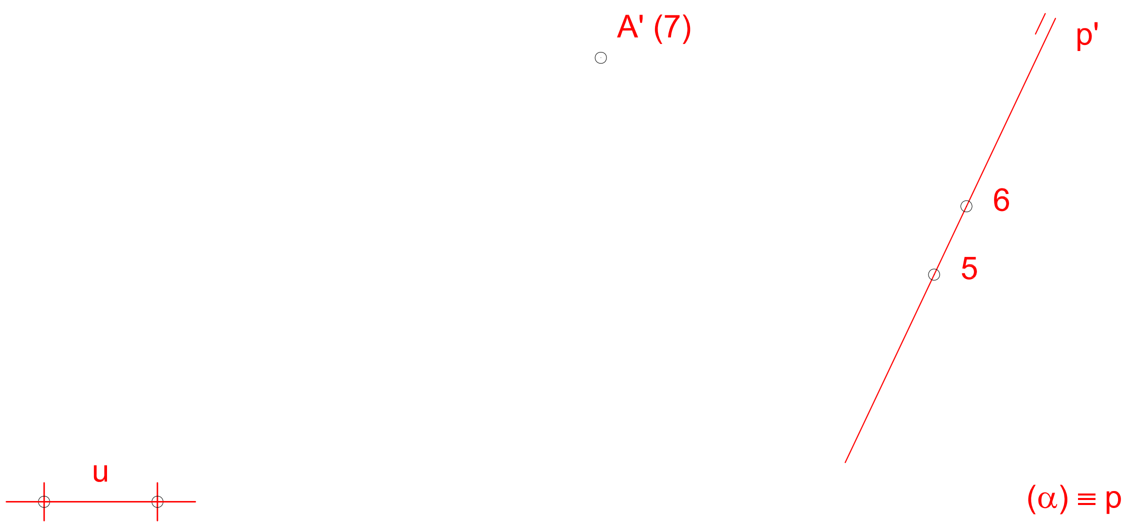
d =

136) Determinar, em verdadeira grandeza, a distância entre as retas dadas.
Escala: 1:200



d =

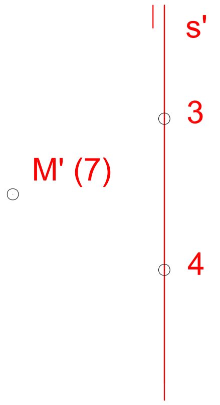
137) Utilizando o processo geral, determinar, em verdadeira grandeza, a distância entre o ponto e o plano dado.



(α) ≡ plano (p)

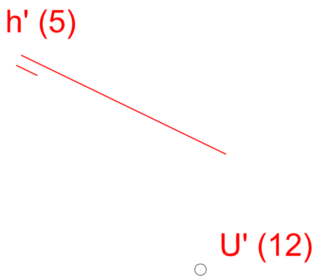
Nas questões 138, 139 e 140 determinar, em verdadeira grandeza, a distância entre os pontos e os planos dados. Escala: 1/100.

138) $(\alpha) \equiv$ plano (s)



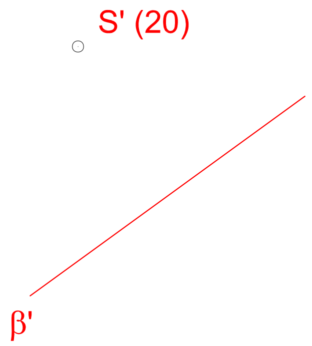
d =

139) $(\gamma) \equiv$ plano (h)



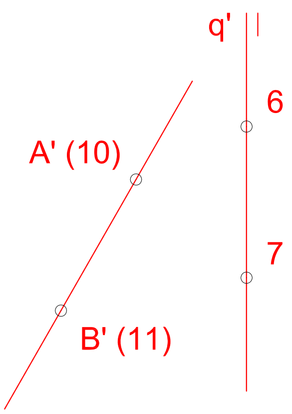
d =

140)



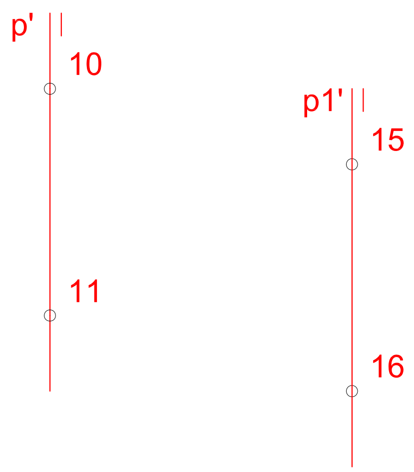
d =

141) Determinar, em V.G., a distância entre (m) e (α), sabendo-se que $(\alpha) \equiv$ plano (q). Escala: 1/100



d =

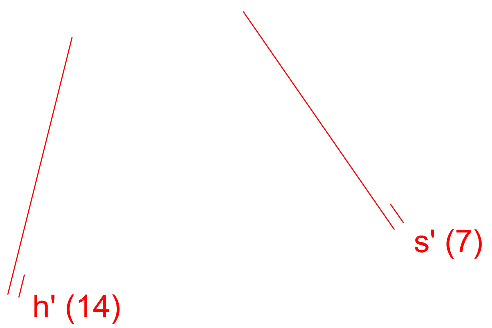
142) $(\alpha) \equiv$ plano (p)
$(\alpha 1) \equiv$ plano (p1)



d =

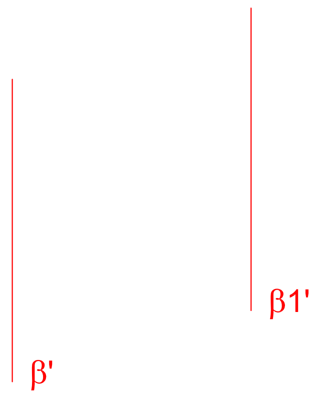
Nas questões 142, 143 e 144 determinar, em verdadeira grandeza, a distância entre os planos dados. Escala: 1/100.

143) $(\delta) \equiv$ plano (s)
$(\delta 1) \equiv$ plano (h)



d =

144)

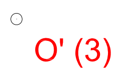


d =

145) Representar o triângulo (A)(B)(C), sabendo-se que as medidas dos seus lados são 4, 6 e 8 m e que seu plano suporte possui cota 5. Escala: 1/125.

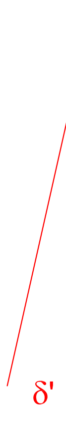
146) Representar a circunferência (c), sabendo-se que:
- o raio de (c) é 2,5 m;
- (O) é o centro de (c);
- o plano suporte de (c) é de mesma cota que seu centro.

Escala: 1/20



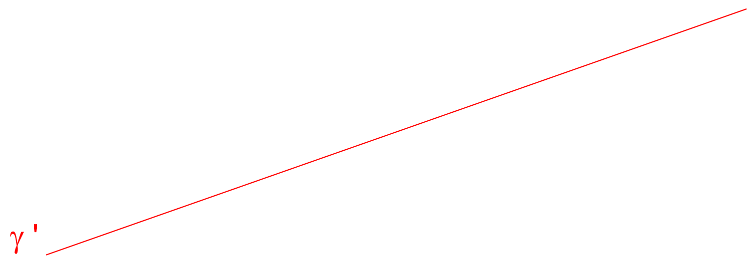
147) Representar o triângulo equilátero (A)(B)(C), sabendo-se que:
- (δ) é seu plano suporte;
- $\overline{(A)(B)}$ // (π) e mede 5 m.

Escala: 1/125.



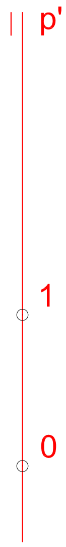
148) Representar o quadrado (A)(B)(C)(D), sabendo-se que:
- seus lados medem 4 m;
- (γ) é seu plano suporte;
- $\overline{(A)(B)}$ faz 45° com (π);

Escala: 1/100.



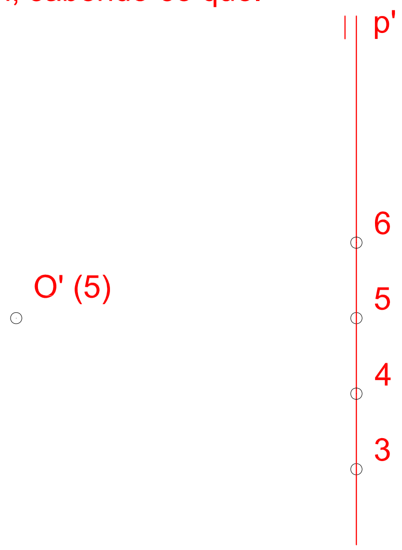
149) Representar o triângulo (E)(F)(G) $\subset (\alpha) \equiv$ plano (p), sabendo-se que:
- os lados medem 4, 5 e 6 m;
- o vértice (E) $\in (\pi)$.

Escala: 1/100



150) Representar a circunferência (c) de raio igual a 2 m, sabendo-se que:
- (O) é o centro de (c);
- (c) $\subset (\alpha) \equiv$ plano (q).

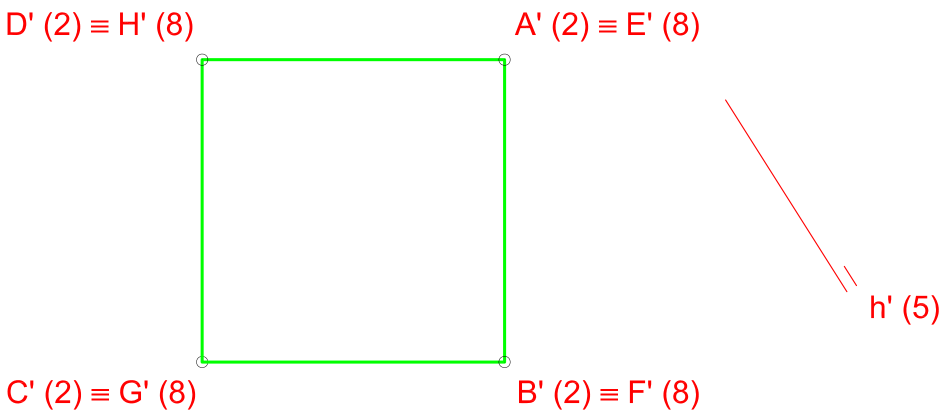
Escala: 1/100.



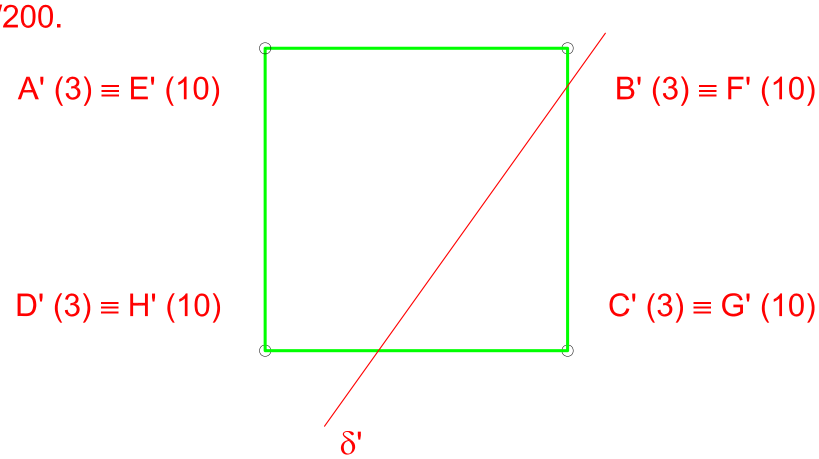
151) Representar um prisma reto de base quadrangular, sabendo-se que:
- o lado de sua base mede 3 m;
- a base (A)(B)(C)(D) possui cota 4;
- a altura do prisma é 6 m.

Escala: 1/50.

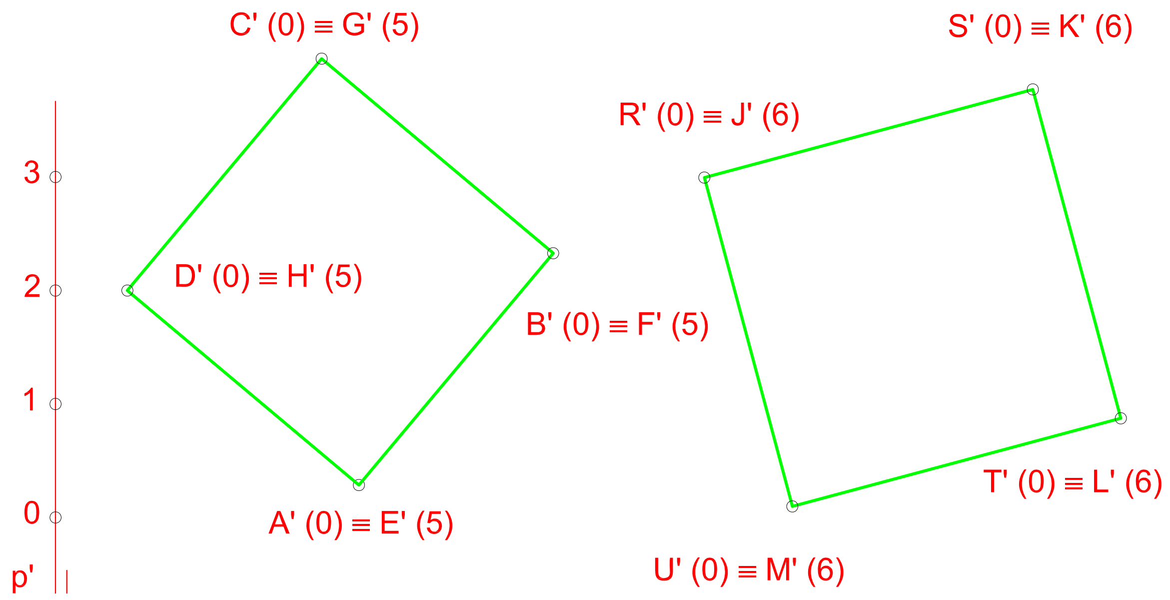
152) Determinar a secção produzida por $(\alpha) \equiv$ plano (h) no prisma dado.
Escala: 1/100



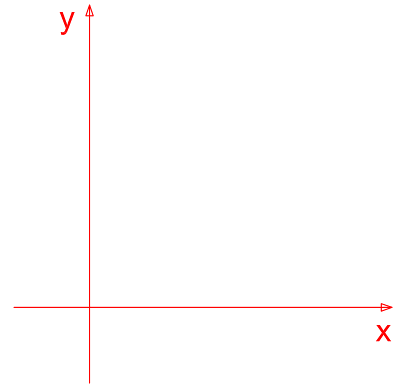
153) Determinar, em V.G., a secção produzida por (δ) no poliedro dado.
Escala: 1/200.



154) Determinar a secção produzida por (γ) ≡ plano (p) em cada um dos prismas dados, suas projeções e verdadeiras grandezas.
Escala: 1/100.

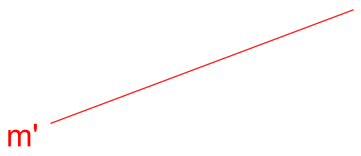


155) Representar a pirâmide (V) - (A)(B)(C), dadas as coordenadas de seus vértices.
(V) [7,5; 0,2; 12]
(A) [0,2; 0,4; 0,3]
(B) [-2,5; 1,5; 0,1]
(C) [0,1; -1,5; 0,2]
Escala: 1/100



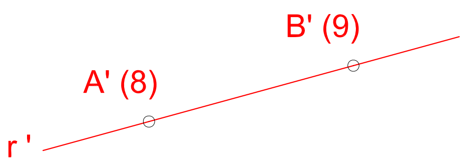
156) Representar um prisma oblíquo, sabendo-se que:
- os lados da base (A)(B)(C) medem 3 m;
- o plano suporte de uma base é de cota 2;
- a altura do prisma é 7 m;
- m' é a direção das projeções das arestas laterais;
- as arestas laterais possuem inclinação de 30°.

Escala: 1/100.



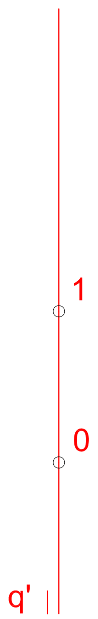
157) Representar o prisma oblíquo (A)(B)(C) - (E)(F)(G), sabendo-se que:
- as arestas laterais são paralelas à (r);
- o comprimento das arestas laterais é de 5 m;
- o lado das bases medem 1,5 m.

Escala: 1/50



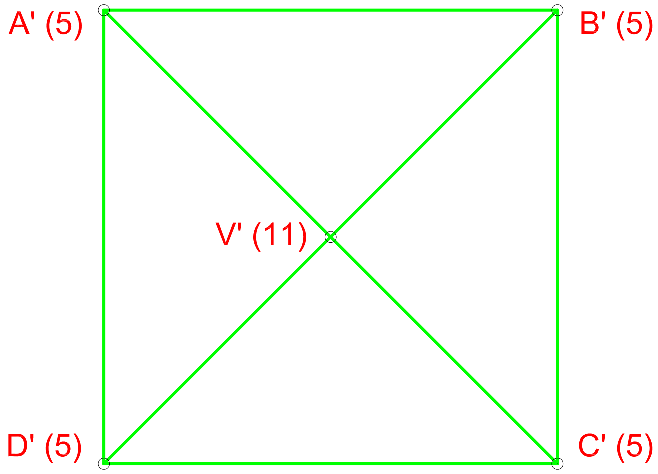
158) Representar a pirâmide regular de base triangular (S) - (A)(B)(C), sabendo-se que:
- a base tem como plano suporte (β) ≡ plano (q);
- o lado da base é de 6 m;
- a altura da pirâmide é 8 m;

Escala: 1/100.



159) Determinar:
- a verdadeira grandeza da face (V)(B)(C);
- o intervalo, a declividade e o ângulo de inclinação das faces laterais.

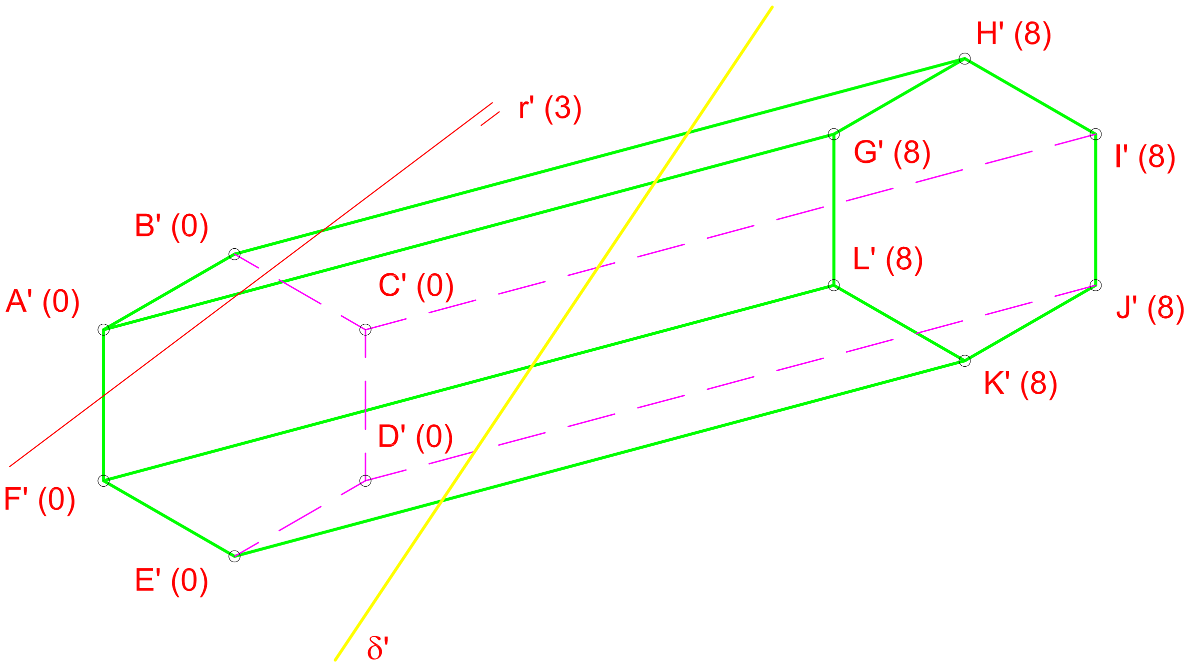
Escala: 1/125



160) Representar as secções produzidas pelos planos $(\beta) \equiv$ plano (r) e (δ) no prisma dado.

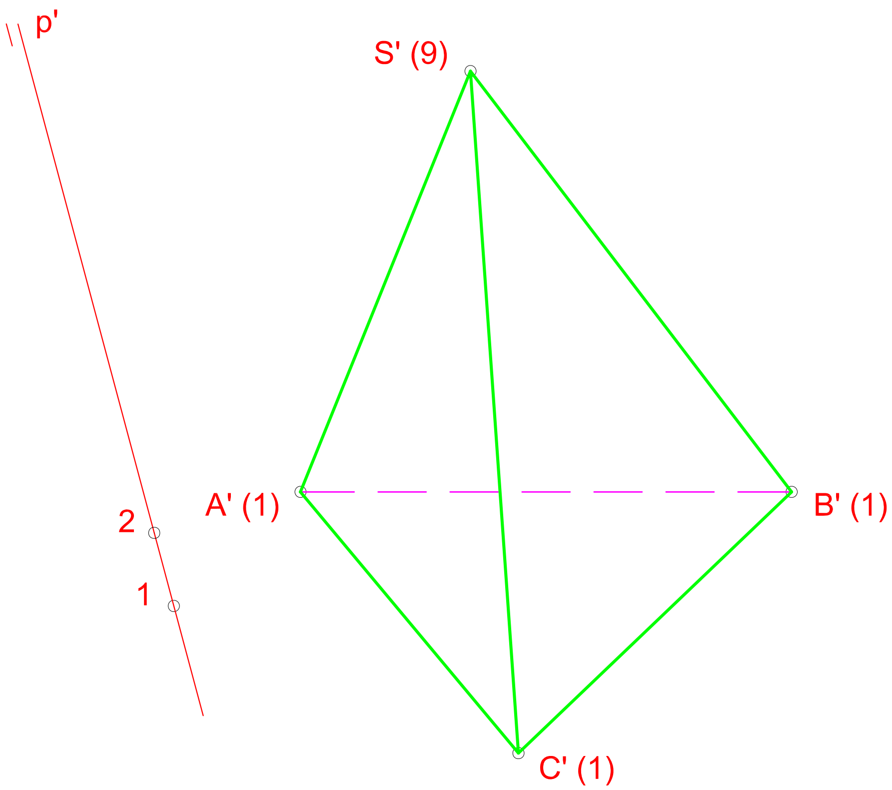
Determinar, em V.G., a secção produzida por (δ) no poliedro dado.

Escala: 1/125.

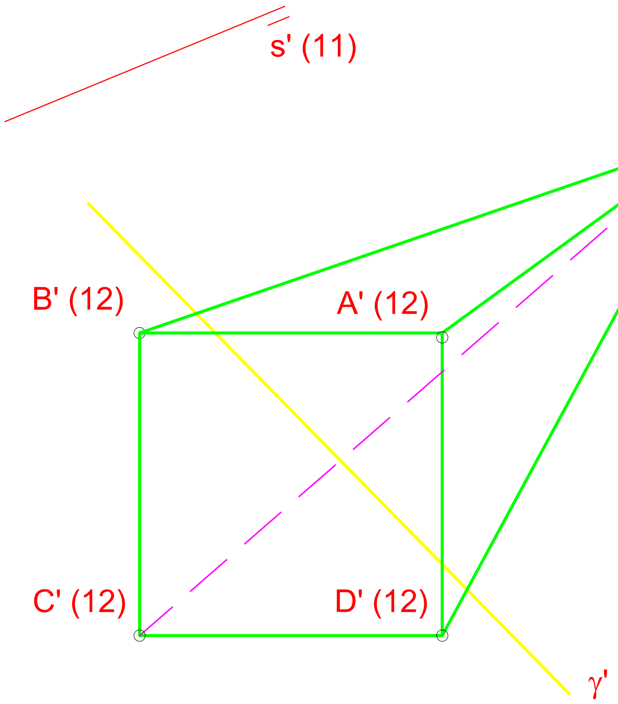


161) Representar a secção produzida por $(\lambda) \equiv$ plano (p) na pirâmide dada e sua verdadeira grandeza.

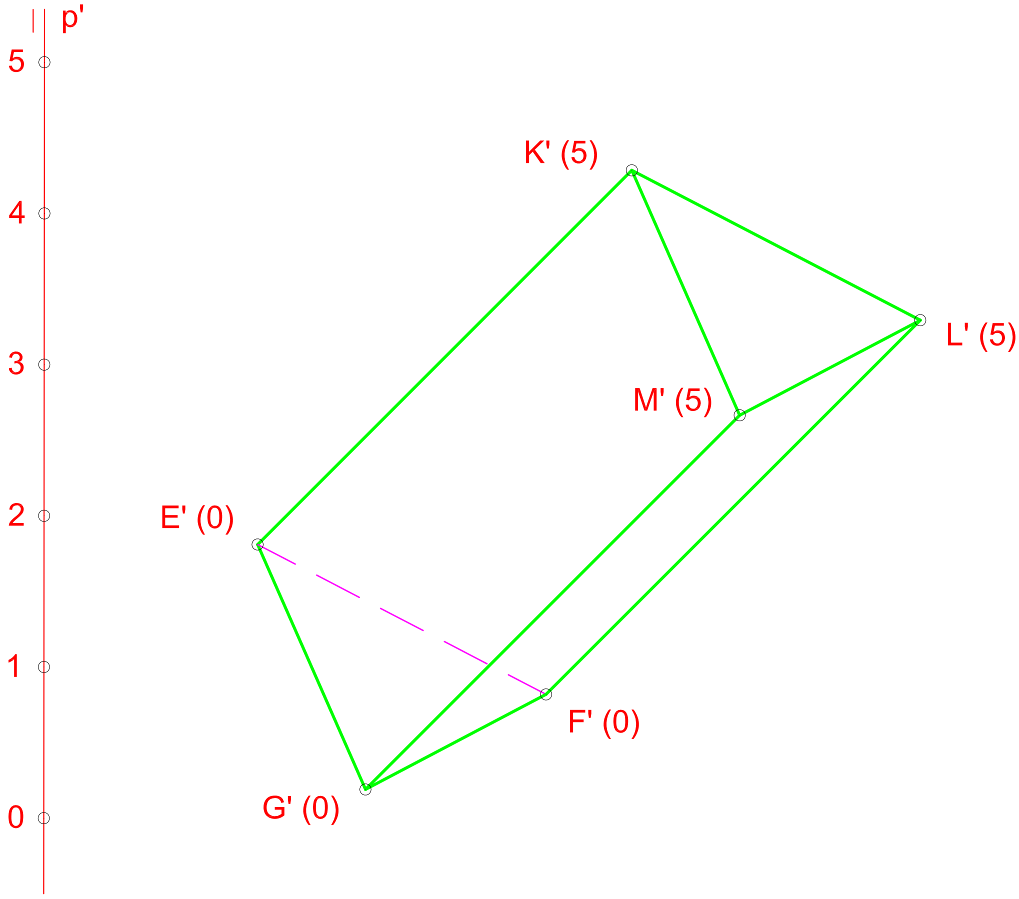
Escala: 1/100



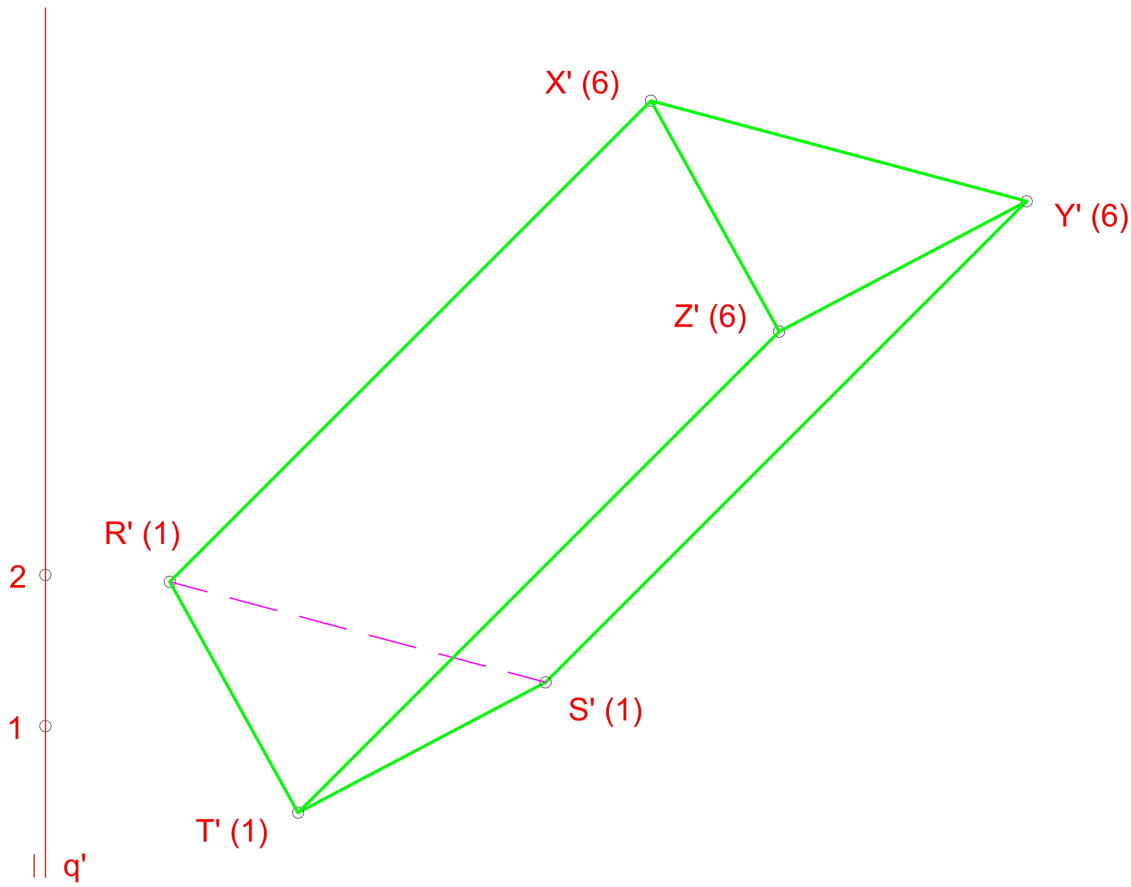
162) Determinar a secção produzida por (δ) ≡ plano (s) e (γ) na pirâmide dada.
Escala: 1/100.



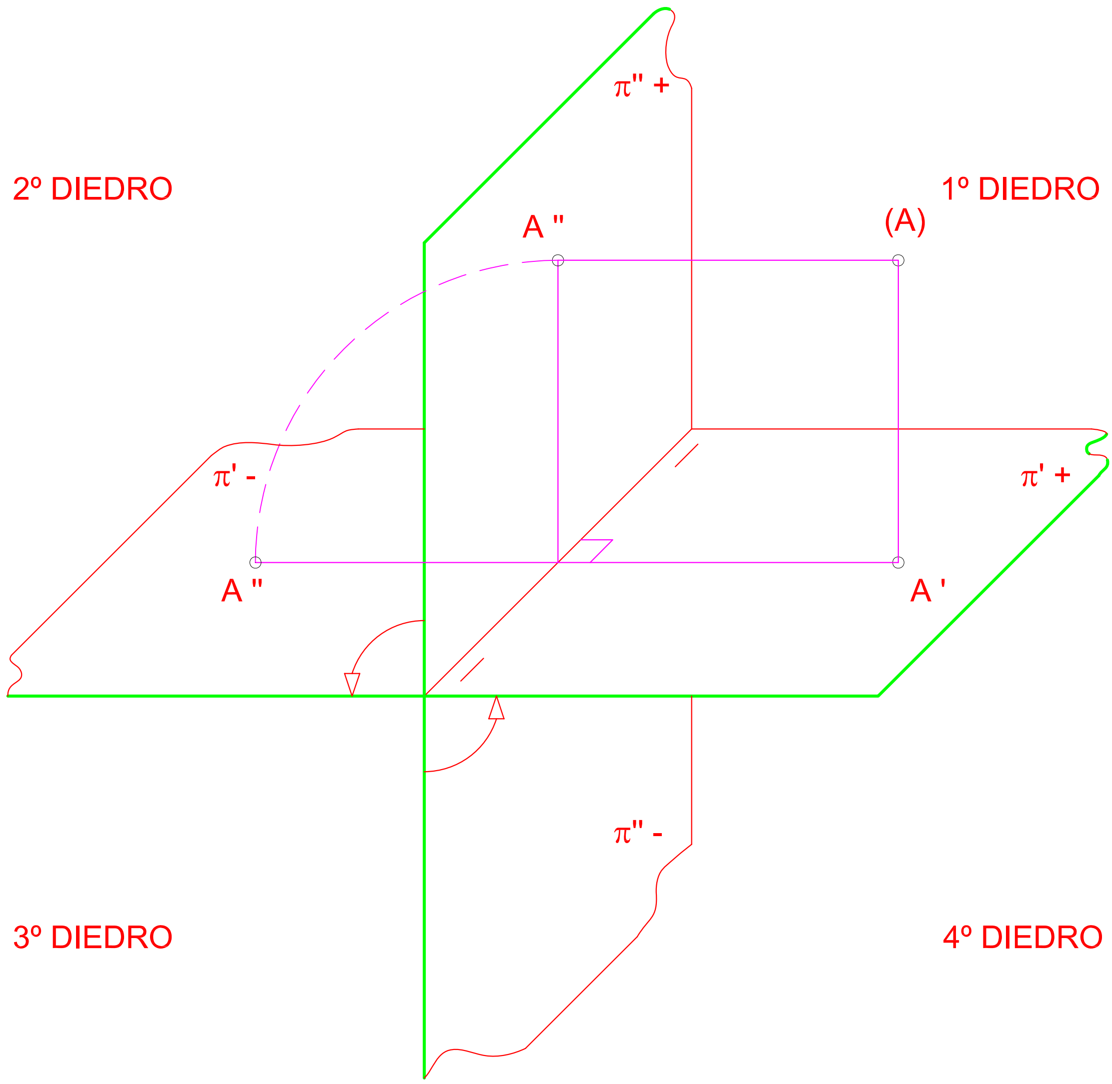
163) Determinar o polígono secção, em projeção e em V.G., produzido por (ω) ≡ plano (p) no poliedro dado. Escala: 1/100.



164) Representar, em projeção e em verdadeira grandeza, o polígono secção produzido por (α) ≡ plano (q) no prisma dado. Escala: 1/100.



UNIDADE II - MÉTODO BI-PROJETIVO MONGEANO
(Gaspar Monge - 1831)



π'' - plano vertical de projeção
π' - plano horizontal de projeção
π' π'' - linha de terra

(A) - ponto objetivo
A' - projeção horizontal do ponto (A)
A'' - projeção vertical ponto (A)

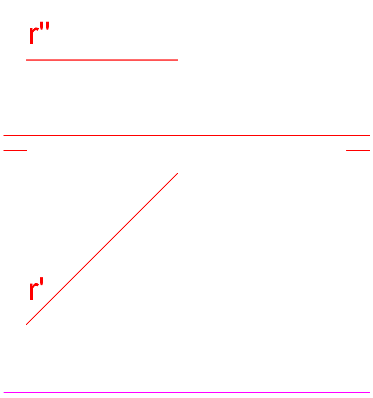
165) Representar:

(A) [2; 1; 3]
(B) [3; -3; 4]
(C) [5; -3; -5]
(D) [7; 2; -4]
(E) [-1; 0; 2]
(F) [-2; 0; -3]
(G) [10; -1; 0]
(H) [6; 2; 0]
(I) [6; 0; 0]
(J) [0; 2; -2]
(K) [-5; -3; -3]
(L) [-4; -5; 5]
(M) [-3; 4; 4]

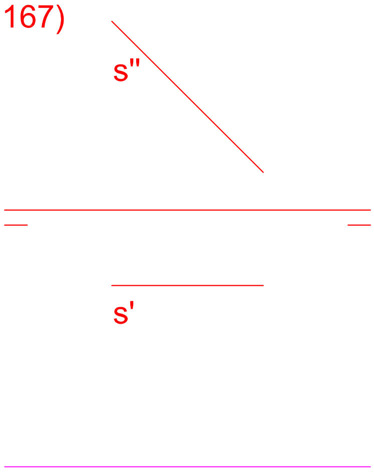
Unidade gráfica: 0,01 m

Nas épuras 166 à 177 faça a leitura simbólica da posição das retas em relação aos planos de projeção, bem como, determine os traços de cada reta nos planos de projeção e nos planos bissetores.

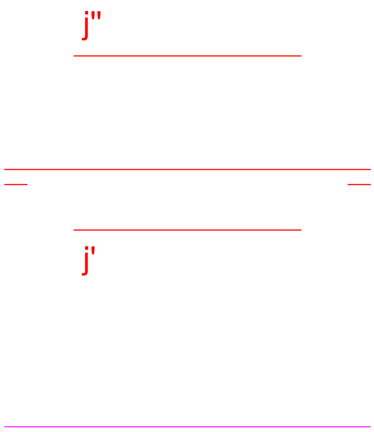
166)



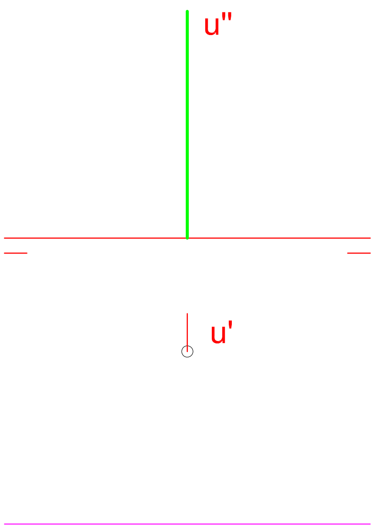
167)



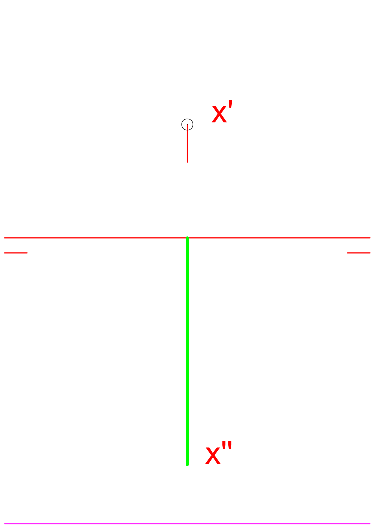
168)



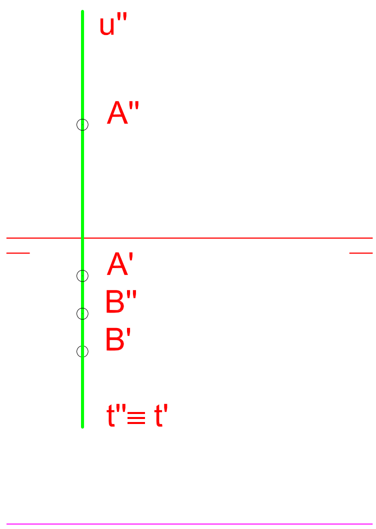
169)



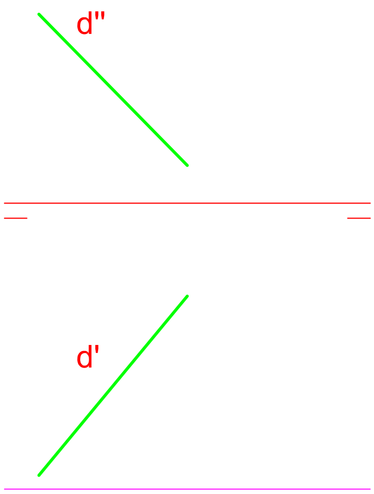
170)



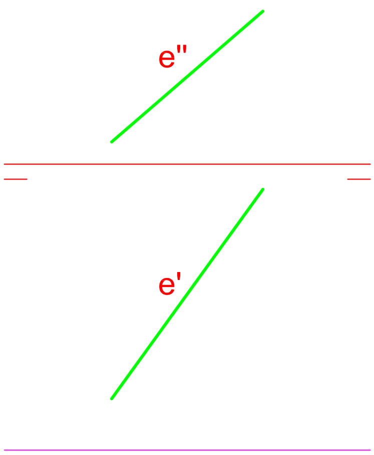
171)



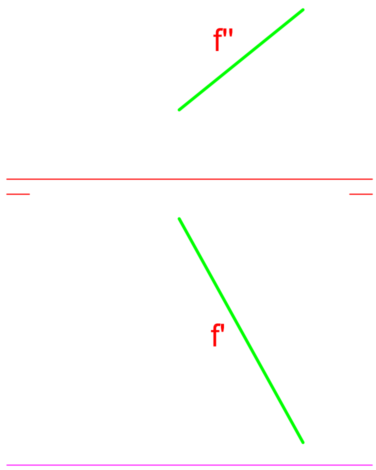
172)



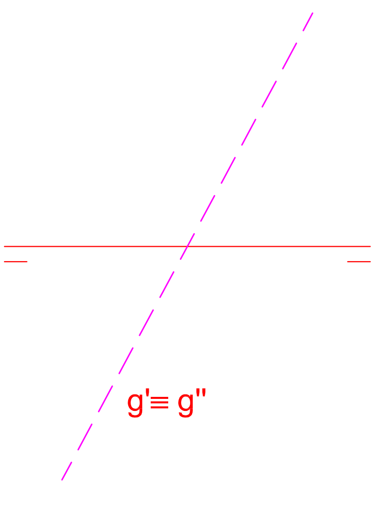
173)



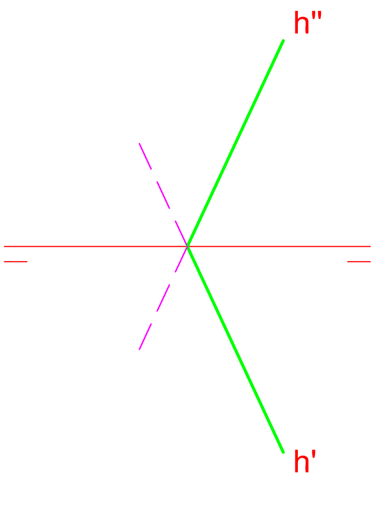
174)



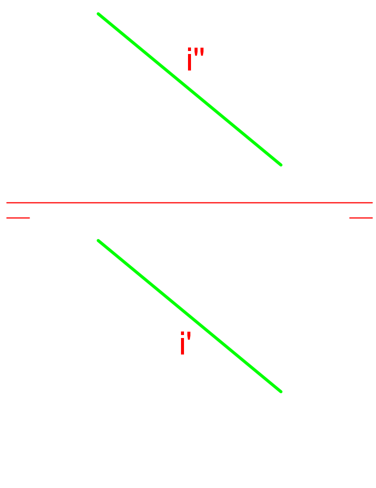
175)



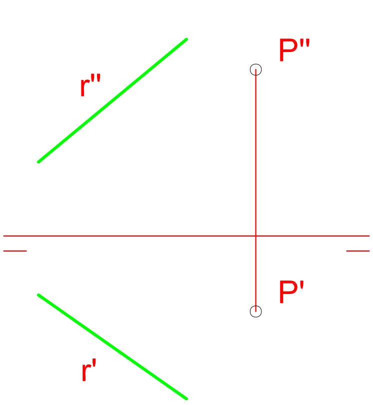
176)



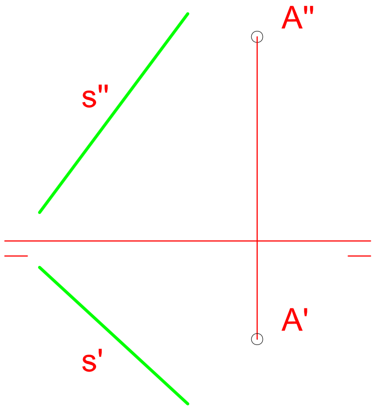
177)



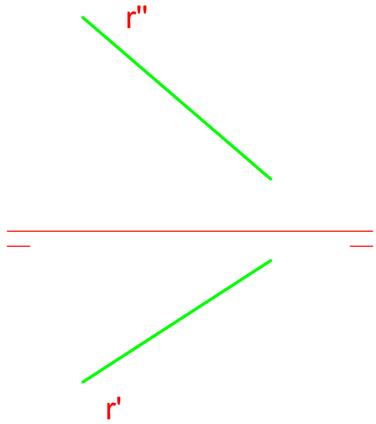
178) Representar:
(r1) // (r) ;
(P) $\in$ (r1).



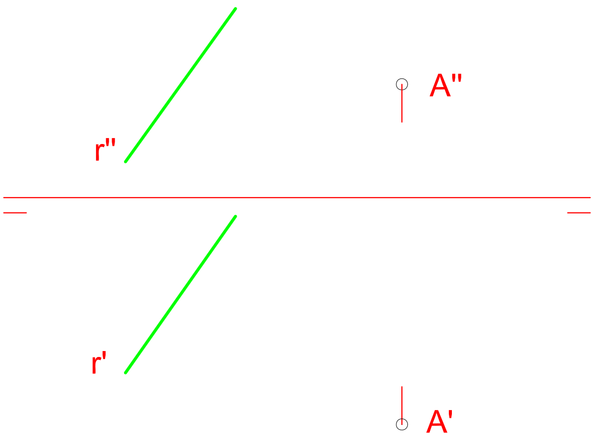
179) Representar:
(s1) // (s) ;
(A) $\in$ (s1).



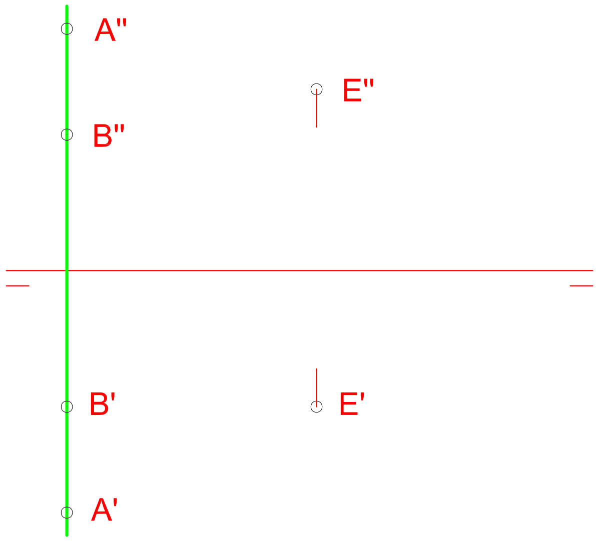
180) Representar:
(g) $\perp$ (r).



181) Representar: (j) $\perp$ (r);
(A) $\in$ (j);
(j) // π' ^ $\perp$ π''

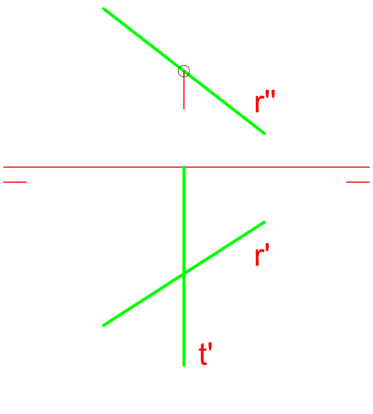


182) Representar: (r1) // (r);
(E) $\in$ (r1).

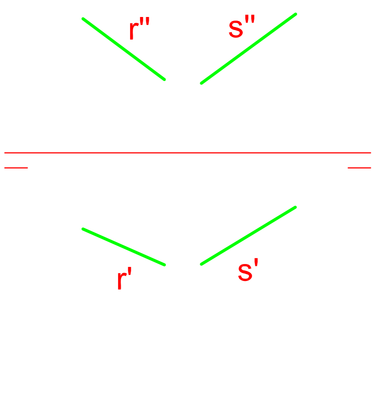


Verifique nas épuras 183 à 192 a posição relativa das retas representadas. No caso das retas serem concorrentes, determine o ponto de concorrência.

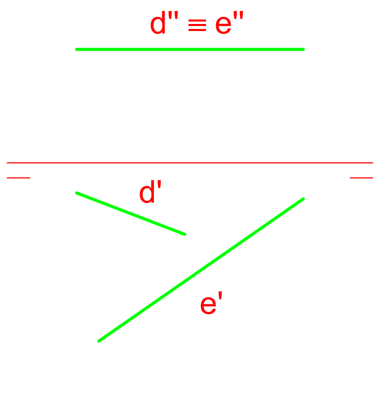
183)



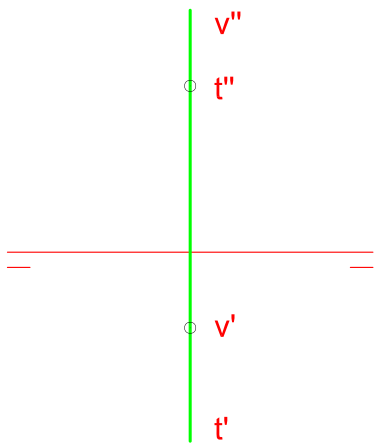
184)



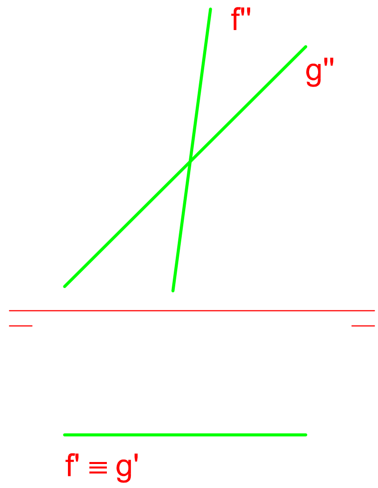
185)



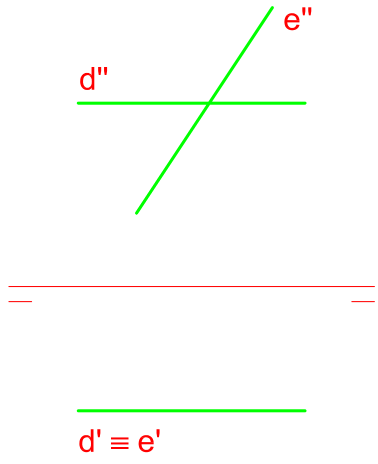
186)



187)

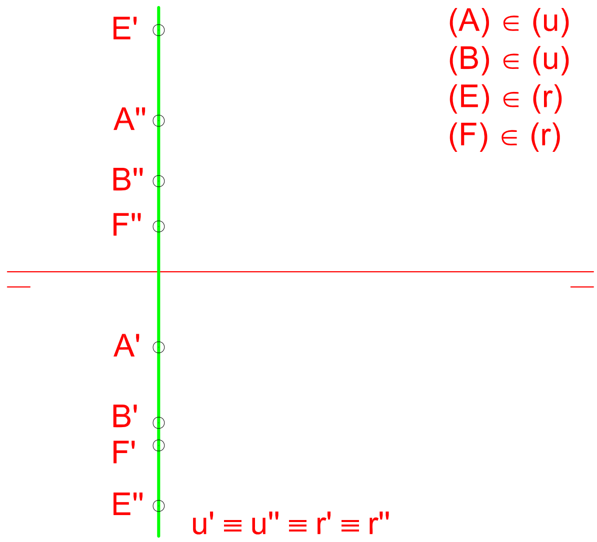


188)

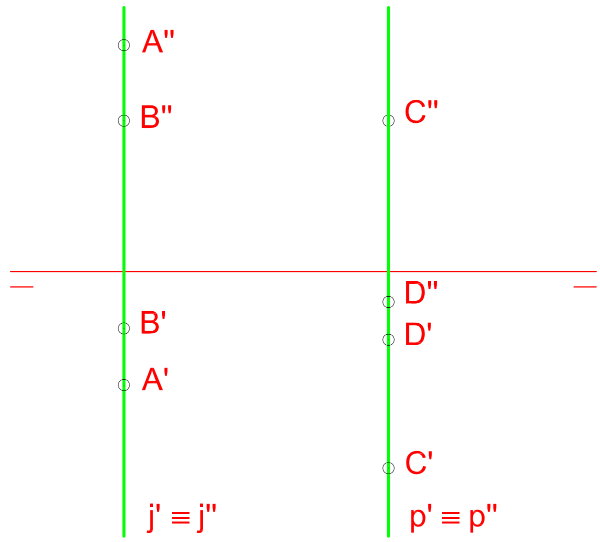


189)

(A) ∈ (u)
(B) ∈ (u)
(E) ∈ (r)
(F) ∈ (r)

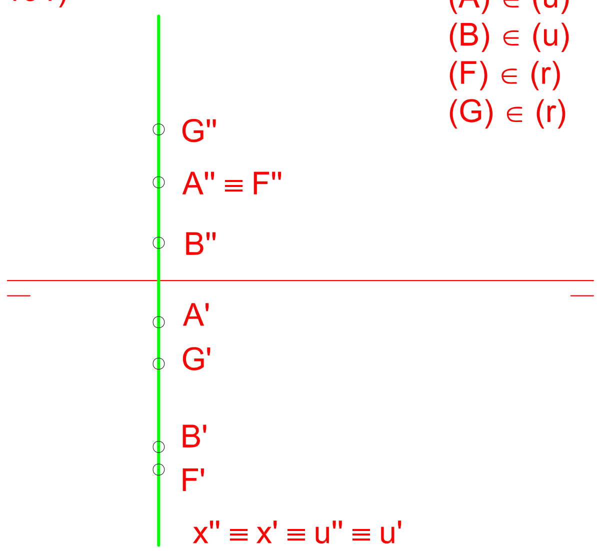


190)

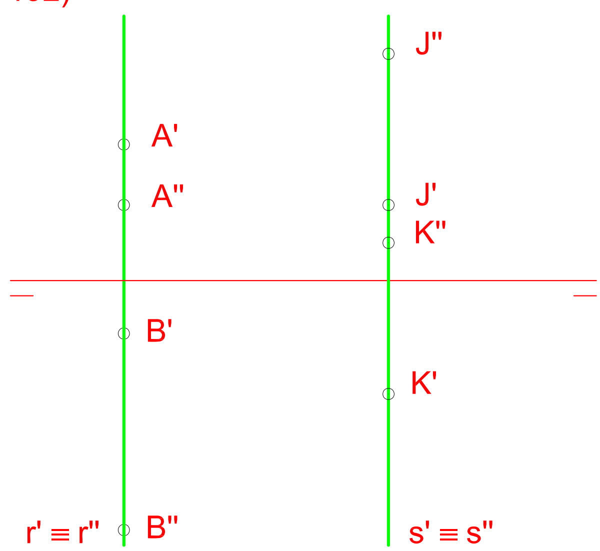


191)

(A) ∈ (u)
(B) ∈ (u)
(F) ∈ (r)
(G) ∈ (r)

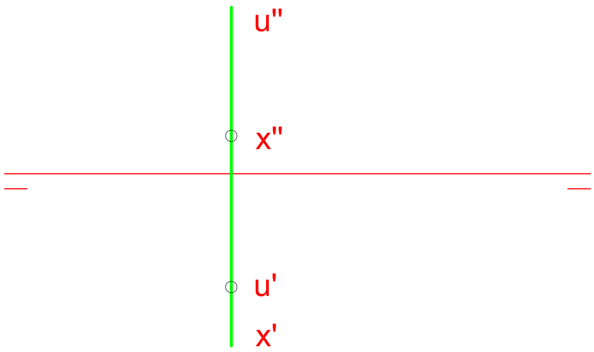


192)

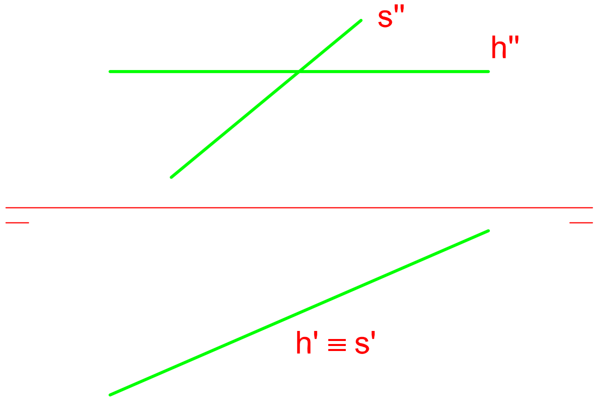


Nas épuras 193 à 204 faça a leitura simbólica da posição dos planos representados em relação aos planos de projeção, determinando os seus traços vertical e horizontal.

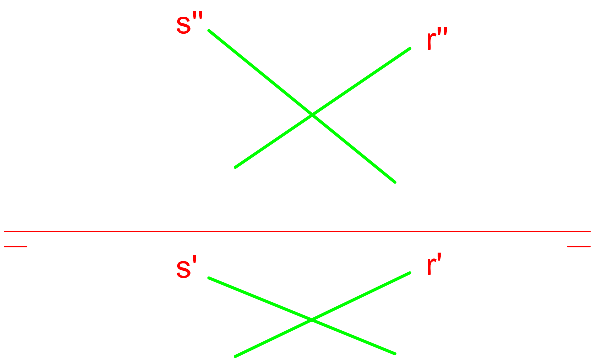
193) (α) ≡ plano (x;u)



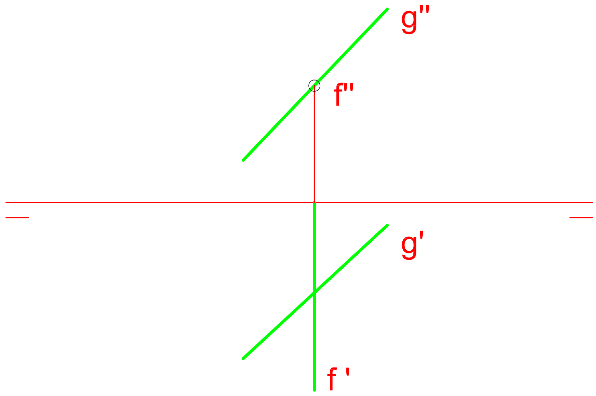
194) (δ) ≡ plano (h;s)



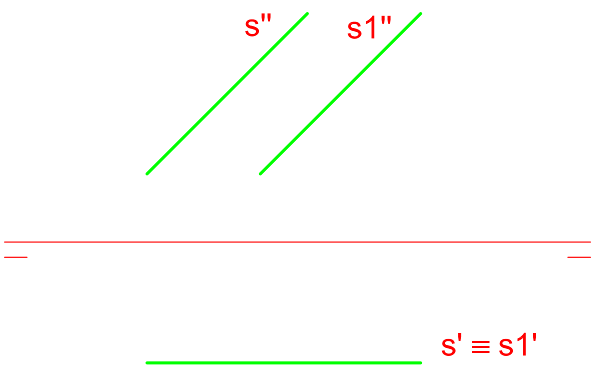
195) (β) ≡ plano (r;s)



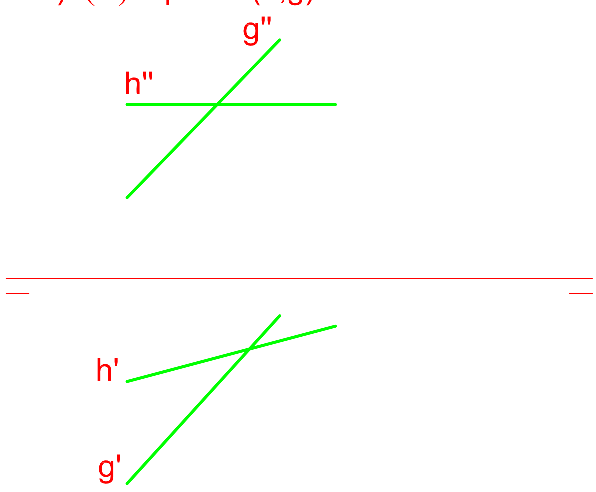
196) (γ) ≡ plano (f;g)



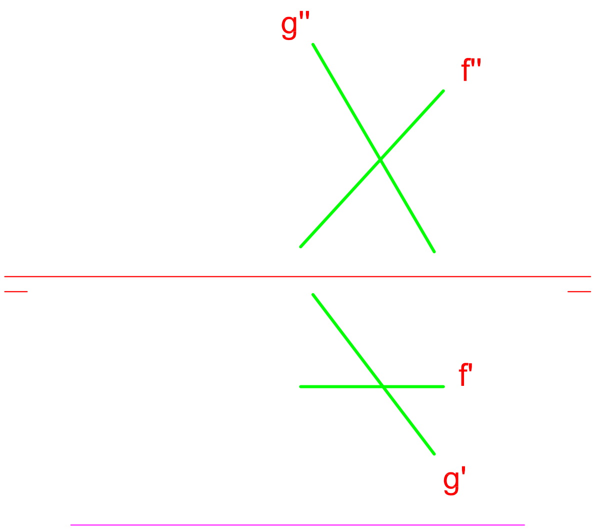
197) (λ) ≡ plano (s;s1)



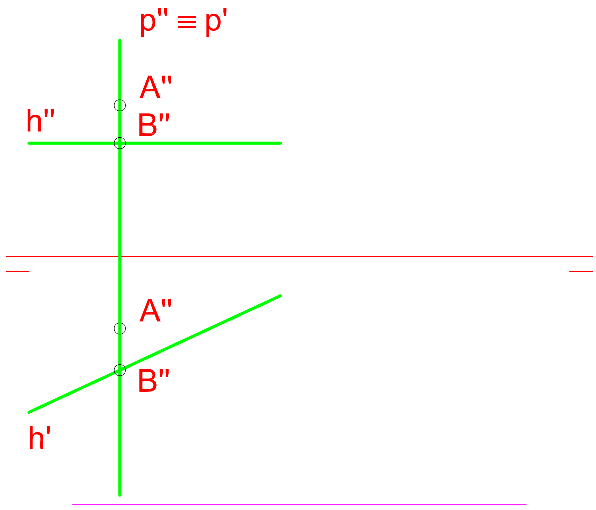
198) (ω) ≡ plano (h;g)



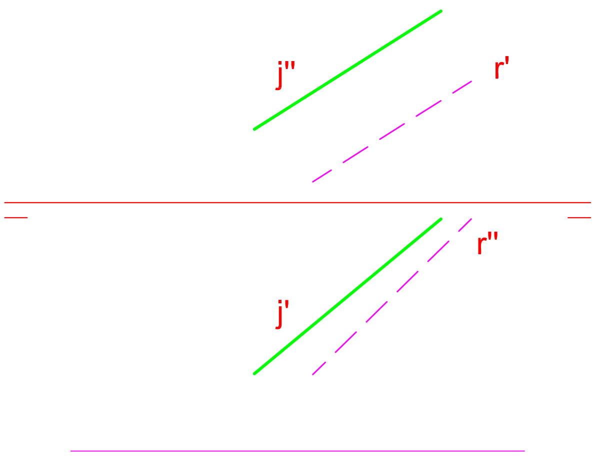
199) $(\alpha) \equiv$ plano (f;g)



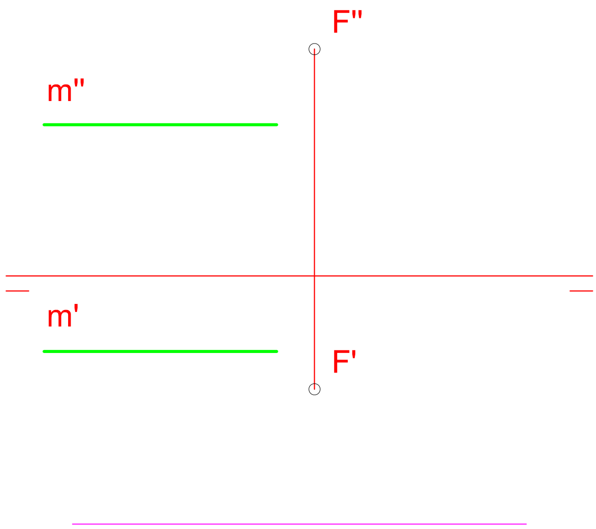
200) $(\beta) \equiv$ plano (h;p)



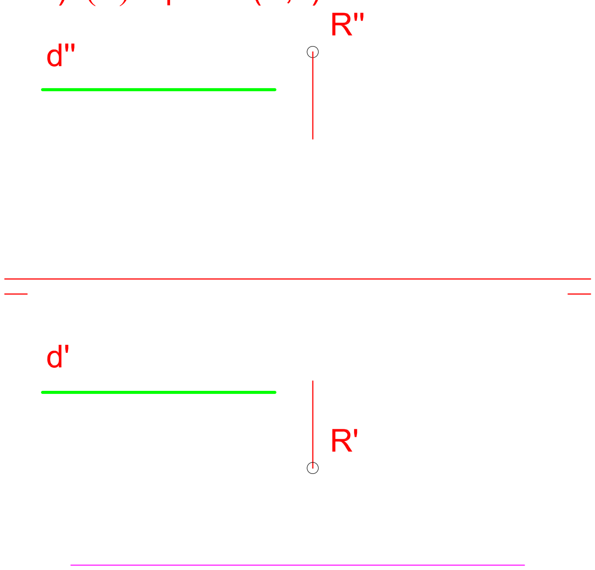
201) $(\delta) \equiv$ plano (j;r)



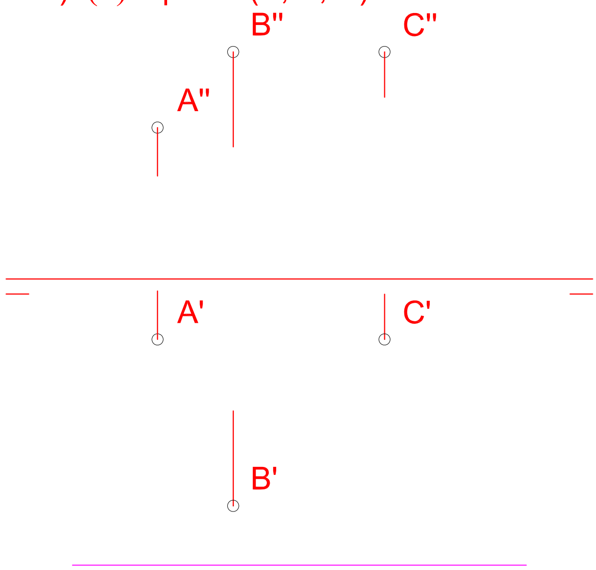
202) $(\gamma) \equiv$ plano (F;m)



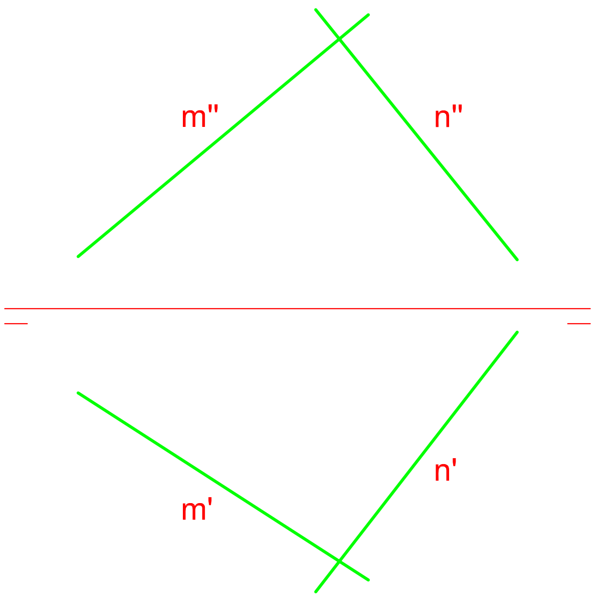
203) $(\omega) \equiv$ plano (R;d)



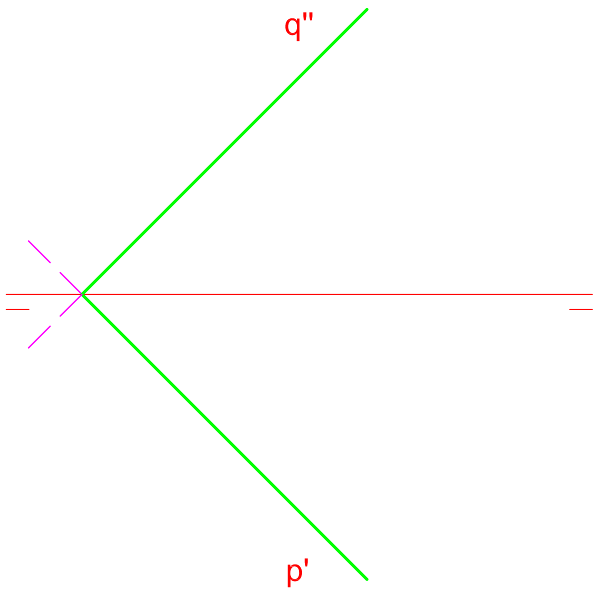
204) $(\lambda) \equiv$ plano (A; B; C)



205) Representar $(r) \subset (\alpha)$, sabendo-se que (r) é reta de máxima declividade de (α) e que $(\alpha) \equiv$ plano (m;n).

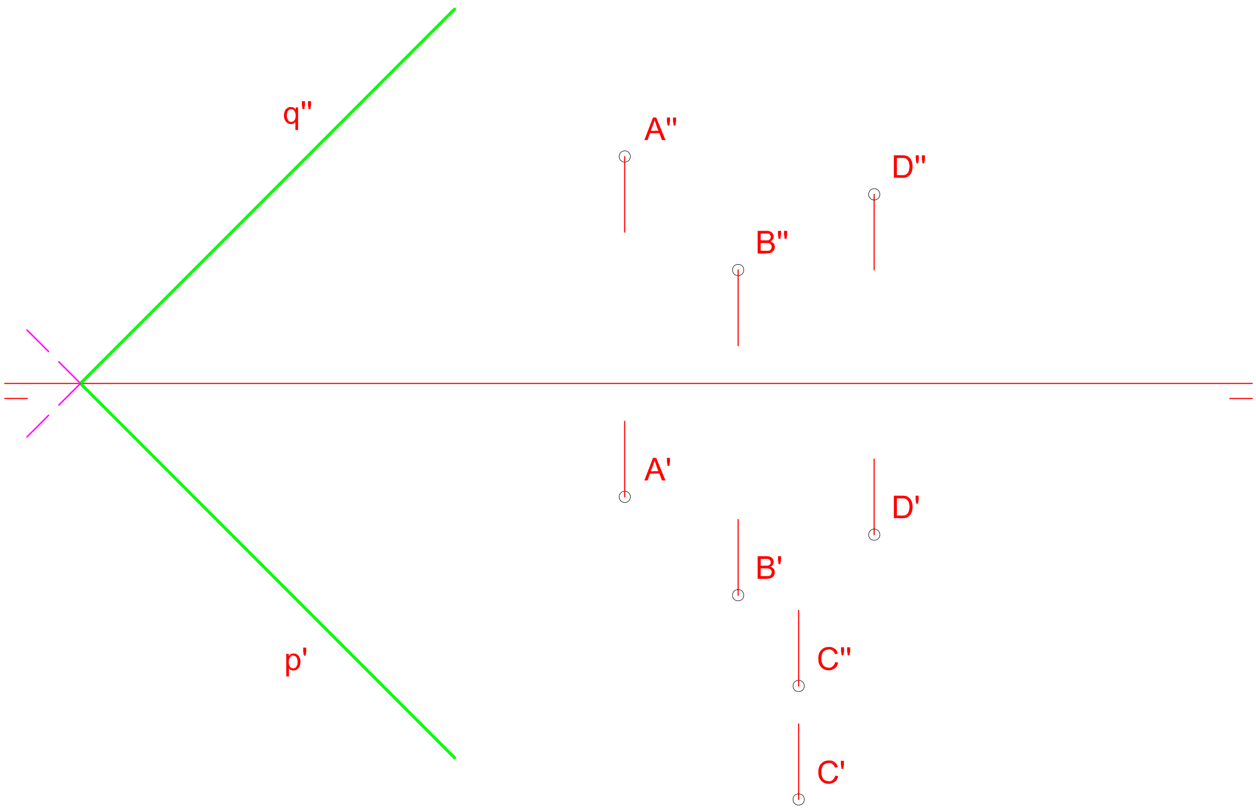


206) Representar $(j) \subset (\beta)$, sabendo-se que (j) é reta de máxima declividade de (β) e que $(\beta) \equiv$ plano (p;q).



207) Representar:

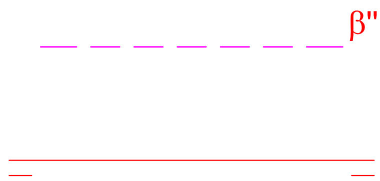
a) $(s) // (\delta)$, sabendo-se que $(A) \in (s)$, $(s) // (\pi')$;
b) $(j) // (\delta)$, sabendo-se que $(B) \in (j)$, $(j) // (\pi'')$;
c) $(u) // (\delta)$, sabendo-se que $(C) \in (u)$, $(u) \not\perp (\pi')$ ^ $\not\perp (\pi'')$;
d) $(x) // (\delta)$, sabendo-se que $(D) \in (x)$, $(x) \not\perp (\pi')$ ^ $\not\perp (\pi'')$, $(x) \subset (\beta)$, sendo $(\beta) \perp \pi'\pi''$ e que $(\delta) \equiv$ plano (p;q).



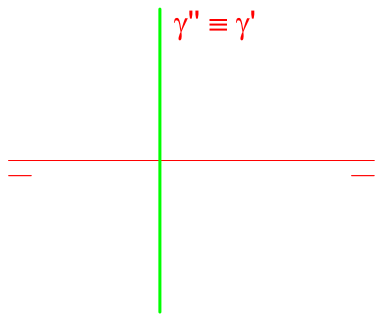
Nas épuras 208 a 214 representar, em cada uma delas, um reta paralela ao plano dado.

208)

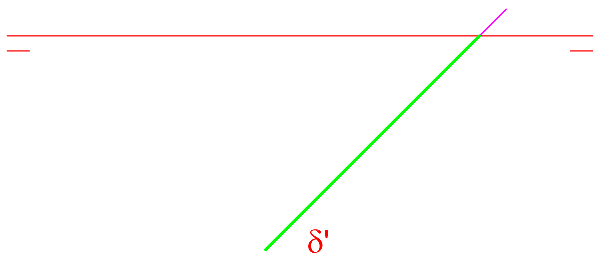
209)



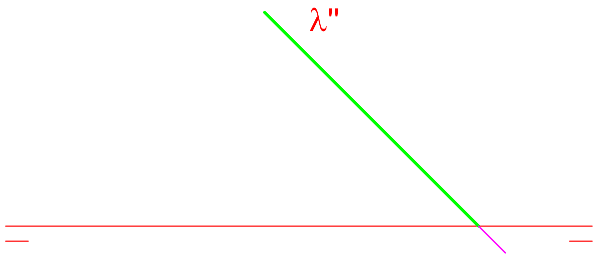
210)



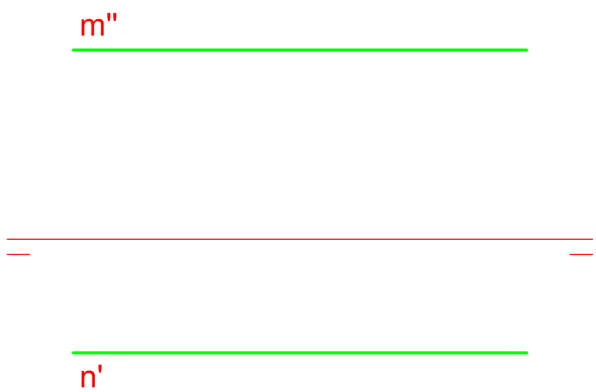
211)



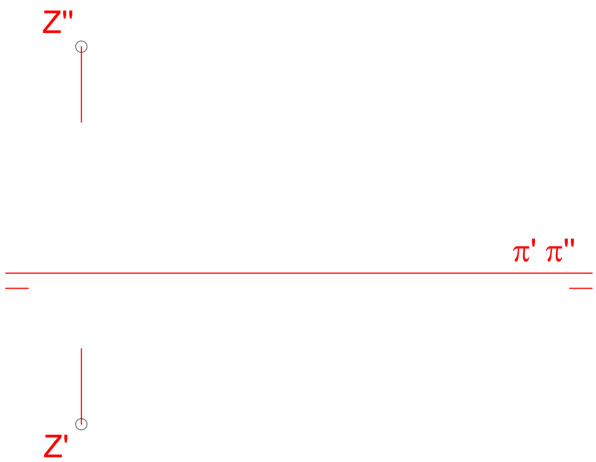
212)



213) (α) ≡ plano (m; n)

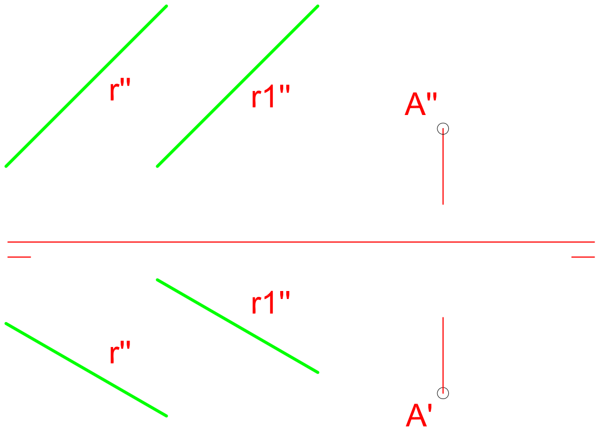


214) (δ) ≡ plano (Z; π' π'')



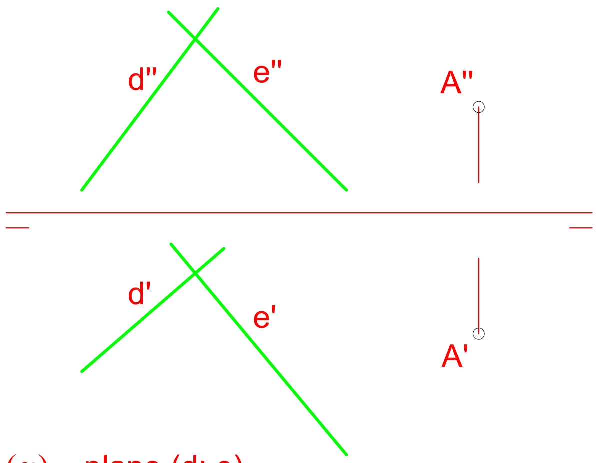
Nas épuras 215 a 221 representar, pelos seus traços, α1 // α, sabendo-se que (A) ∈ α1.

215)



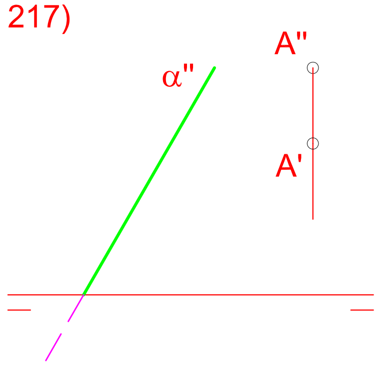
(α) ≡ plano (r; r1)

216)

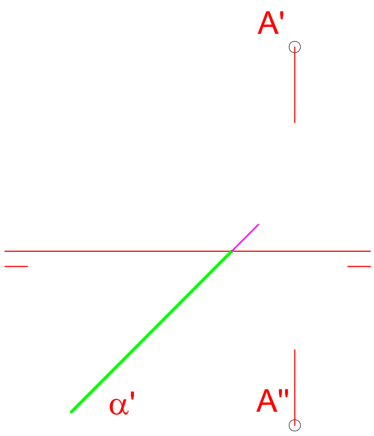


(α) ≡ plano (d; e)

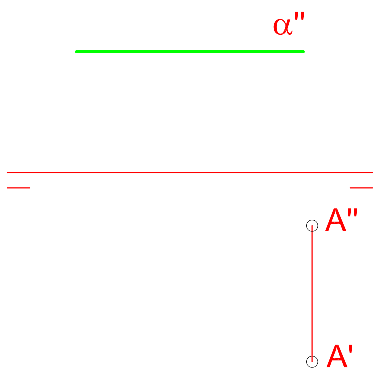
217)



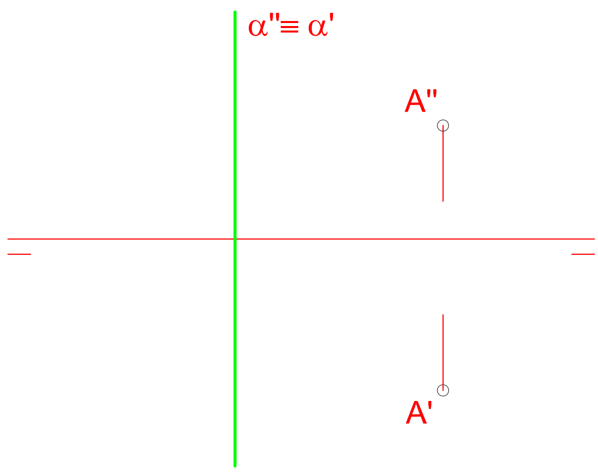
218)



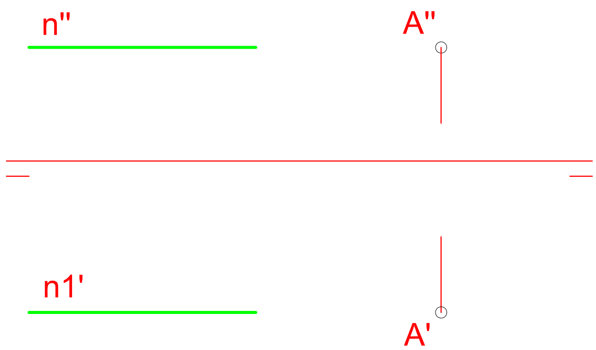
219)



220)



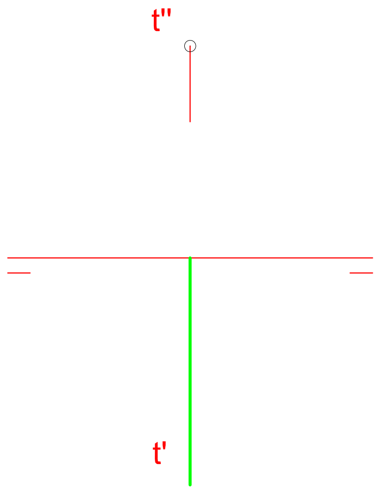
221)



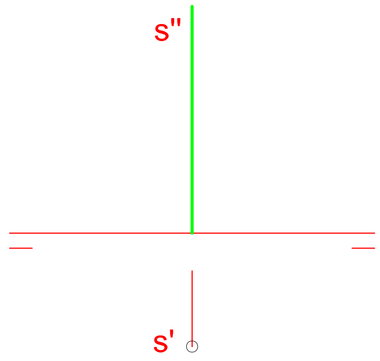
(α) ≡ plano (n; n1)

Nas épuras 222 a 230, representar uma reta perpendicular à reta dada.

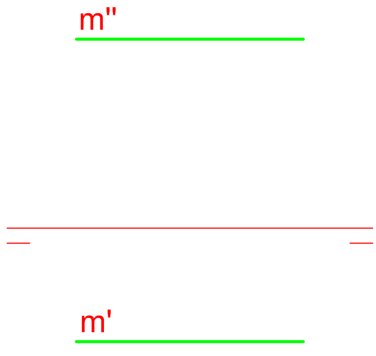
222)



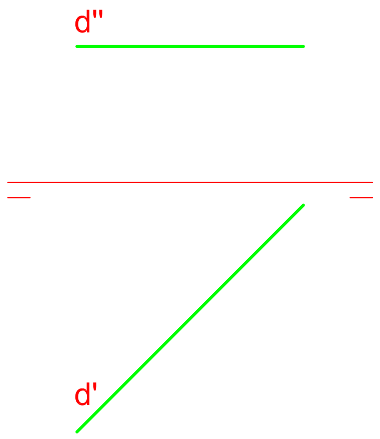
223)



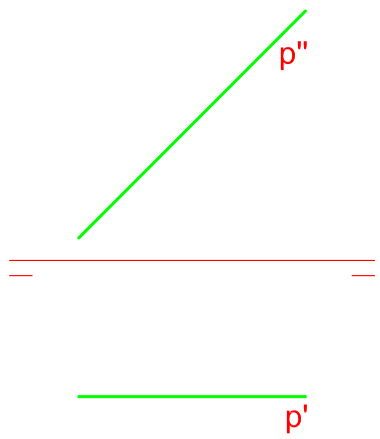
224)



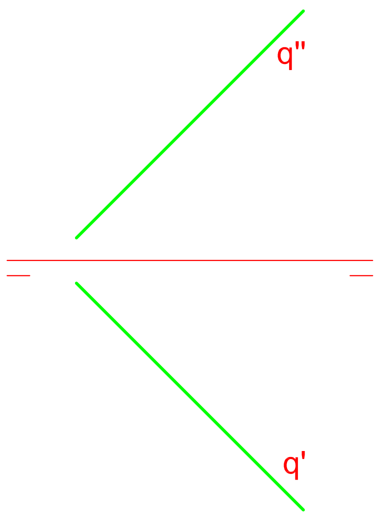
225)



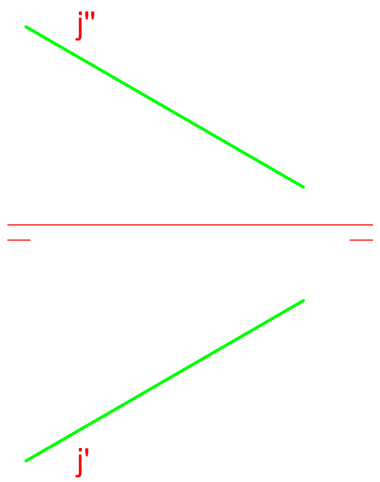
226)



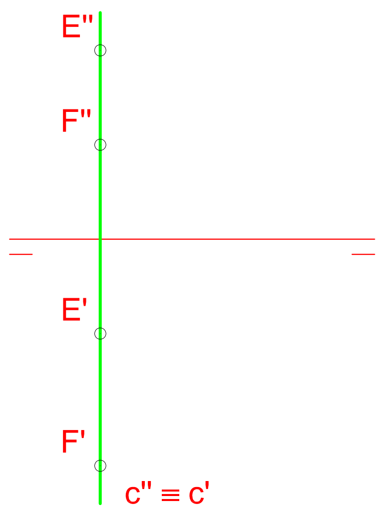
227)



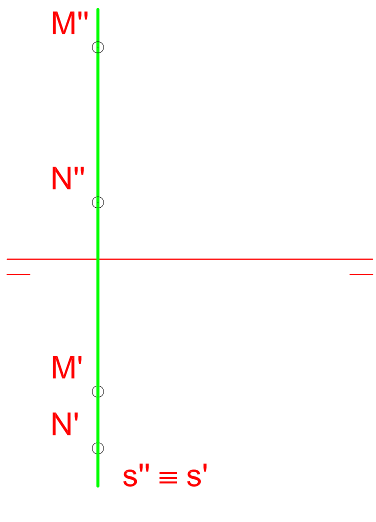
228)



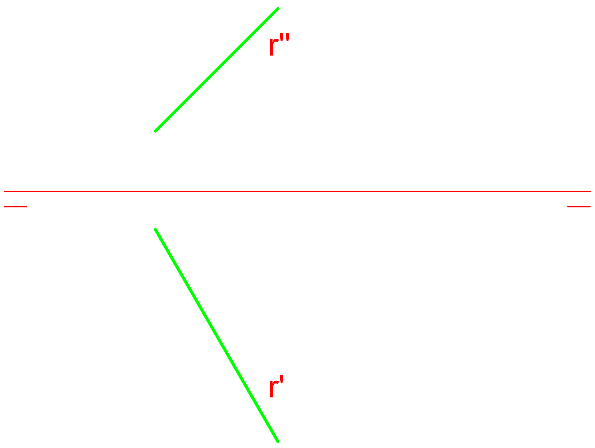
229)



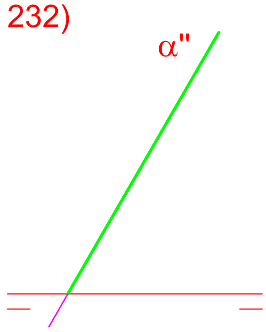
230)



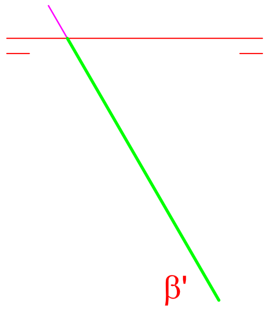
231) Representar (m) $\perp$ (r), sabendo-se que (m) $\not\perp$ π' ^ $\not\perp$ π''.



232)



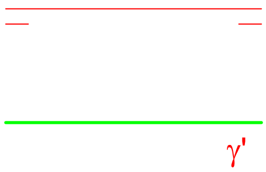
233)



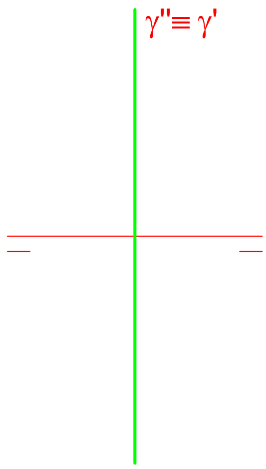
Nas épuras 232 a 239, representar uma reta perpendicular ao plano dado.

234)

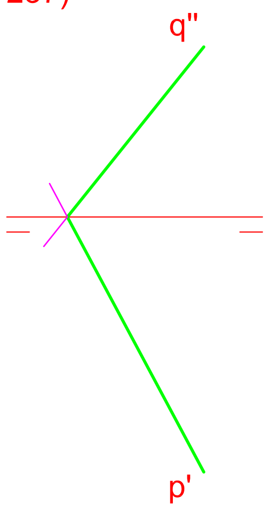
235)



236)

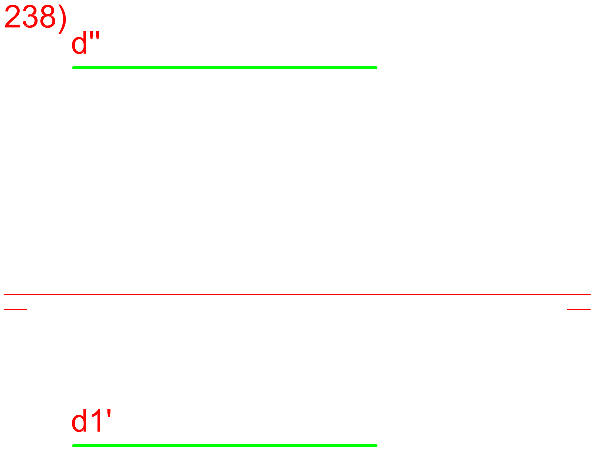


237)



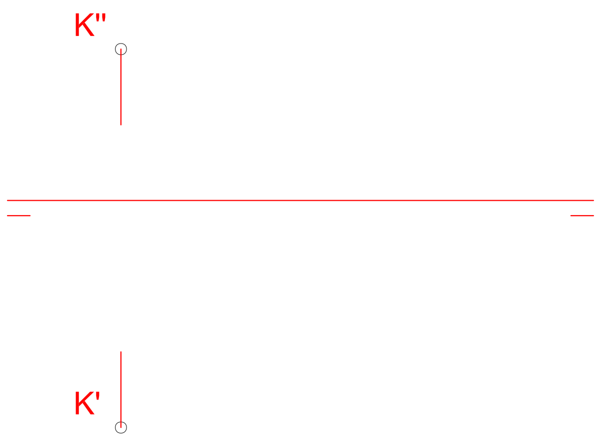
(α) ≡ plano (p; q)

238)



(ω) ≡ plano (d; d1)

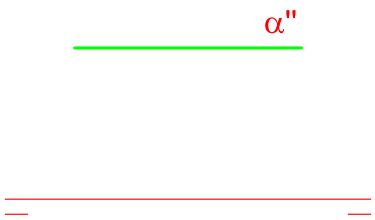
239)



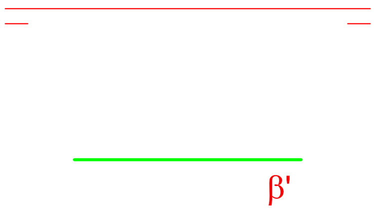
(δ) ≡ plano (K; π'π'')

Nas épuras 240 a 247, representar um plano perpendicular ao plano dado.

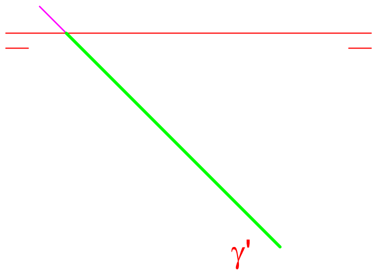
240)



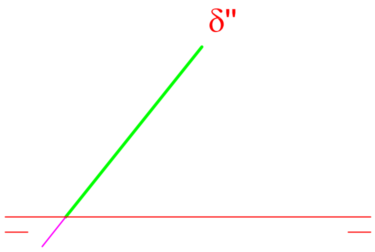
241)



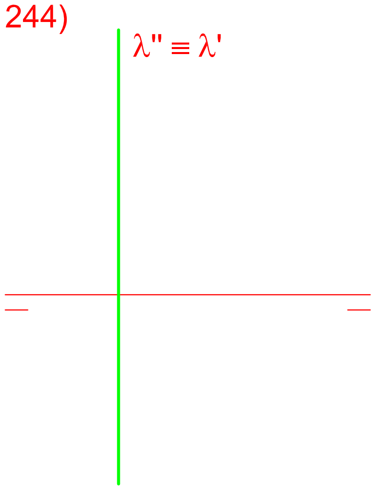
242)



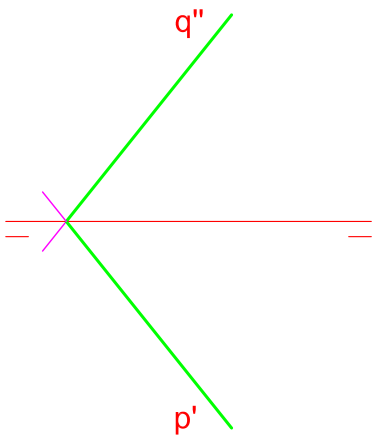
243)



244)



245)

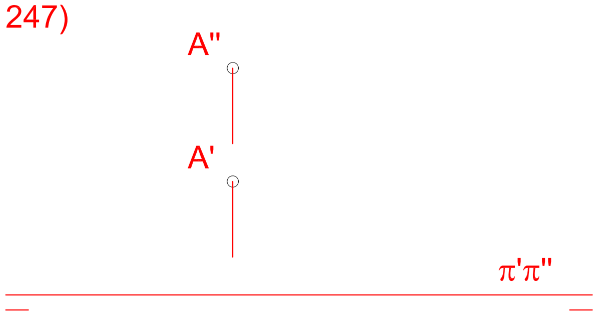


(α) ≡ plano (p; q)

246)

(β) ≡ plano (n; n1)

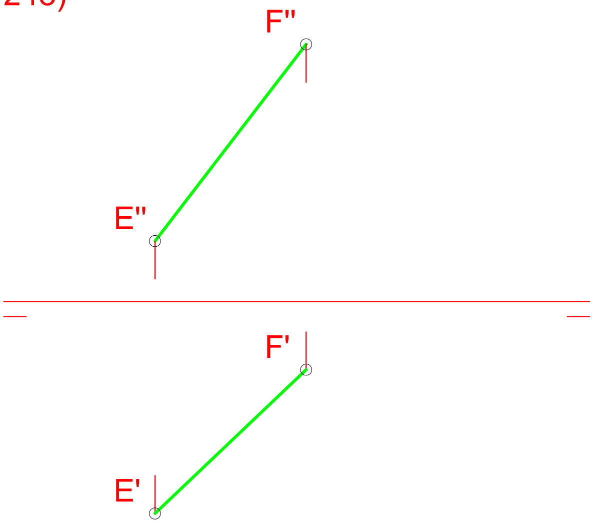
247)



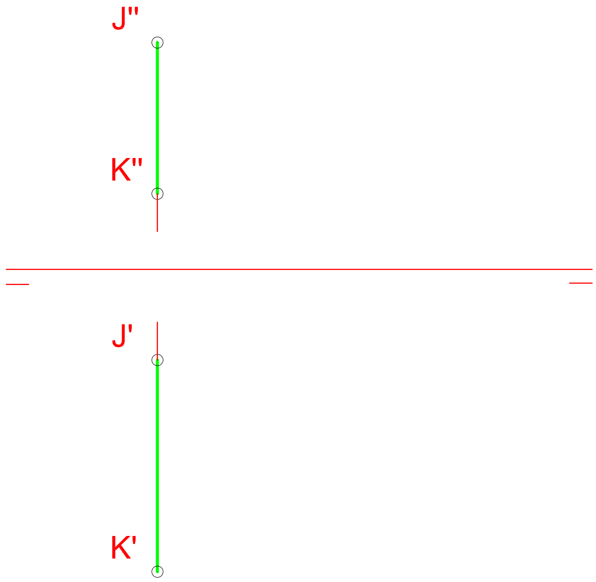
(δ) ≡ plano (A; π'π")

Nas épuras 248 a 249, utilizando o Método de Rebatimento, determinar a verdadeira grandeza dos segmentos representados.

248)

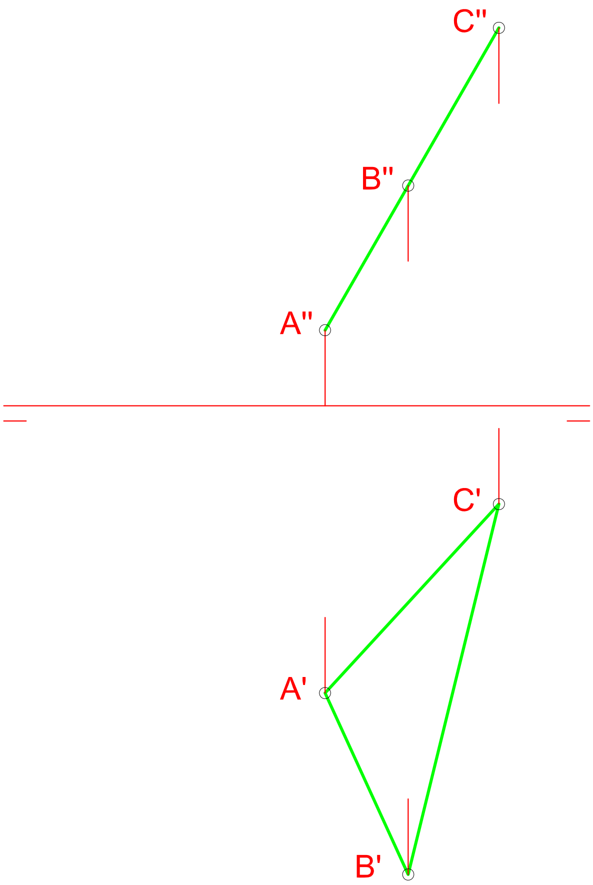


249)

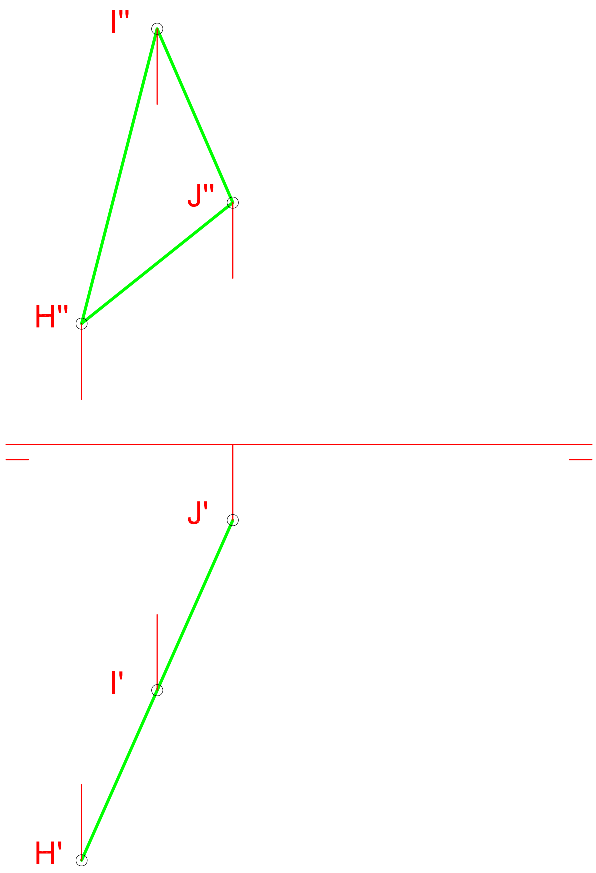


Nas épuras 250 a 255, através de rebatimento, determinar a verdadeira grandeza da figura dada.

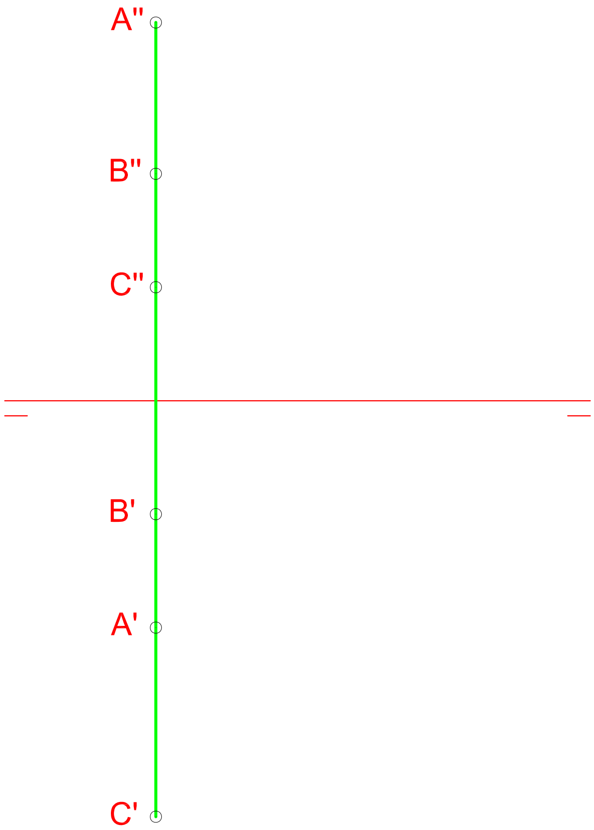
250)



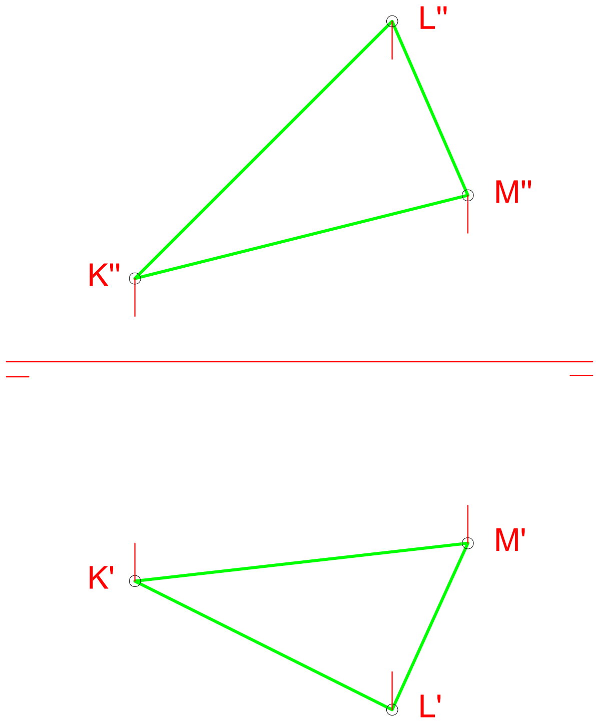
251)



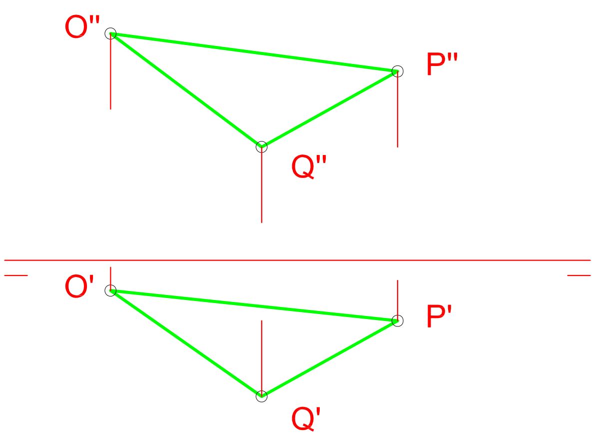
252)



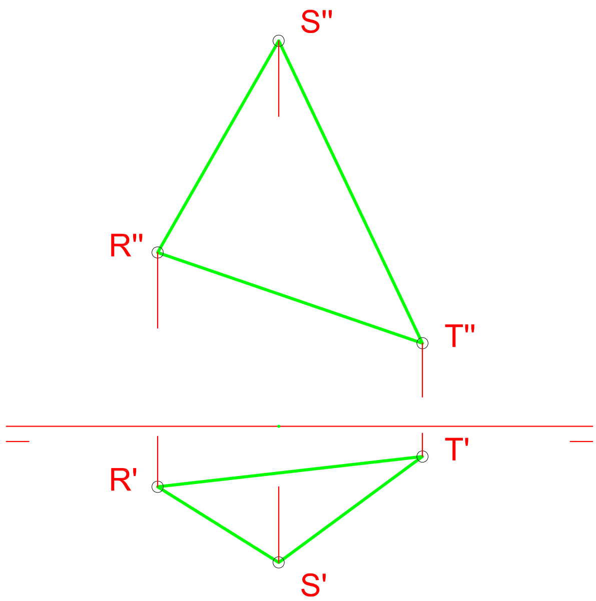
253)



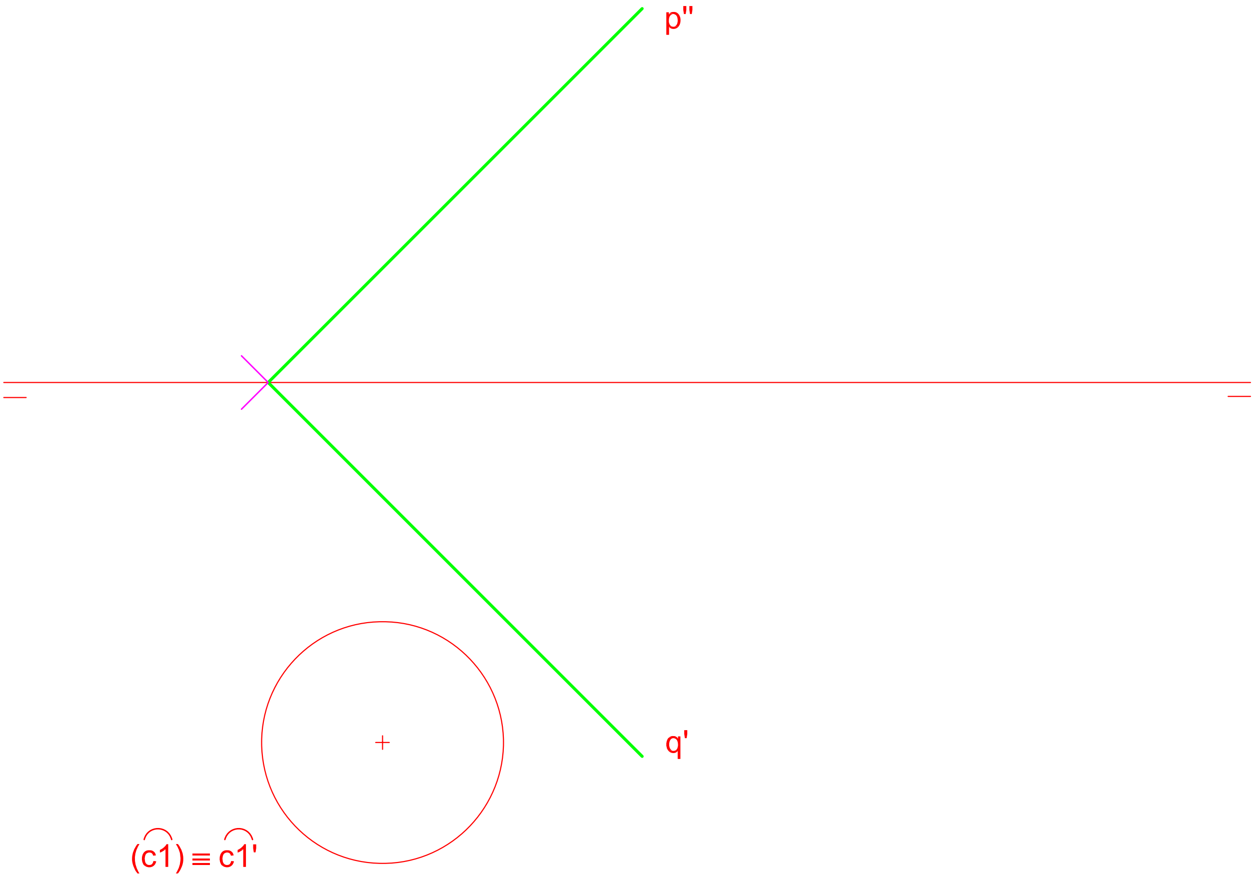
254)



255)

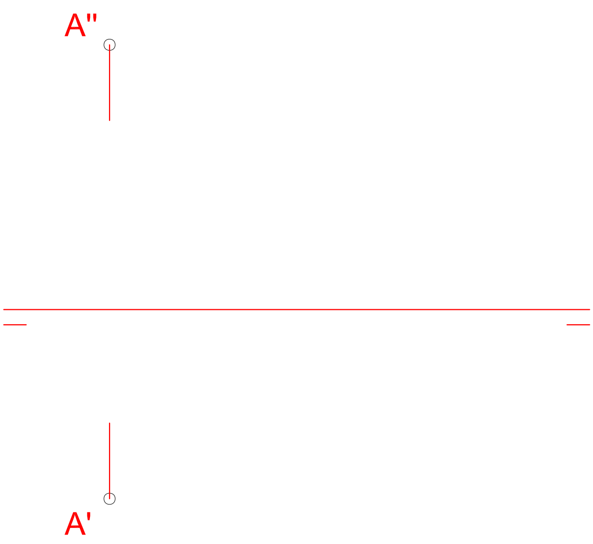


256) Dada a curva $(\overset{\frown}{c1})$, rebatimento de $(\overset{\frown}{c}) \subset (\alpha)$, alçar $(\overset{\frown}{c})$ para (α), utilizando o alçamento das horizontais de (α) e sabendo que $(\alpha) \equiv$ plano (p;q).

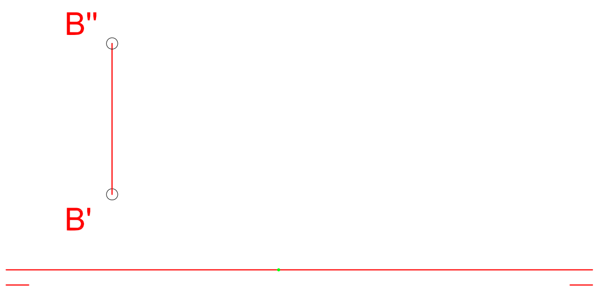


Nas épuras 257 a 267 resolver os exercícios utilizando o Método de Rotações.

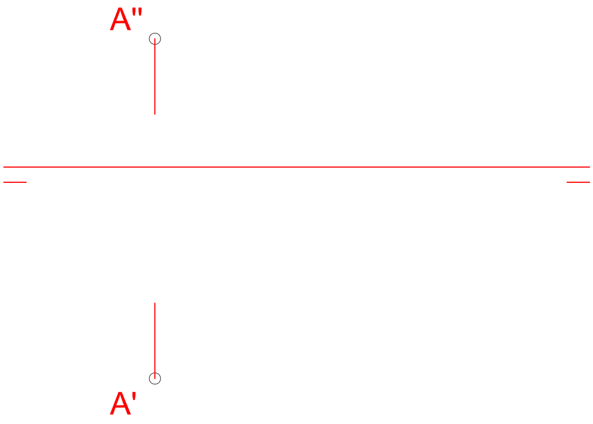
257) Fazer com que (A) venha a pertencer ao 3º diedro e ao bissetor.



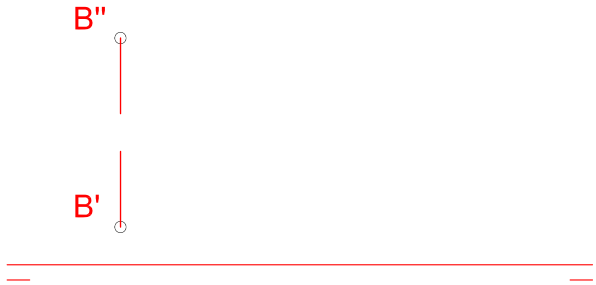
258) Localizar (B) no 4º diedro e no bissetor.



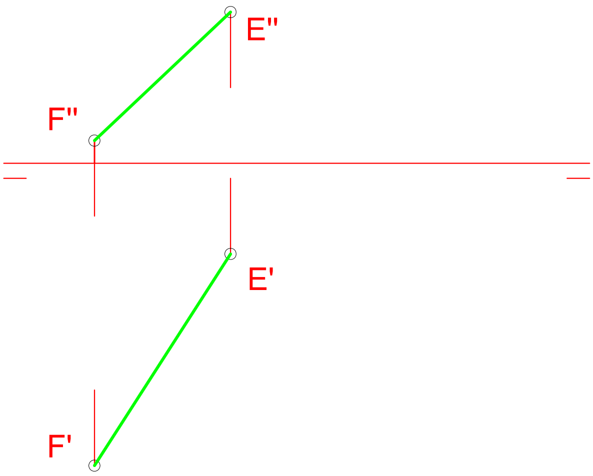
259) Rotar (A) para π''.



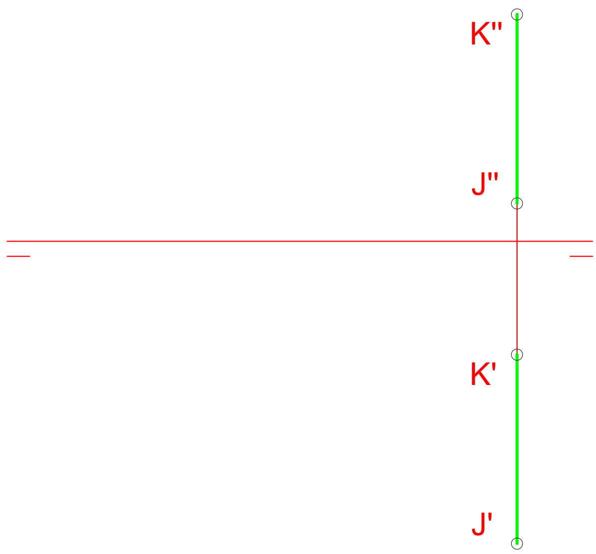
260) Rotar (B) para π'.



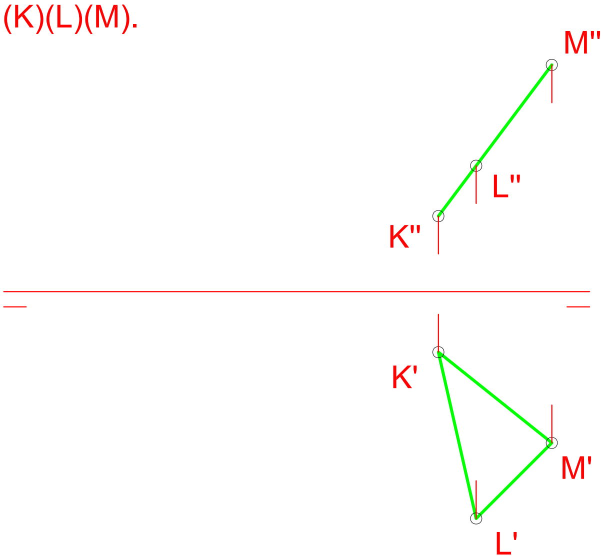
261) Determinar a V.G. de $\overline{(E)\,(F)}$.



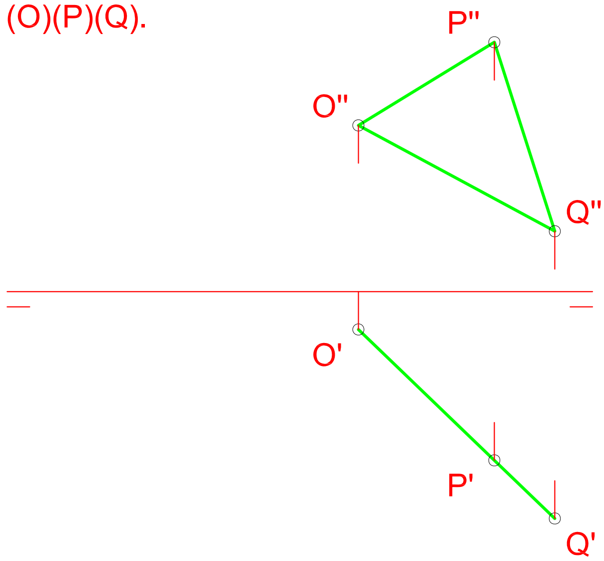
262) Determinar a V.G. de $\overline{(J)\,(K)}$.



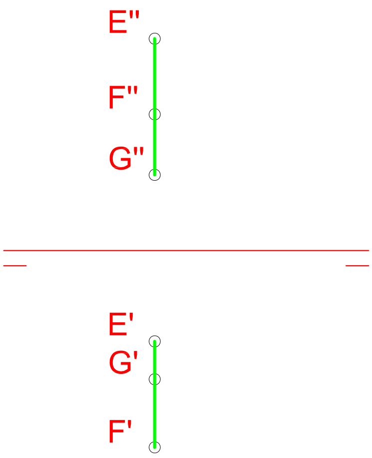
263) Determinar a V.G. do triângulo (K)(L)(M).



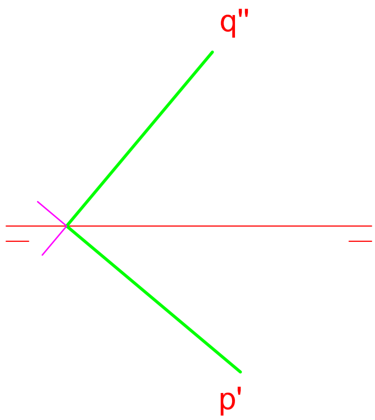
264) Determinar a V.G. do triângulo (O)(P)(Q).



265) Determinar a V.G.

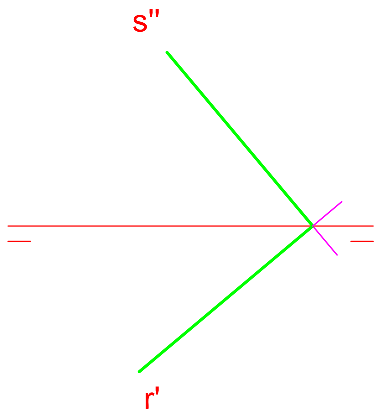


266) Tornar (α) de tôpo.



(α) ≡ plano (p;q)

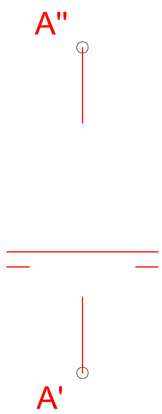
267) Tornar (δ) vertical.



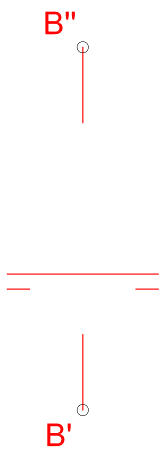
(δ) ≡ plano (r;s)

Nas épuras 268 a 286 solucionar pelo Método de Mudança de Plano de Projeção.

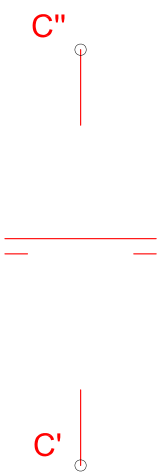
268) Passar (A) para o 2º diedro.



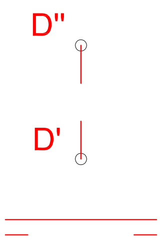
269) Passar (B) para o 4º diedro.



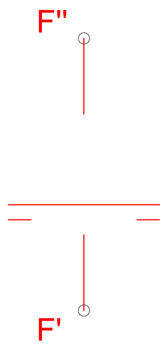
270) Passar (C) para o 3º diedro e bissetor.



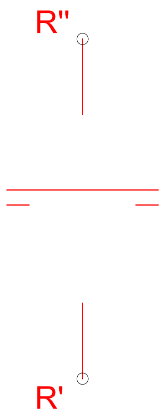
271) Passar (D) para o 4º diedro e bissetor.



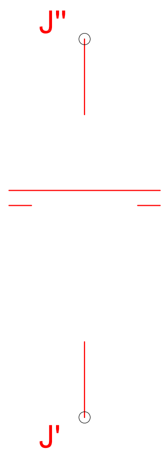
272) (F) $\in (\pi'+)$.



273) (E) $\in (\pi''+)$.

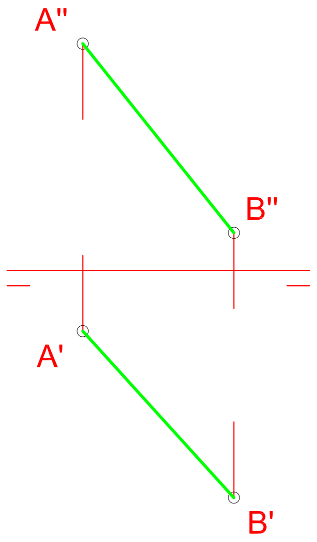


274) (J) $\in (\pi'-)$.

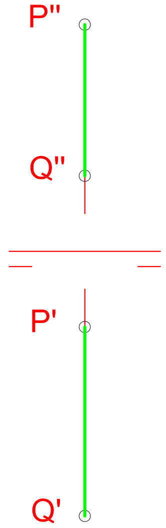


Nas épuras 275 e 276 determinar a verdadeira grandeza do segmento dado.

275)

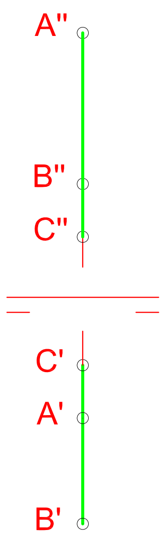


276)

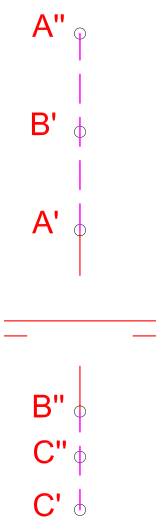


Nas épuras 277 a 281 determine a verdadeira grandeza das figuras planas dadas.

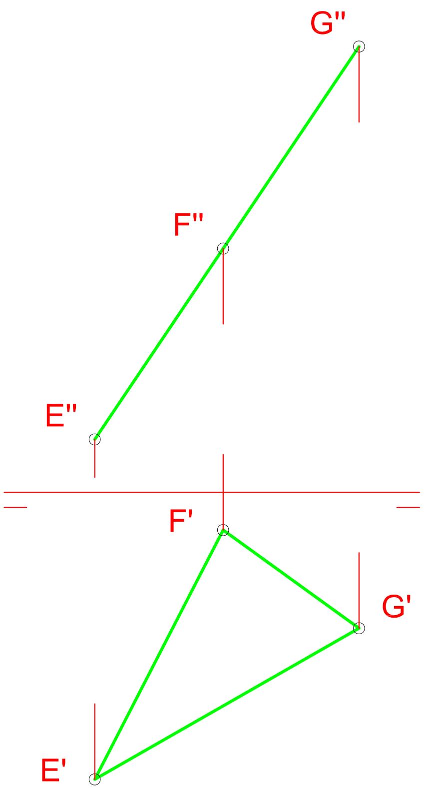
277)



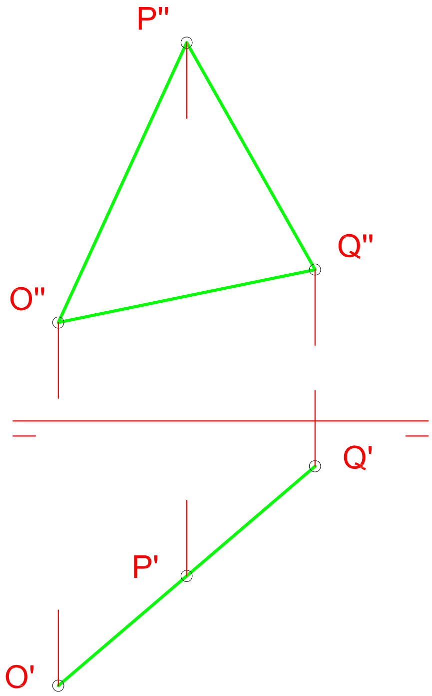
278)



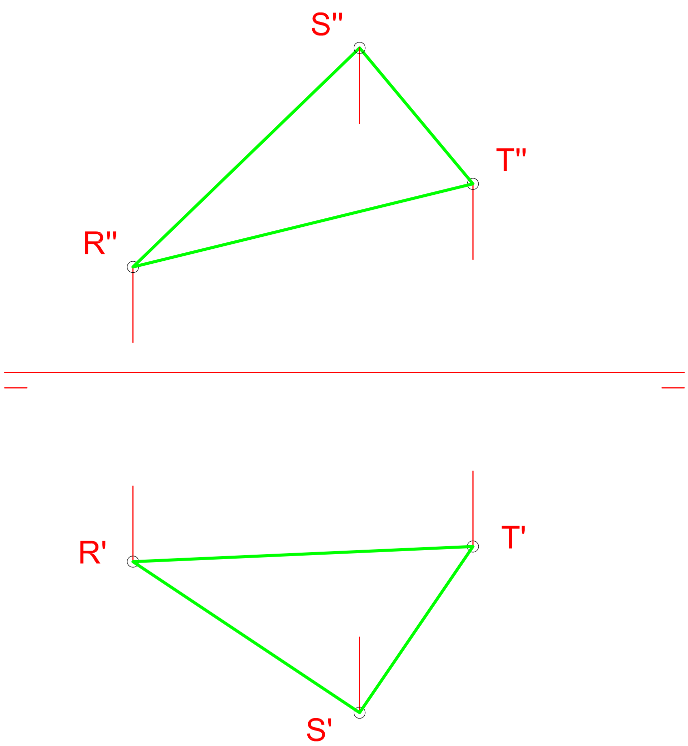
279)



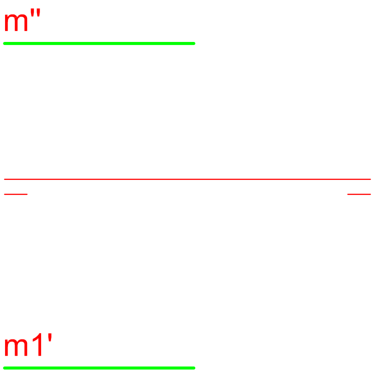
280)



281)

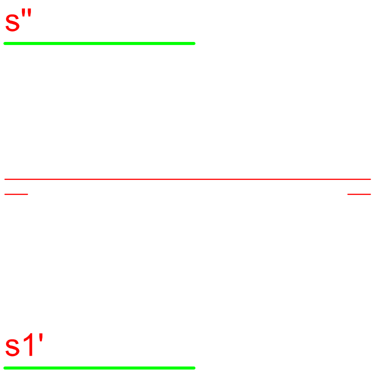


282) Tornar (α) de tôpo.



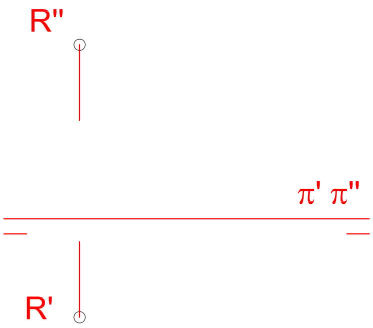
(α) ≡ plano (m; m1)

283) Tornar (β) vertical.



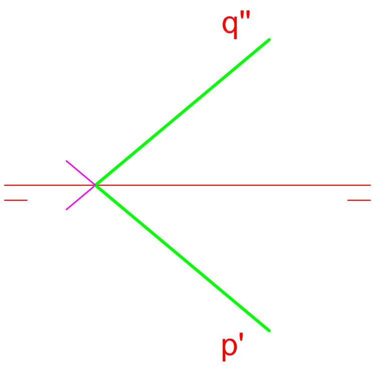
(β) ≡ plano (s; s1)

284) Tornar (γ) de tôpo.



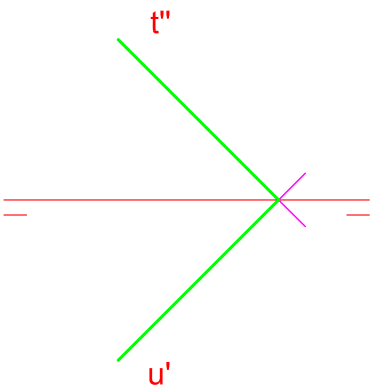
(γ) ≡ plano (R; π' π'')

285) Tornar (δ) de tôpo.



(δ) ≡ plano (p; q)

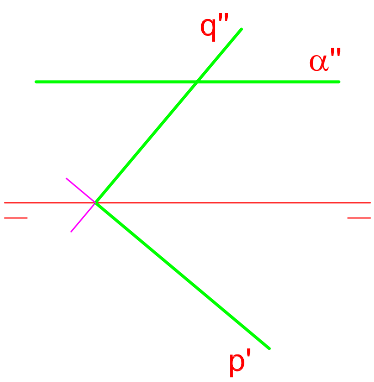
290) Tornar (σ) vertical.



(σ) ≡ plano (t; u)

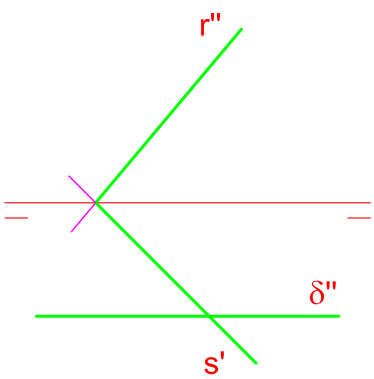
Nas épuras 287 a 323 determine a curva (i) de intersecção entre os planos dados.

287)



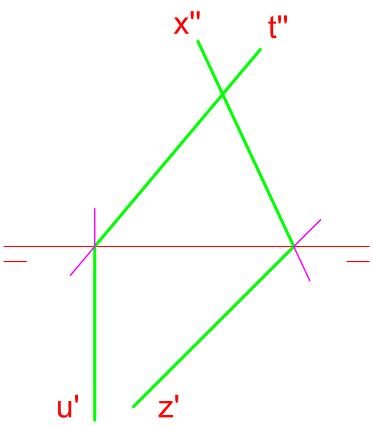
(λ) ≡ plano (p; q)

288)



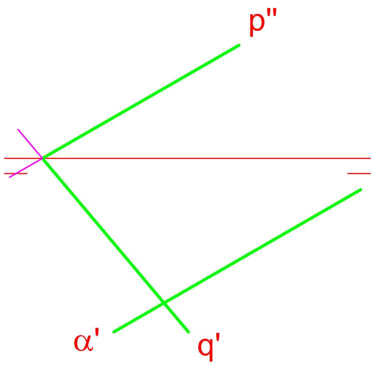
(ω) ≡ plano (r; s)

289)

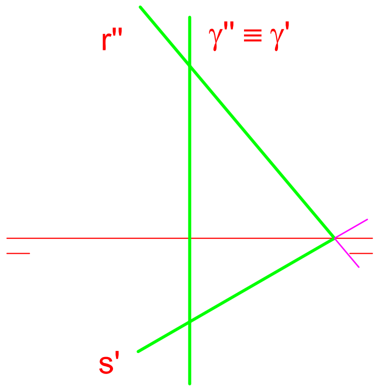


(α) ≡ plano (x; z)
(β) ≡ plano (t; u)

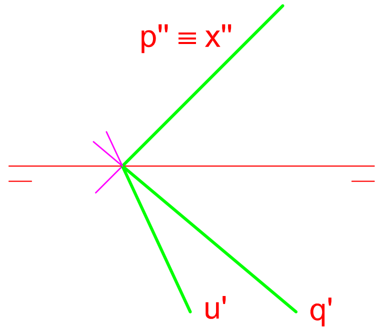
290) $(\delta) \equiv$ plano (p; q)



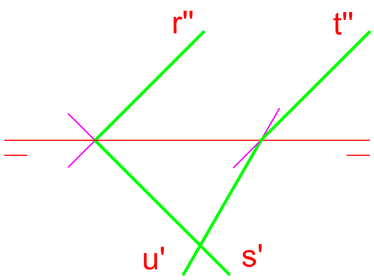
291) $(\beta) \equiv$ plano (r; s)



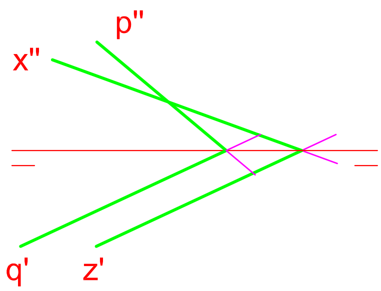
292) $(\alpha) \equiv$ plano (p; q)
$(\beta) \equiv$ plano (x; u)



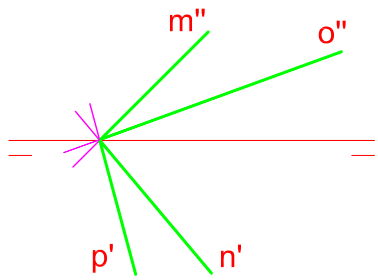
293) $(\lambda) \equiv$ plano (r; s)
$(\sigma) \equiv$ plano (t; u)



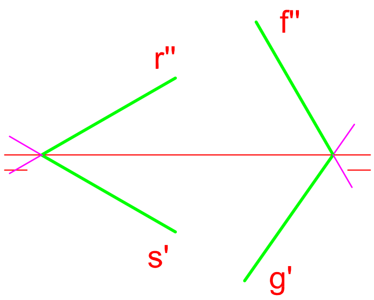
294) $(\alpha) \equiv$ plano (p; q)
$(\omega) \equiv$ plano (x; z)



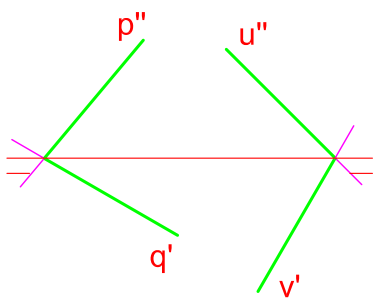
295) $(\beta) \equiv$ plano (m; n)
$(\delta) \equiv$ plano (o; p)



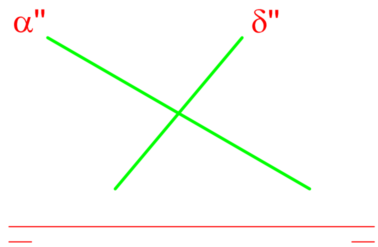
296) $(\gamma) \equiv$ plano (r; s)
$(\beta) \equiv$ plano (f; g)



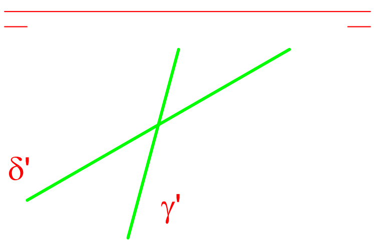
297) $(\omega) \equiv$ plano (p; q)
$(\delta) \equiv$ plano (u; v)



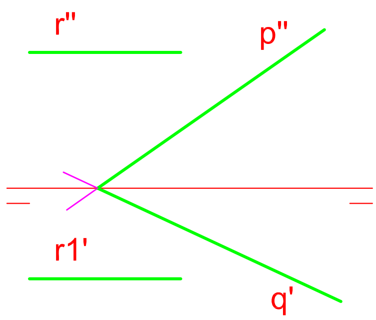
298)



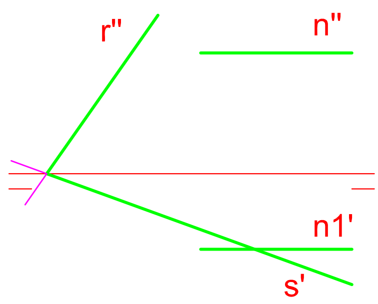
299)



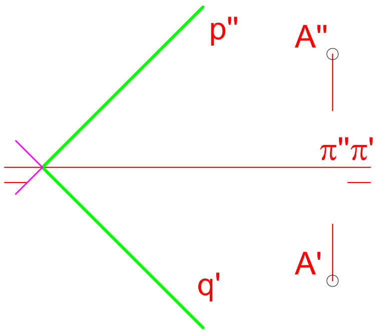
300) $(\alpha) \equiv$ plano (p; q)
$(\beta) \equiv$ plano (r; r1)



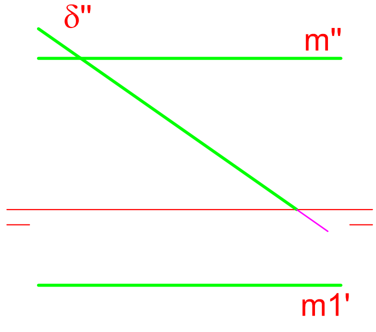
301) $(\delta) \equiv$ plano (r; s)
$(\gamma) \equiv$ plano (n; n1)



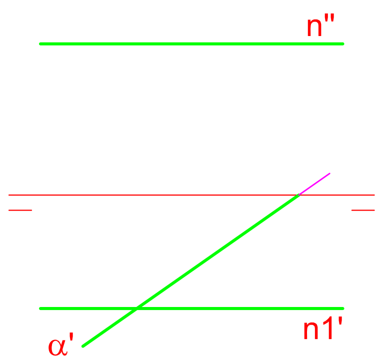
302) (α) ≡ plano (p; q)
(δ) ≡ plano (A; π"π')



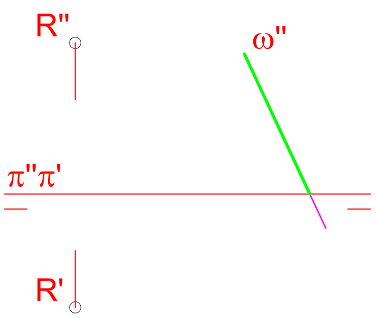
303) (ω) ≡ plano (m; m1)



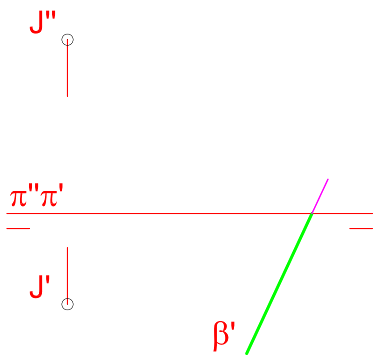
304) (β) ≡ plano (n; n1)



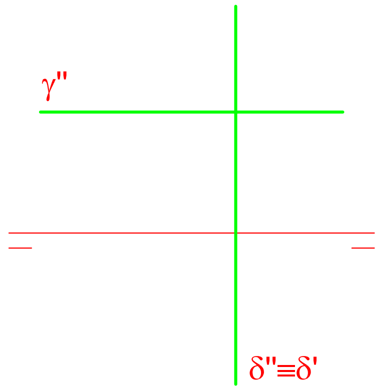
305) (α) ≡ plano (R; π"π')



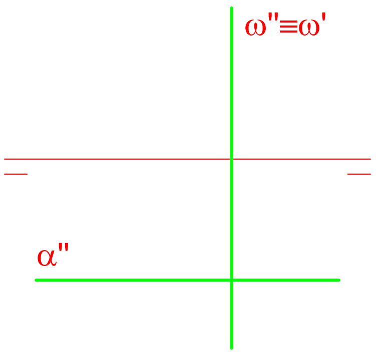
306) (δ) ≡ plano (J; π"π')



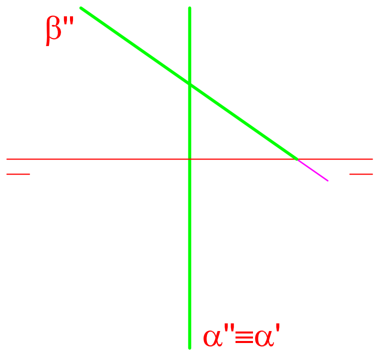
307)



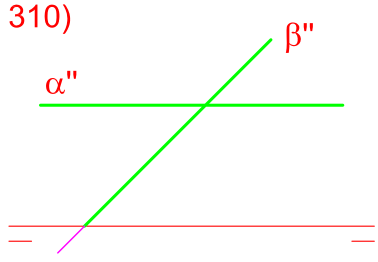
308)



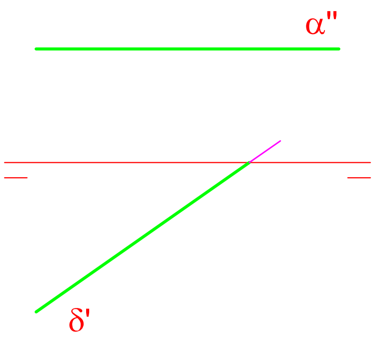
309)



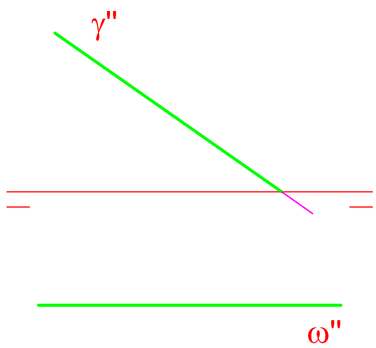
310)



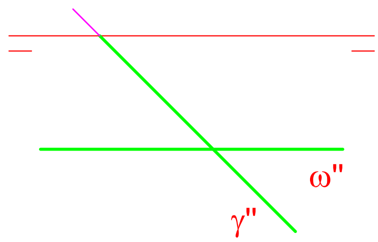
311)



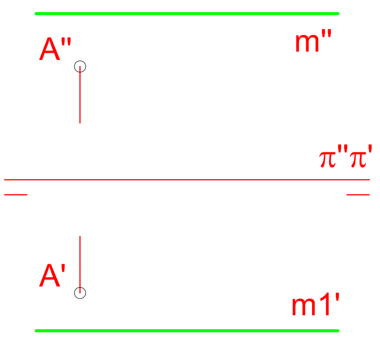
312)



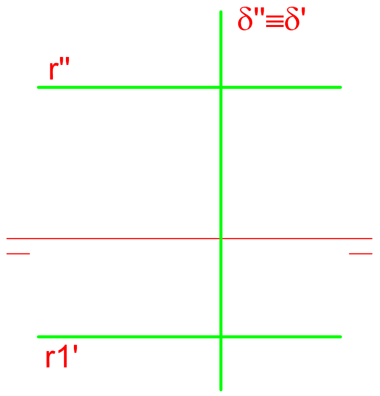
313)



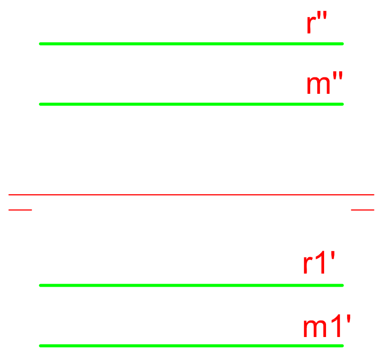
314) (δ) ≡ plano (m; m1)
(α) ≡ plano (A; π"π')



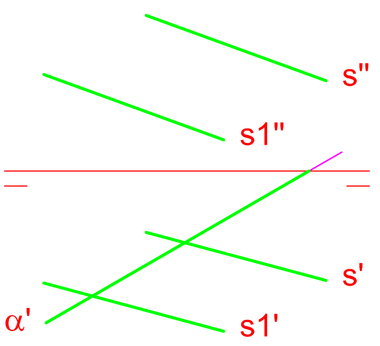
315) (α) ≡ plano (r; r1)



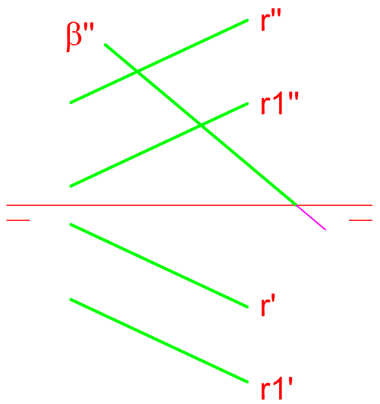
316) (α) ≡ plano (m; m1)
(β) ≡ plano (r; r1)



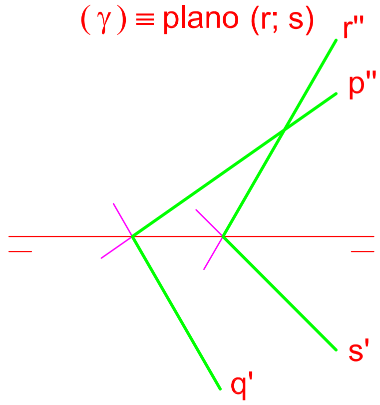
317) (γ) ≡ plano (s; s1)



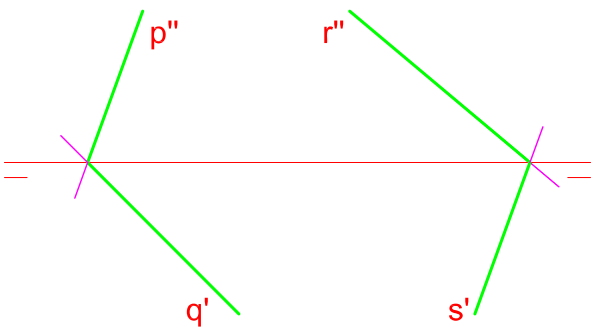
318) (α) ≡ plano (r; r1)



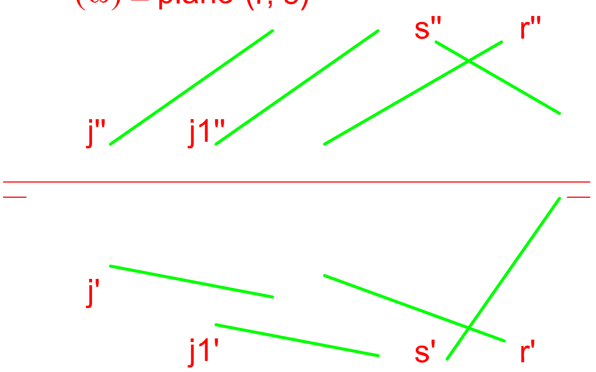
319) (δ) ≡ plano (p; q)
(γ) ≡ plano (r; s)



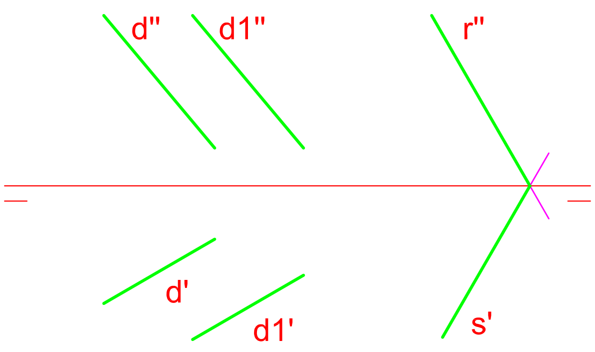
320) (λ) ≡ plano (p; q)
(ω) ≡ plano (r; s)



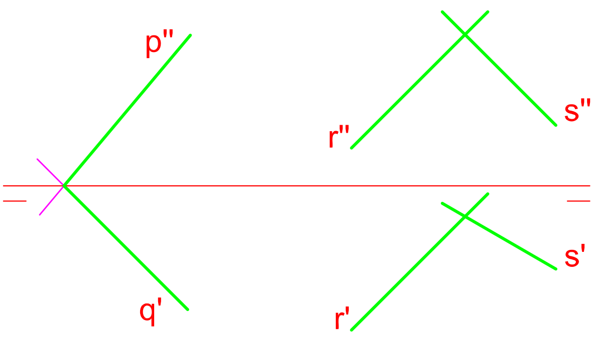
321) (σ) ≡ plano (j; j1)
(ω) ≡ plano (r; s)



322) (α) ≡ plano (r; s)
(β) ≡ plano (d; d1)

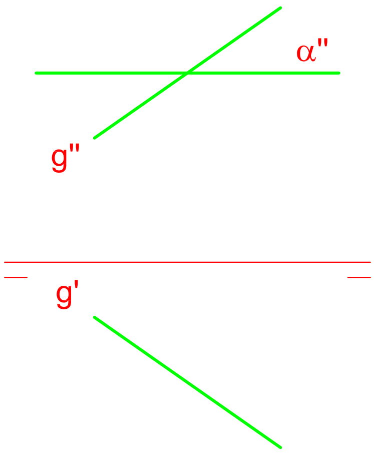


323) (δ) ≡ plano (r; s)
(γ) ≡ plano (p; q)

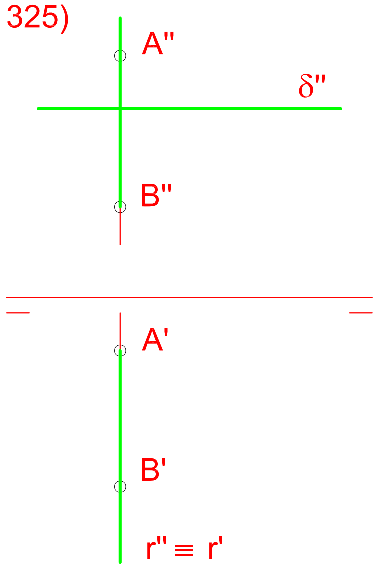


Nas épuras 324 a 337 determine a intersecção (T) entre a reta e o plano dado.

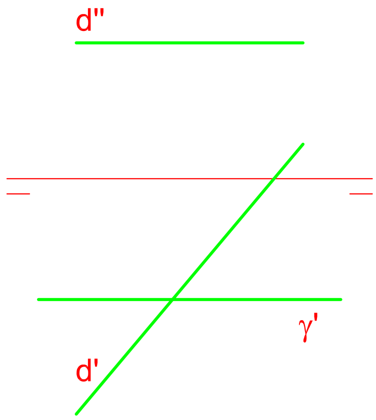
324)



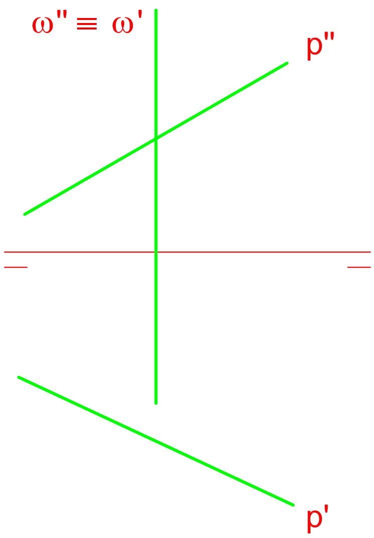
325)



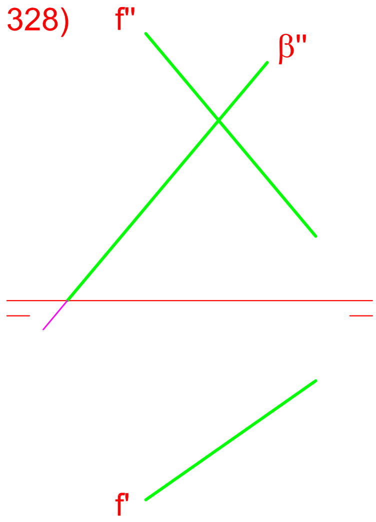
326)



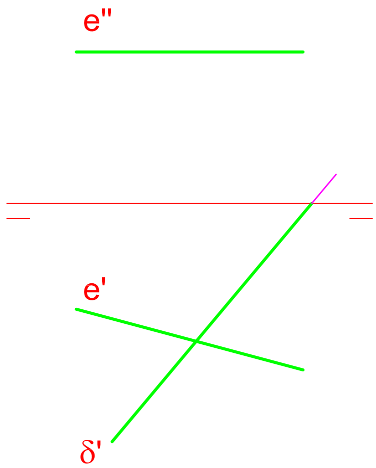
327)



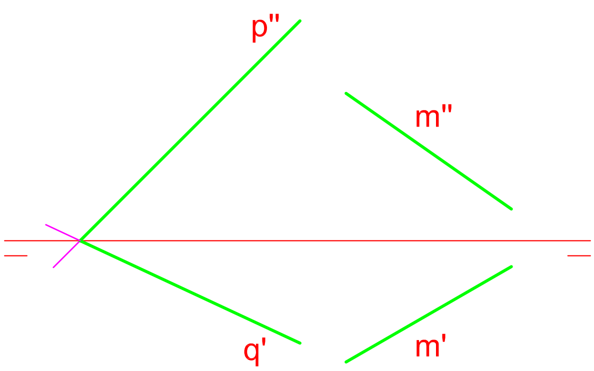
328)



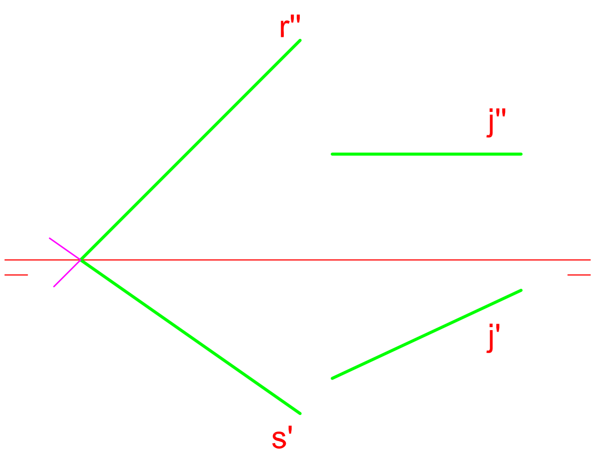
329)



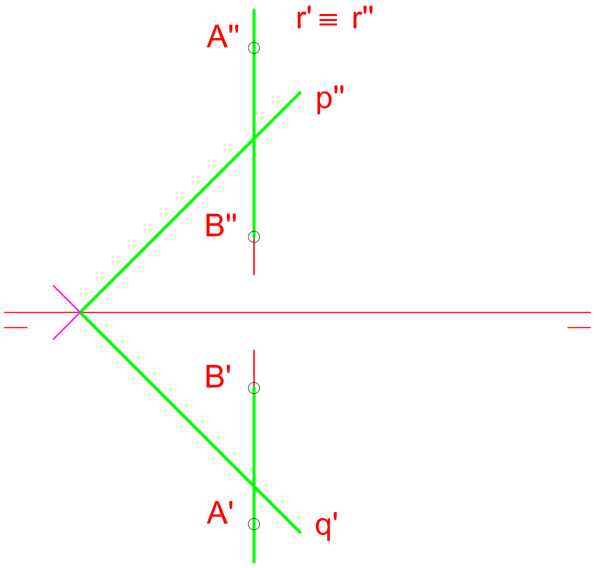
330) $(\alpha) \equiv$ plano (q; p)



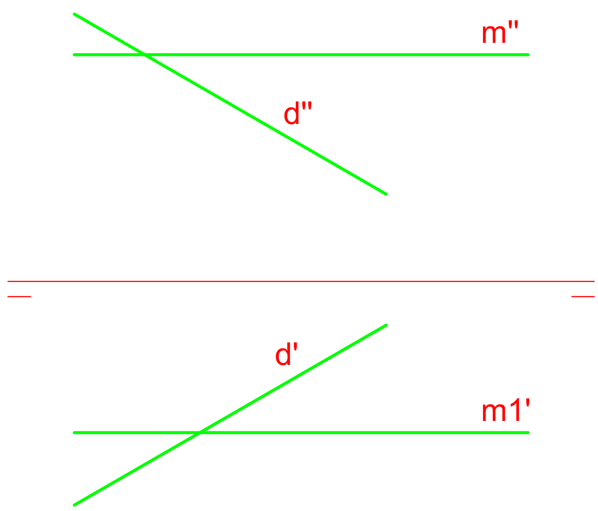
331) $(\lambda) \equiv$ plano (r; s)



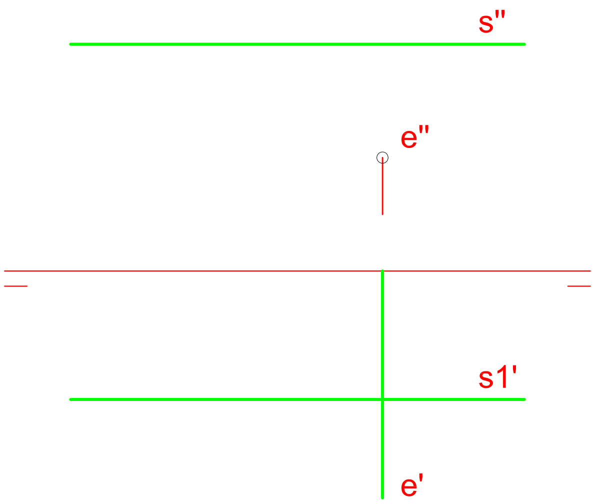
332) $(\alpha) \equiv$ plano (p; q)



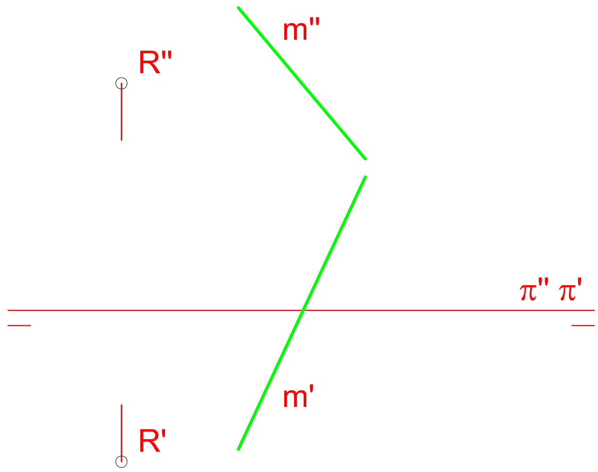
333) $(\beta) \equiv$ plano (m; m1)



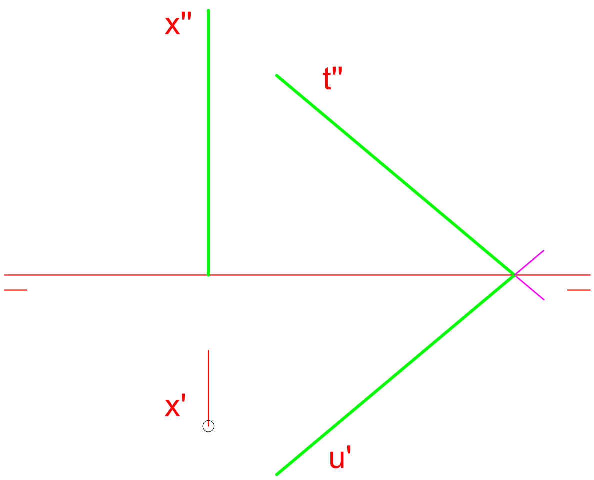
334) $(\delta) \equiv$ plano (s; s1)



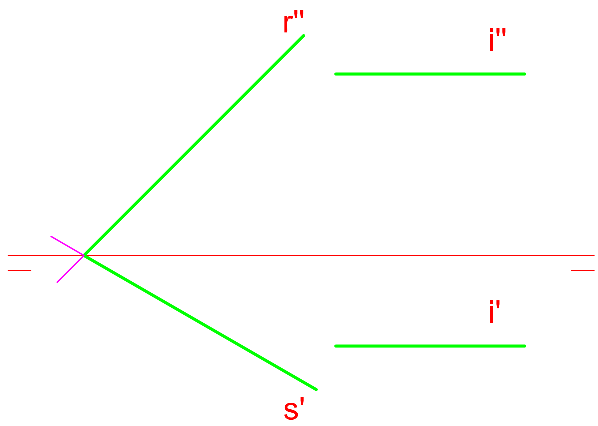
335) $(\gamma) \equiv$ plano (R; π'' π')



336) $(\omega) \equiv$ plano (t; u)

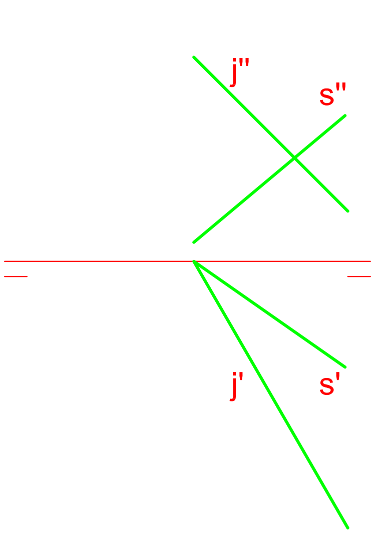


337) $(\lambda) \equiv$ plano (r; s)

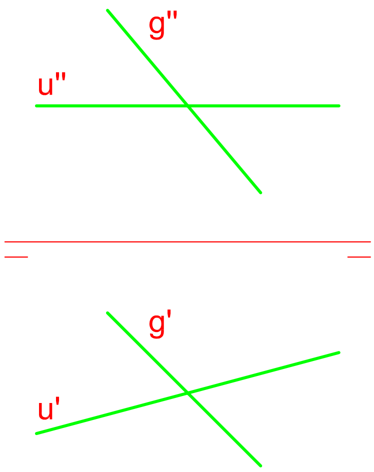


Nas épuras 338 à 349 determine, em V.G., o ângulo formado pelas retas dadas.

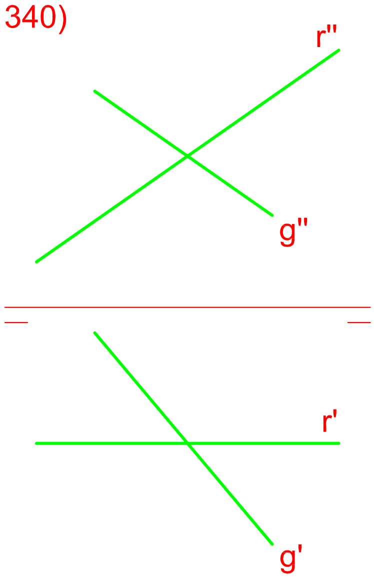
338)



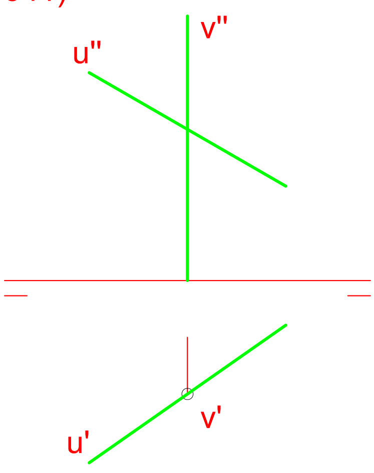
339)



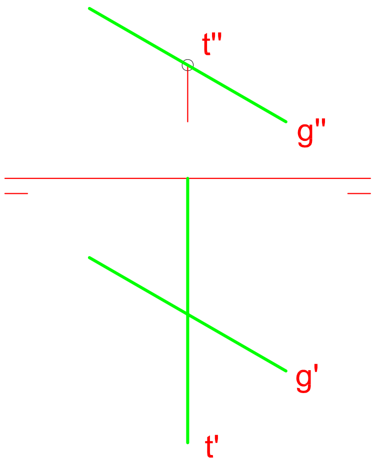
340)



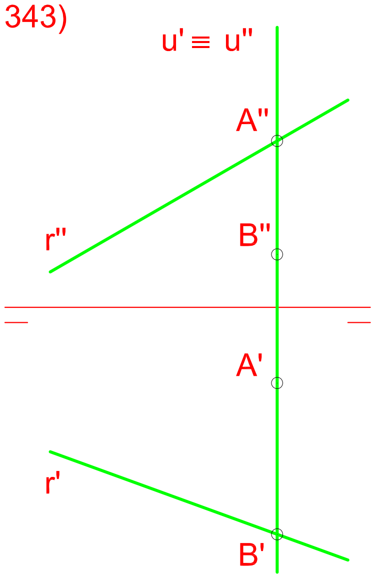
341)



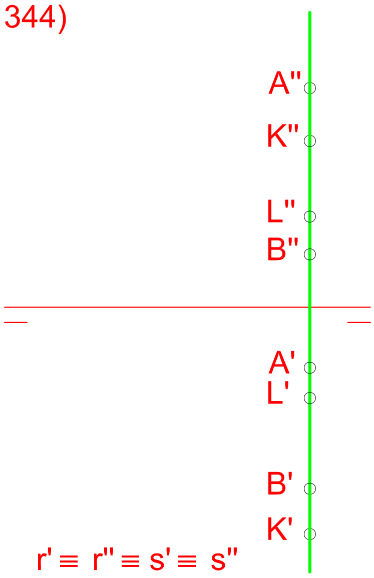
342)



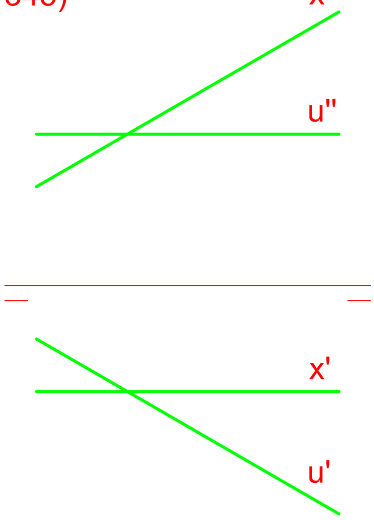
343)



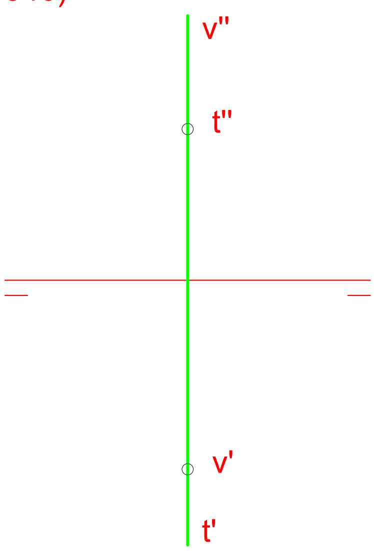
344)



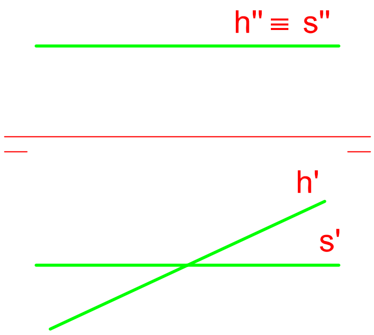
345)



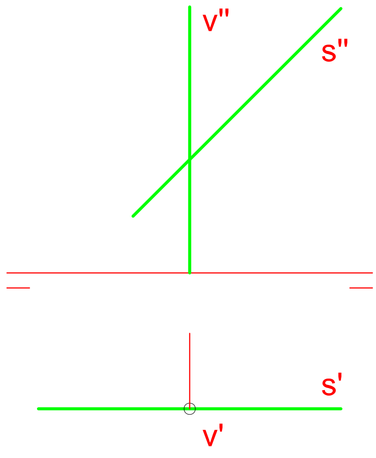
346)



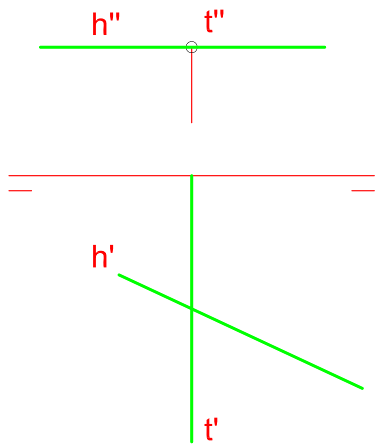
347)



348)

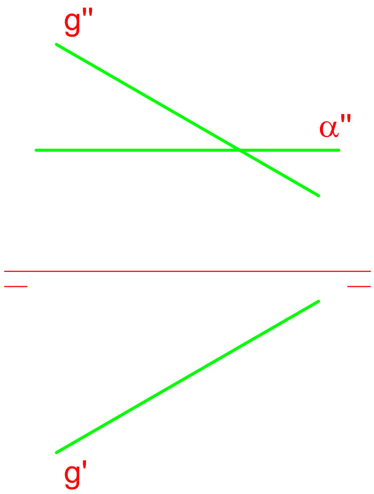


349)

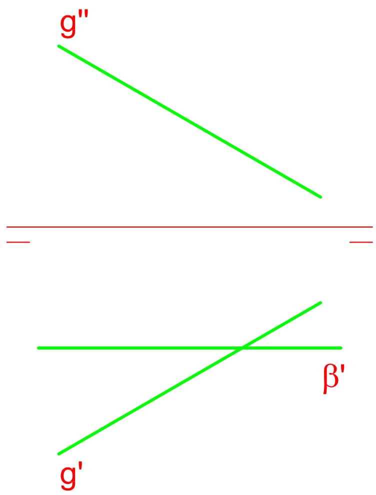


Nas épuras 350 à 359 determine, em V.G., os ângulos entre as retas e os planos dados.

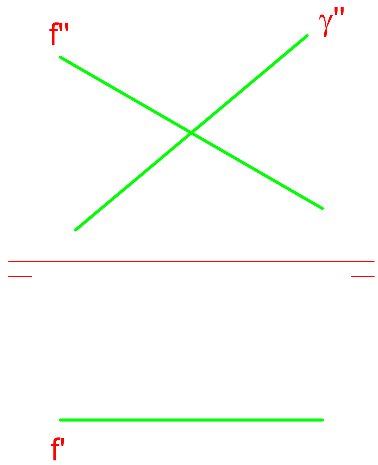
350)



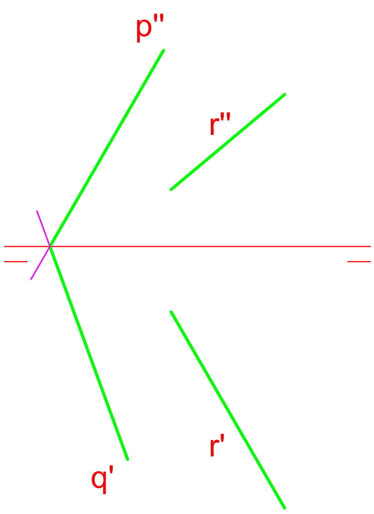
351)



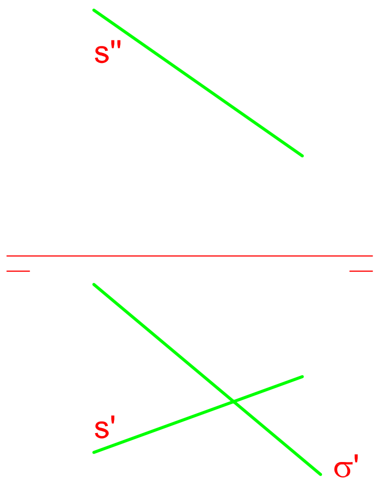
352)



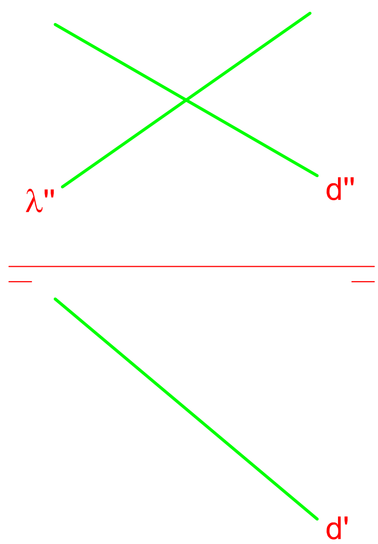
353) (δ) ≡ plano (p; q)



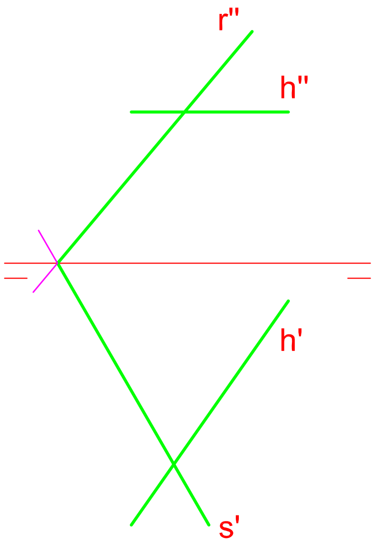
354)



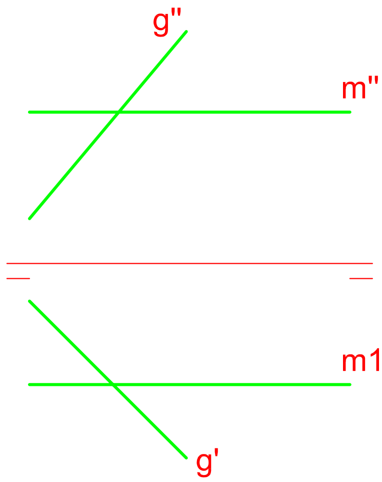
355)



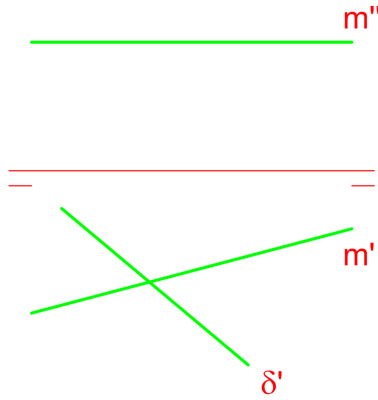
356) $(\delta) \equiv$ plano (r; s)



357) $(\alpha) \equiv$ plano m; m1)

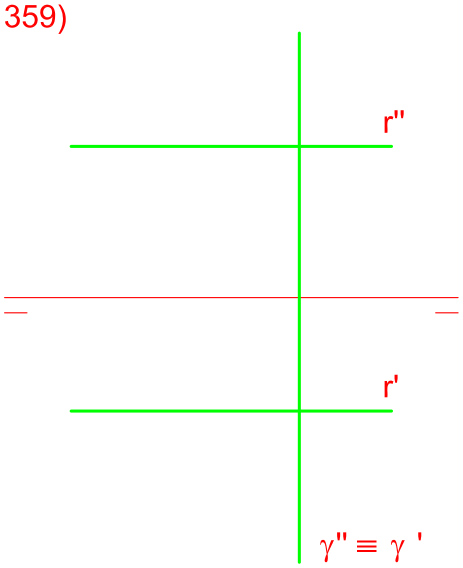


358)

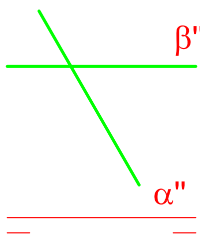


Nas épuras 360 à 368 determine, em V.G., o ângulo formado entre os planos dados.

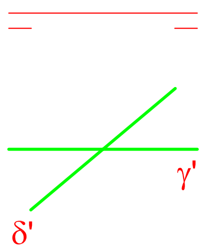
359)



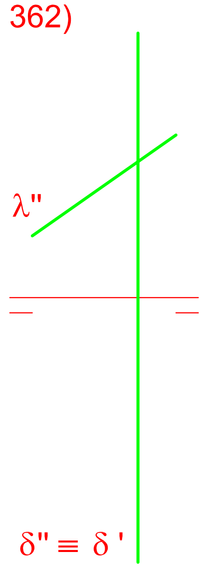
360)



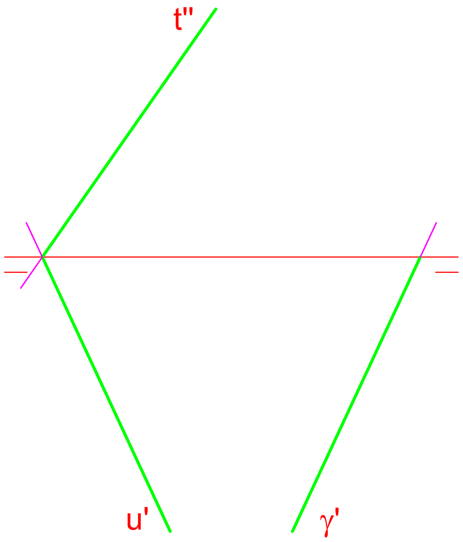
361)



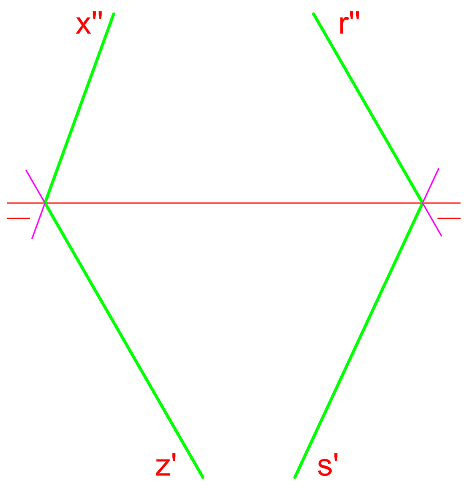
362)



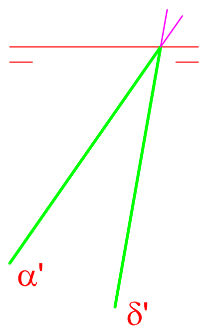
363) $(\alpha) \equiv$ plano (t; u)



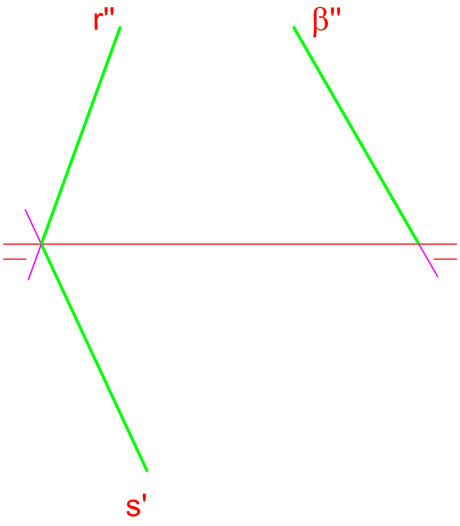
364) $(\delta) \equiv$ plano (x; z)
$(\gamma) \equiv$ plano (r; s)



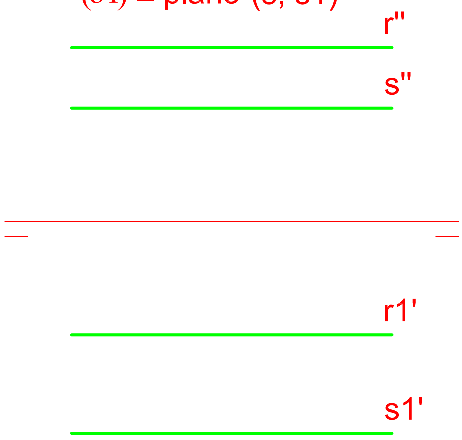
365)



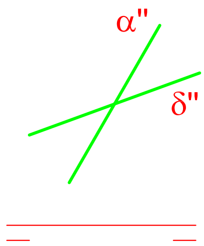
366) (α) ≡ plano (r; s)



367) (δ) ≡ plano (r; r1)
(δ1) ≡ plano (s; s1)

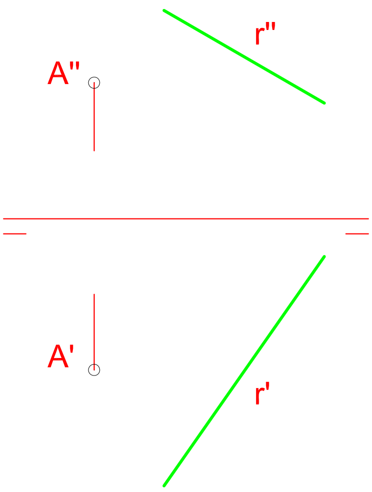


368)

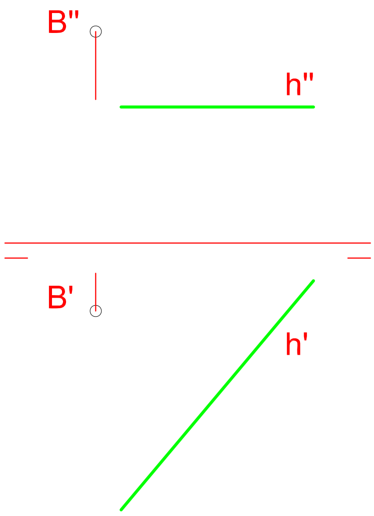


Nas épuras 369 à 371 determine, em V.G., a distância do ponto à reta dada.

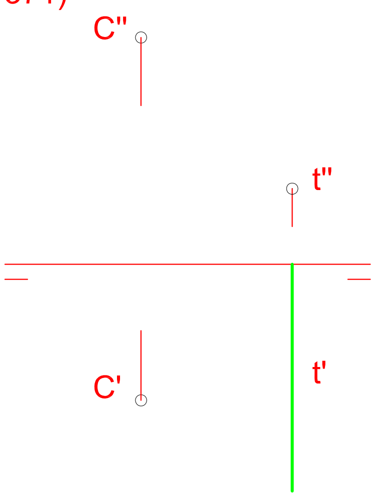
369)



370)

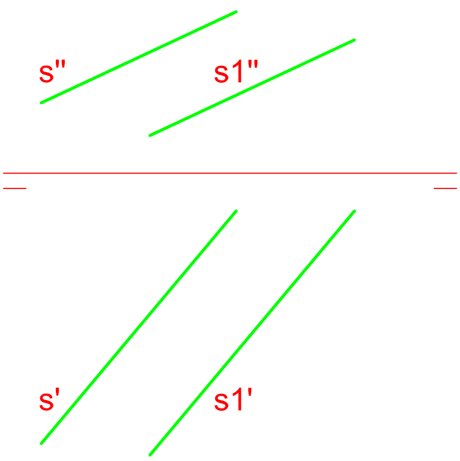


371)

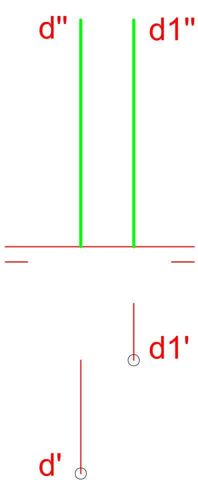


Nas épuras 372 à 375 determine, em V.G., a distância entre as retas dadas.

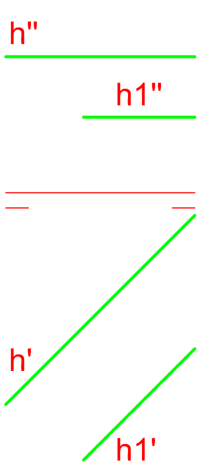
372)



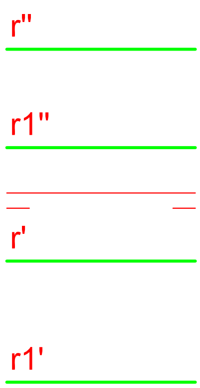
373)



374)

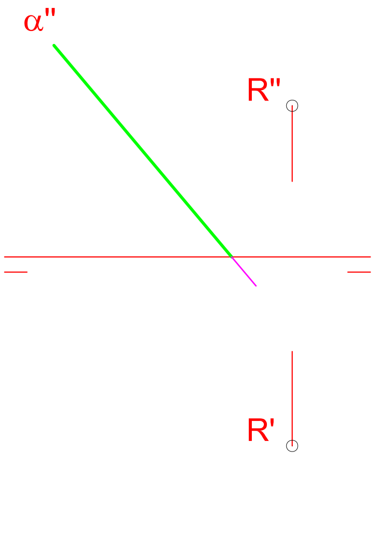


375)

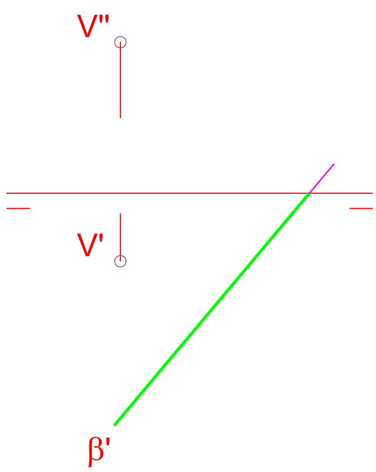


Nas épuras 376 à 382 determine, em V.G., a distância do ponto ao plano dado.

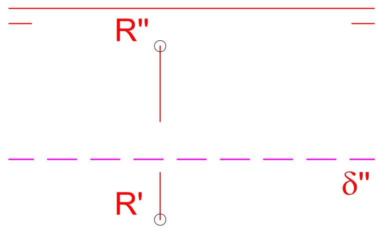
376)



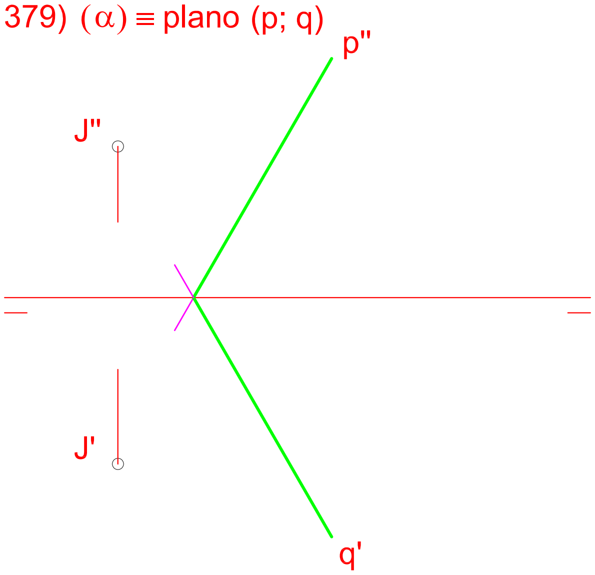
377)



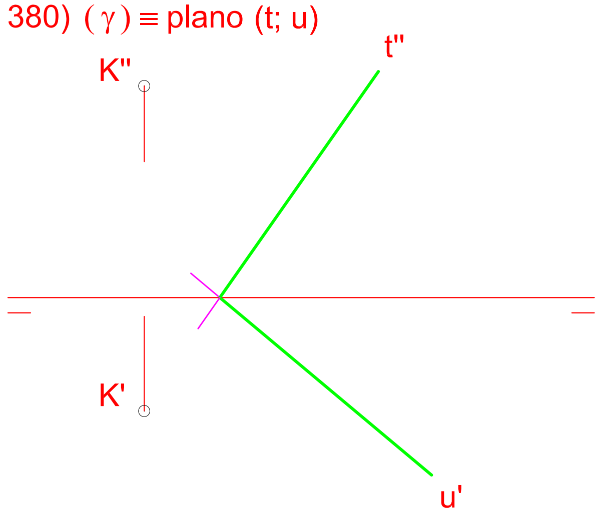
378)



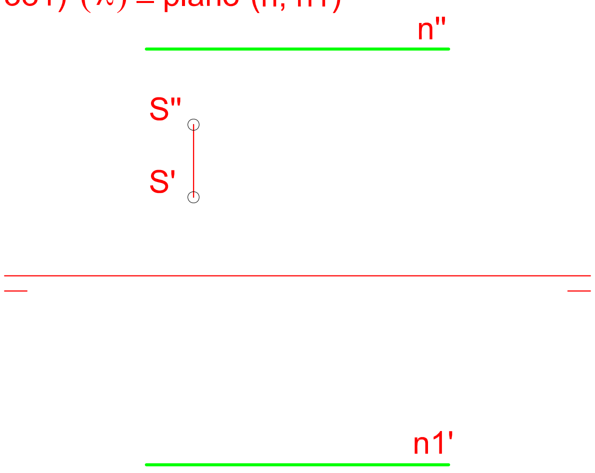
379) (α) ≡ plano (p; q)



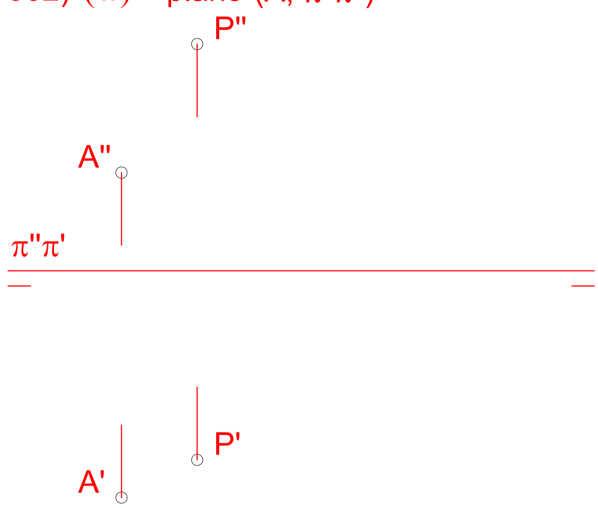
380) (γ) ≡ plano (t; u)



381) (λ) ≡ plano (n; n1)

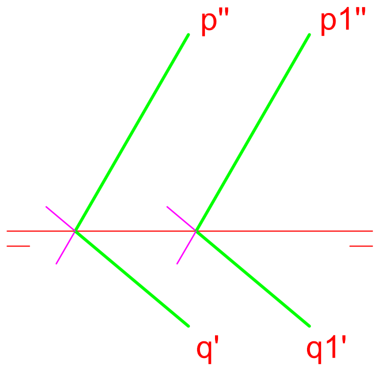


382) (ω) ≡ plano (A; π"π')

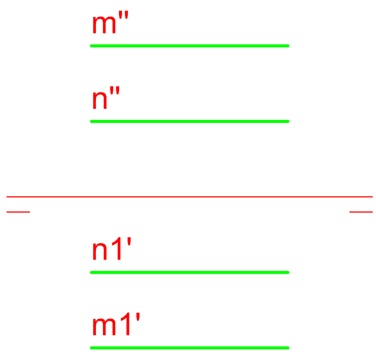


Nas épuras 383 à 389 determine, em V.G., a distância entre os planos dados.

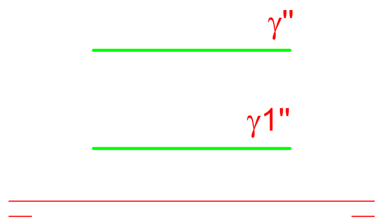
383) $(\alpha) \equiv$ plano (p; q)
$(\alpha 1) \equiv$ plano (q1; p1)



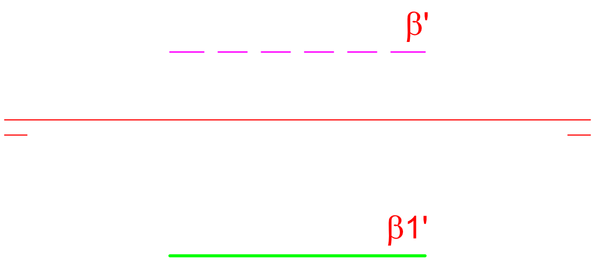
384) $(\delta) \equiv$ plano m; m1)
$(\delta 1) \equiv$ plano (n; n1)



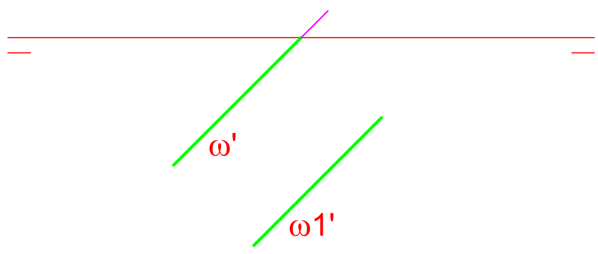
385)



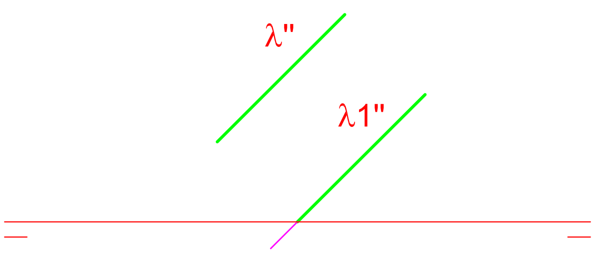
386)



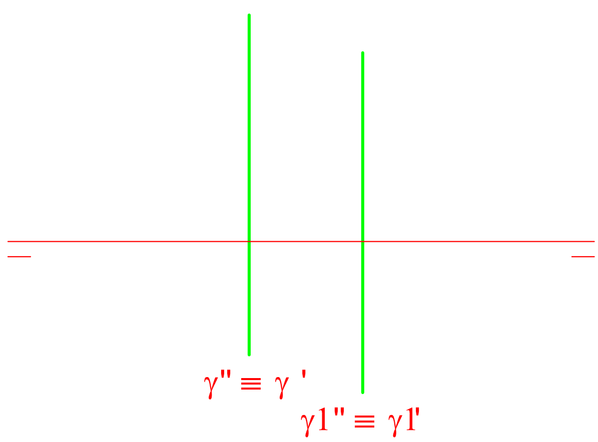
387)



388)



389)

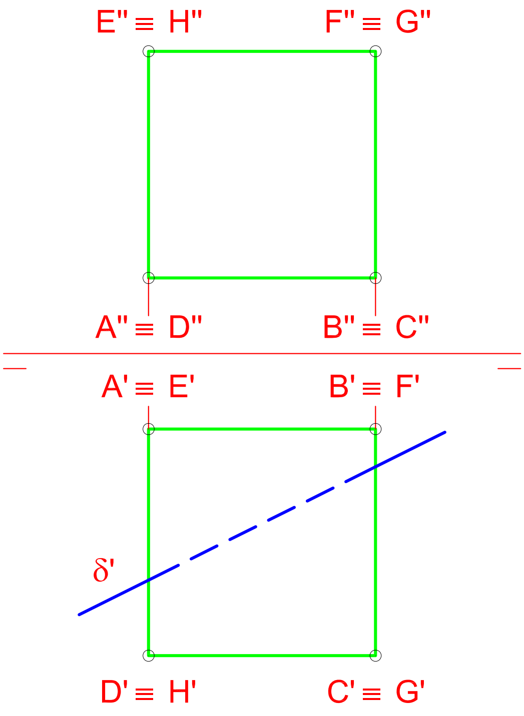


390) Representar, na escala 1/100, o prisma reto (A)(B)(C)(D) - (E)(F)(G)(H) de base quadrada regular, sabendo-se que a base (A)(B)(C)(D) tem cota igual a 1,0 m, a altura do prisma é igual a 4,0 m e que o lado (A)(B) faz 60° com π'' e mede 3,0.

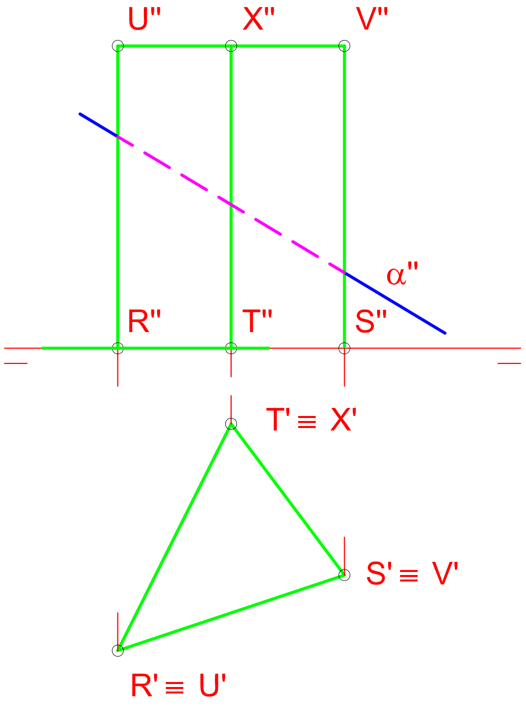
a) Determinar a secção produzida no prisma por um plano horizontal de cota 2,0;

b) Planificar o prisma com a transformada da secção.

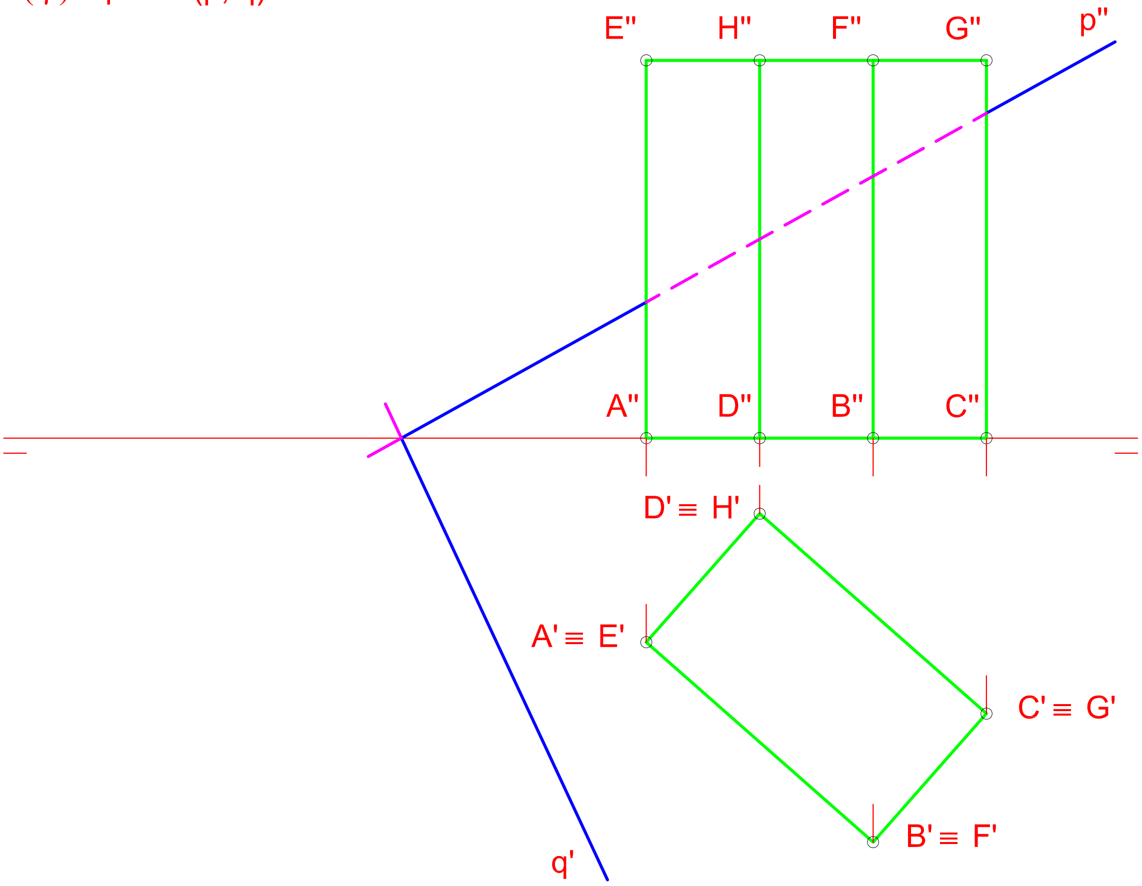
391) Representar o polígono secção e determinar a sua verdadeira grandeza. Planificar o prisma com a transformada da secção.



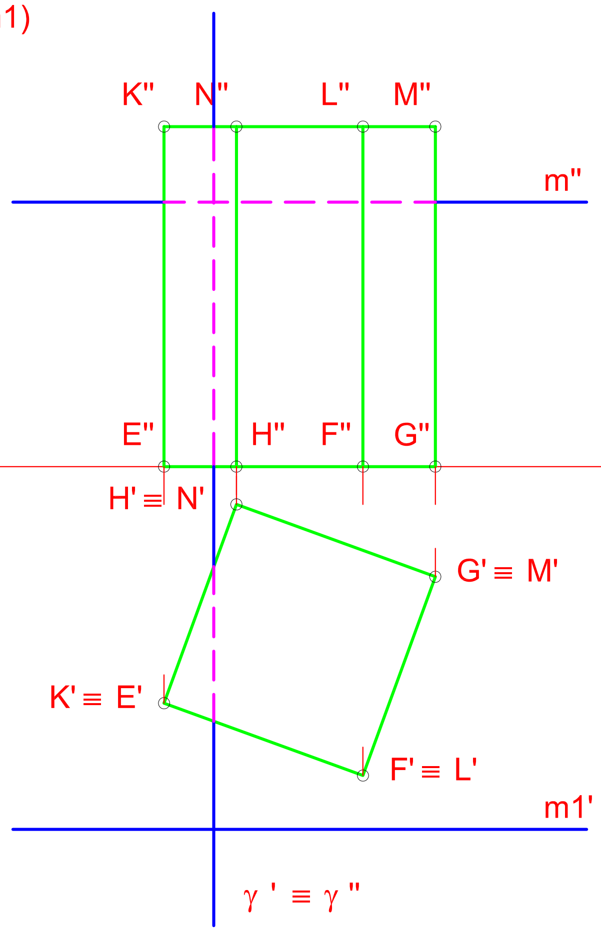
392) Representar o polígono secção e determinar a sua verdadeira grandeza. Planificar o prisma com a transformada da secção.



393) Representar o polígono secção e determinar a sua verdadeira grandeza.
(γ) ≡ plano (p; q)



394) Representar o polígono secção e determinar a sua verdadeira grandeza.
$(\alpha) \equiv$ plano (m; m1)

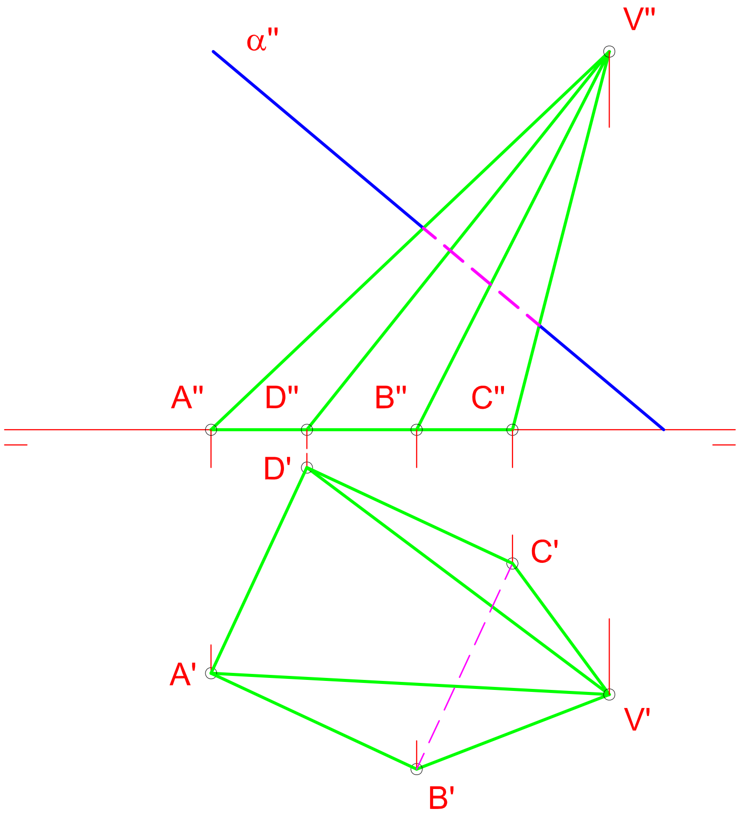


395) Representar uma pirâmide oblíqua de base triangular regular assentada em π' e planificar a pirâmide.

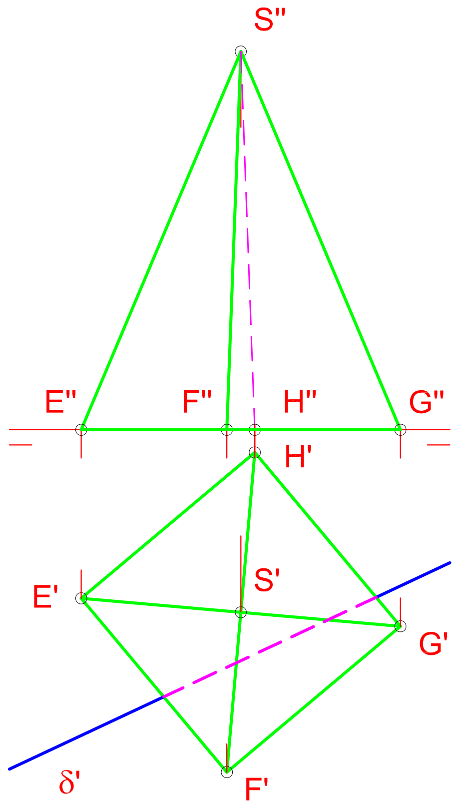
396) Representar a pirâmide regular de base quadrangular regular assentada em π' e planificar a pirâmide.

Nas épuras 397 a 400 represente o polígono secção.

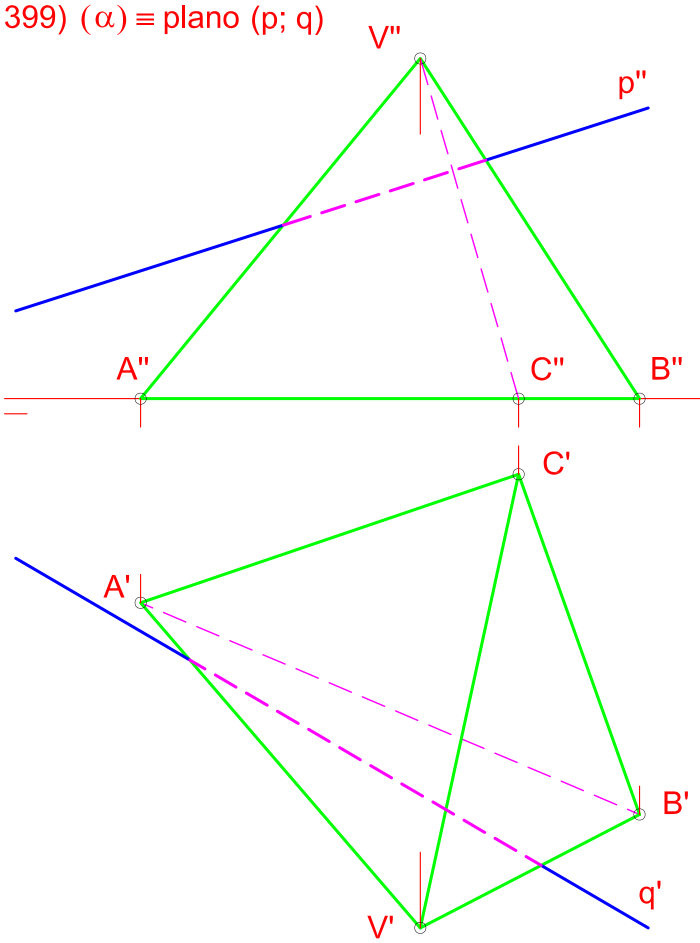
397)



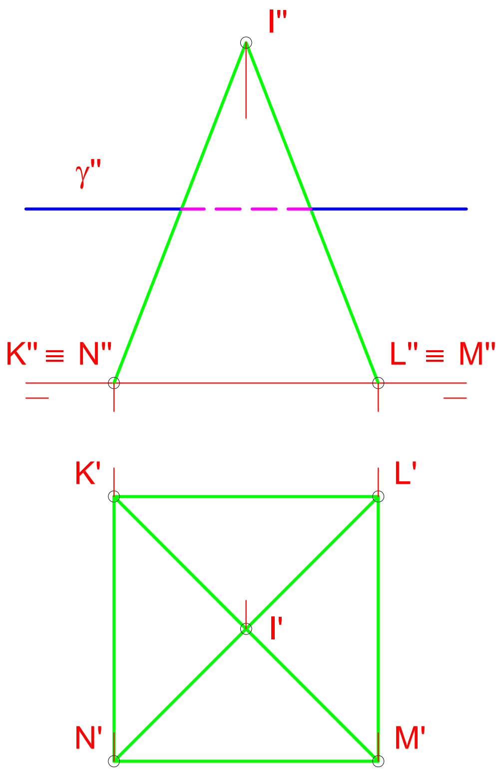
398)



399) (α) ≡ plano (p; q)

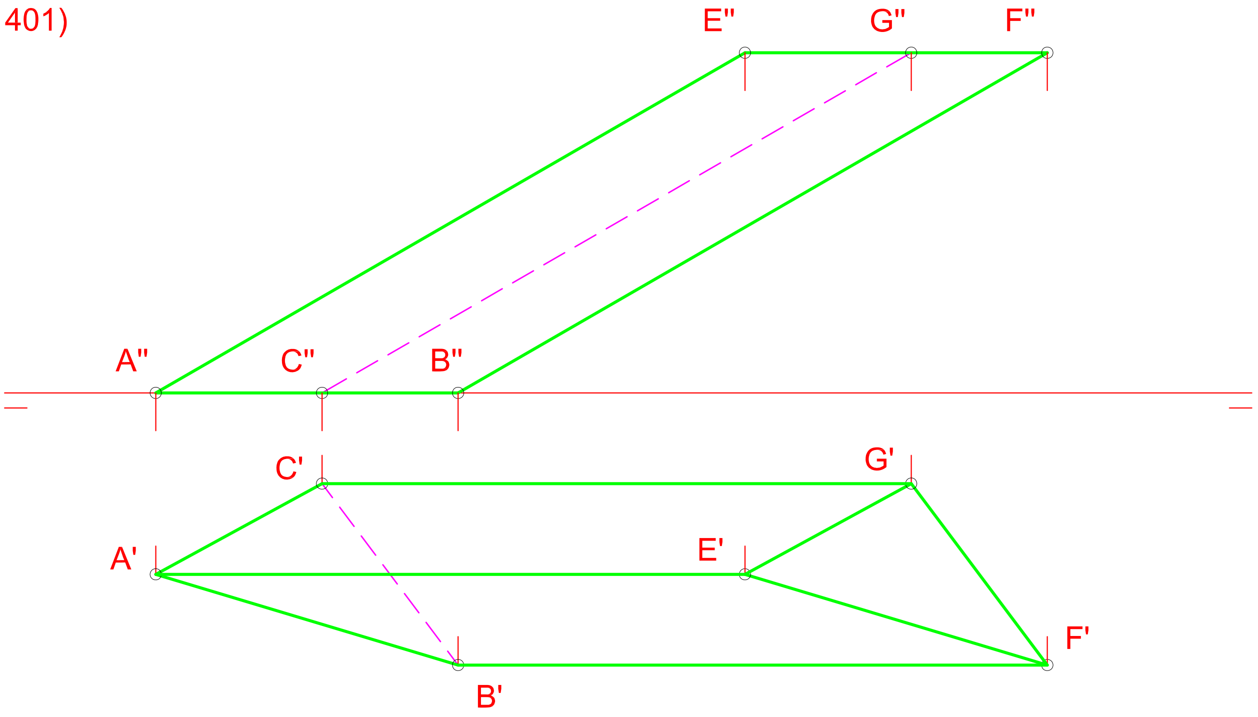


400)

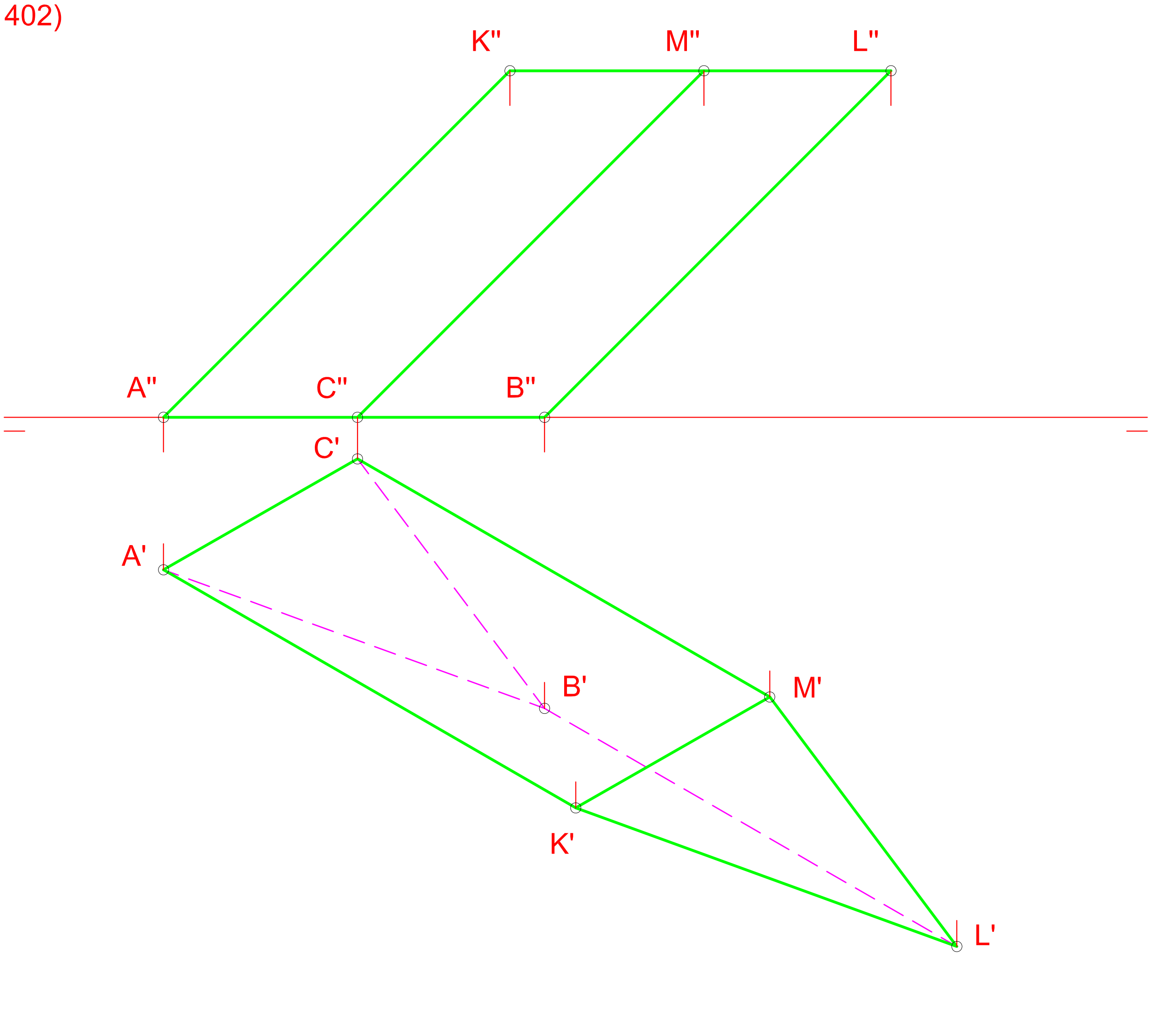


Nas épuras 401 e 402 efetuar as planificações dos prismas.

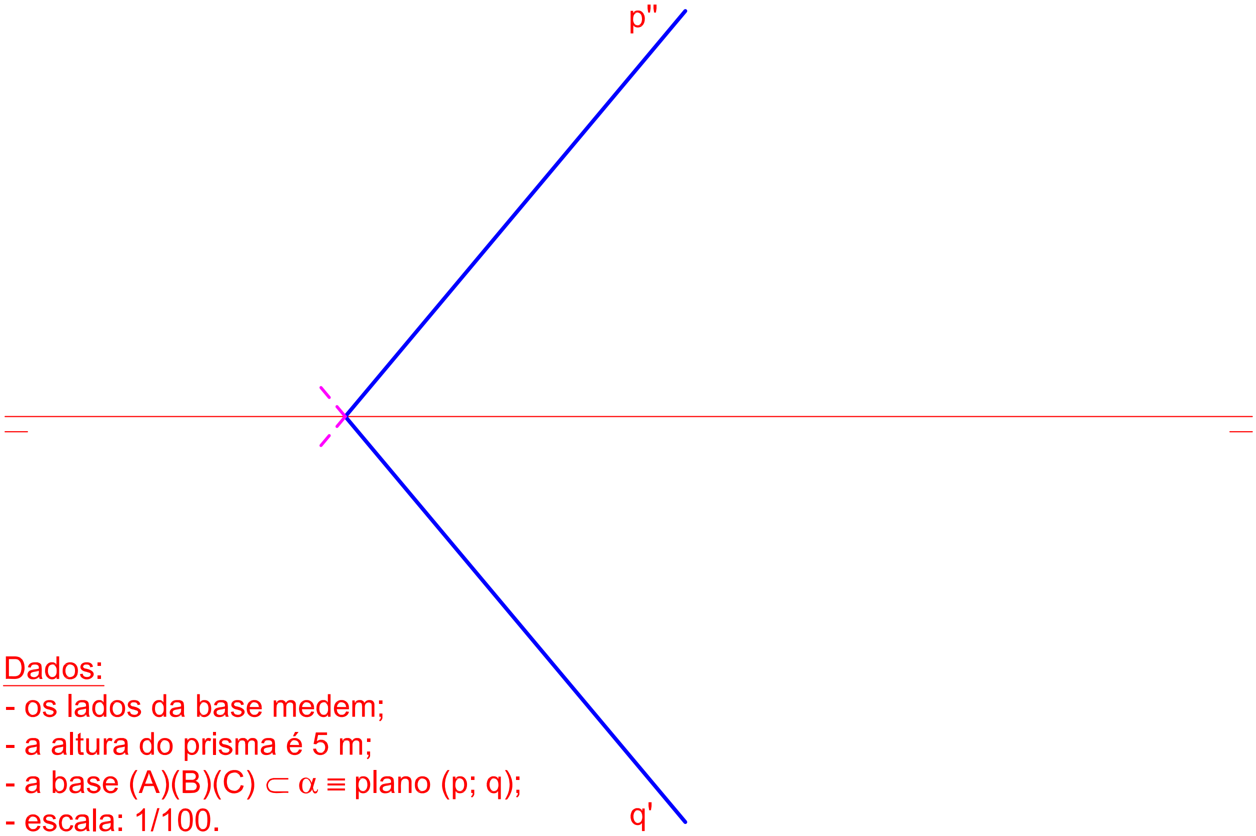
401)



402)



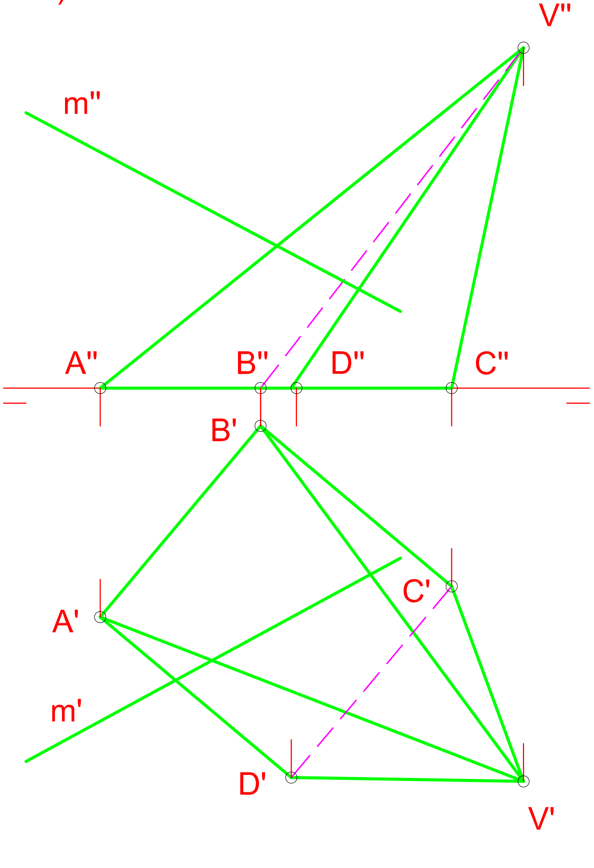
403) Representar o prisma reto de base triangular.



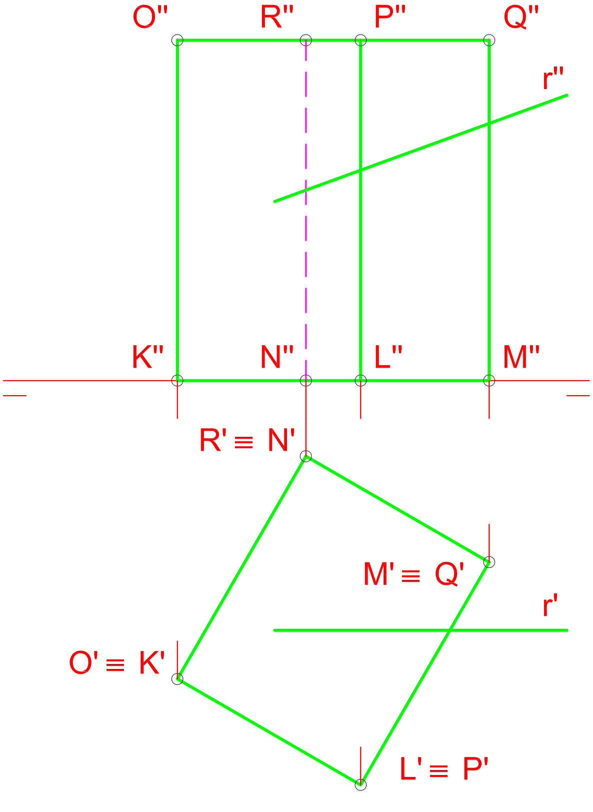
Dados:
- os lados da base medem;
- a altura do prisma é 5 m;
- a base (A)(B)(C) ⊂ α ≡ plano (p; q);
- escala: 1/100.

Nas épuras 404 e 405 determinar os traços das retas nos planos.

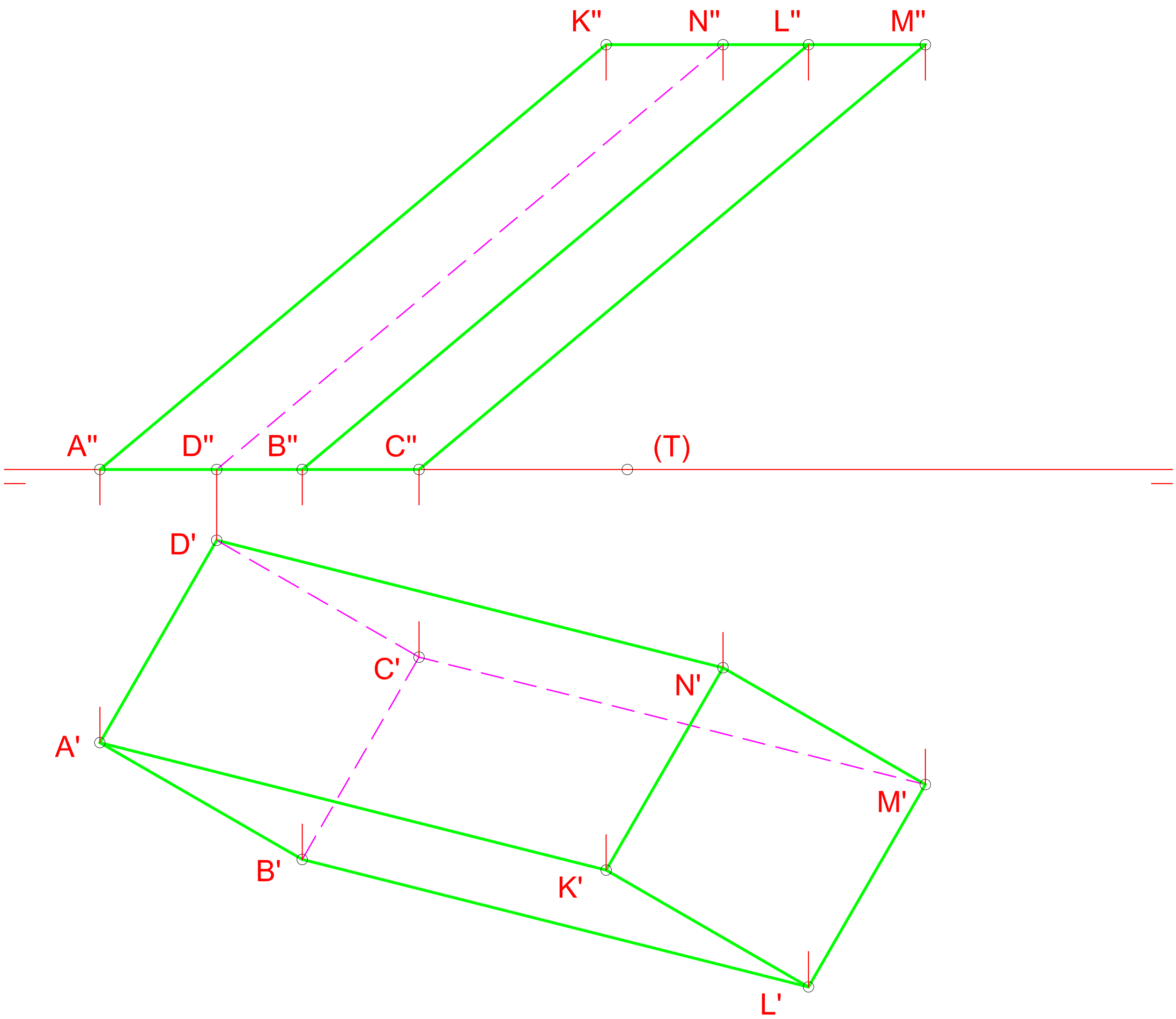
404)



405)



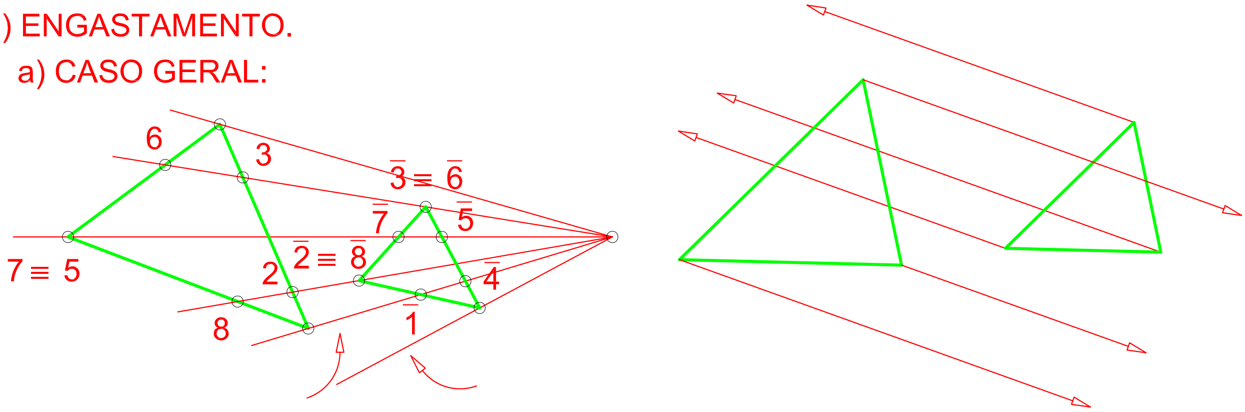
406) Planificar o poliedro. Resolver o exercício tornando o prisma de arestas laterais frontais, mediante mudança de plano vertical. Para determinar a secção reta, utilizar o plano a que pertence (T).



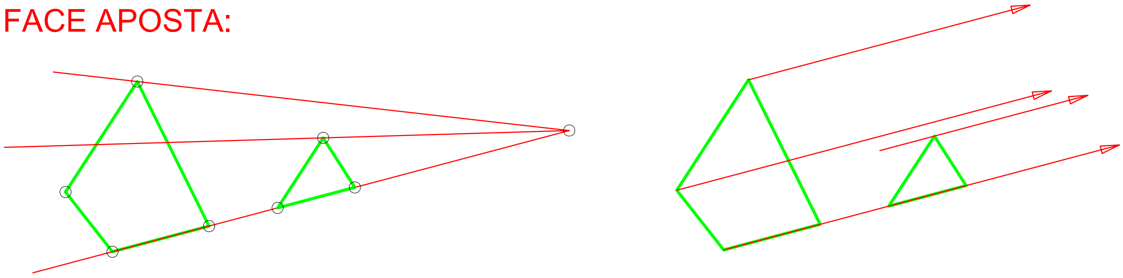
INTERSECÇÕES DE POLIEDROS CONVEXOS.
(Prismas e pirâmides com a base assente em π')

1) ENGASTAMENTO.

a) CASO GERAL:



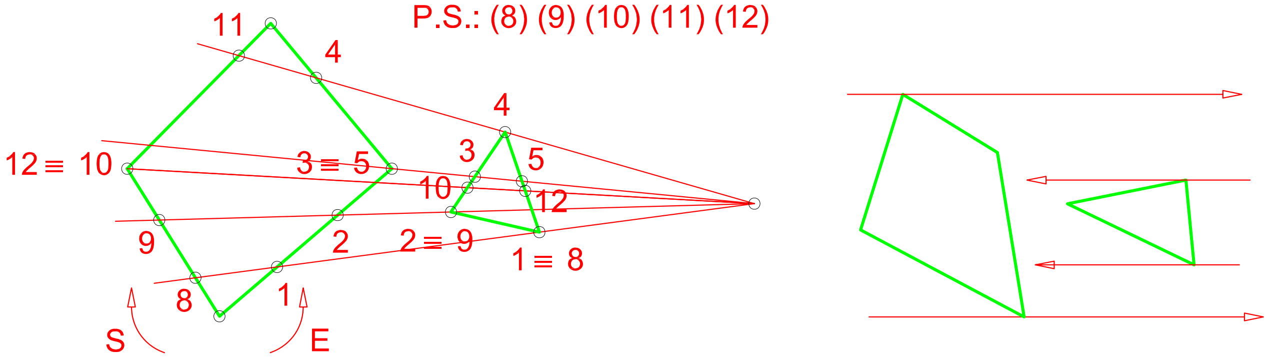
b) FACE APOSTA:



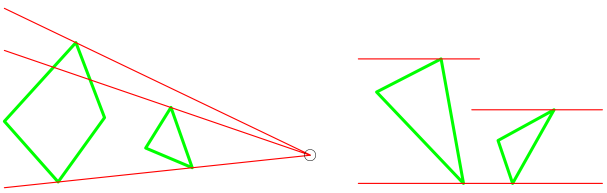
2) PENETRAÇÃO:

a) CASO GERAL:

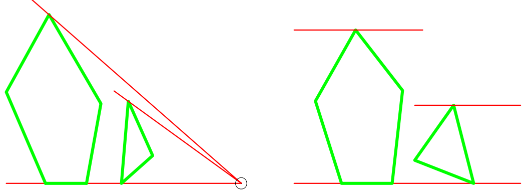
P.E.: (1) (2) (3) (4) (5)
P.S.: (8) (9) (10) (11) (12)



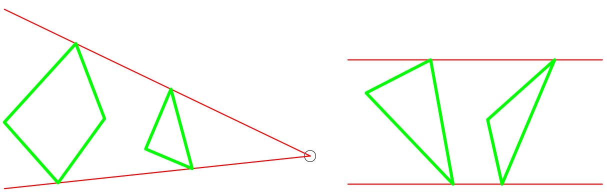
b) UM PONTO DUPLO:



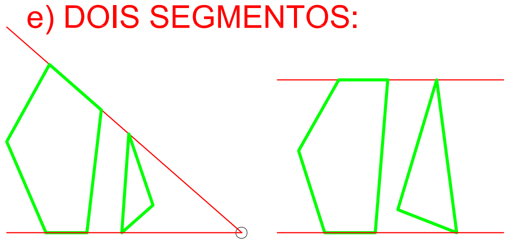
c) UM SEGMENTO:



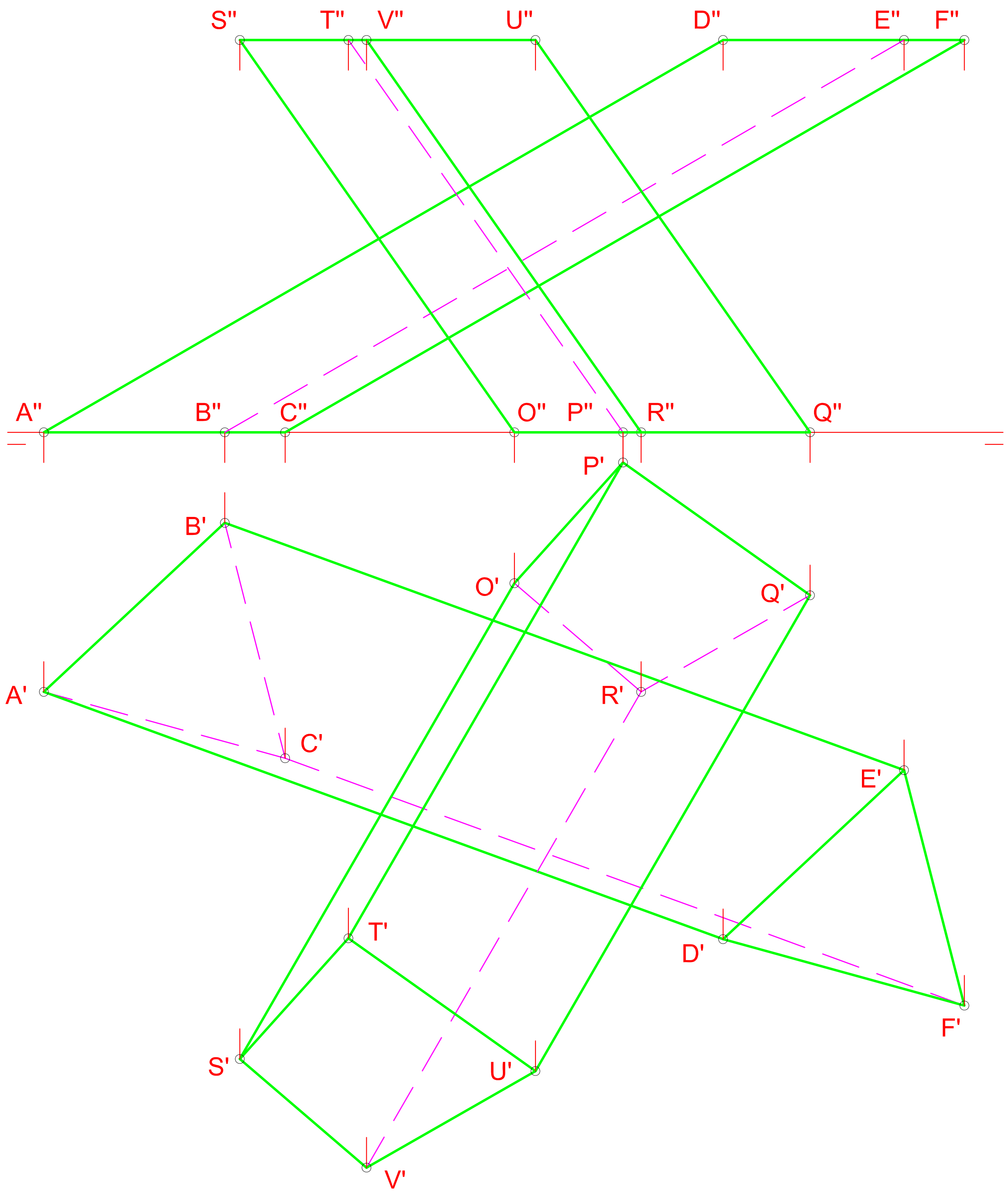
d) DOIS PONTOS DUPLOS:



e) DOIS SEGMENTOS:

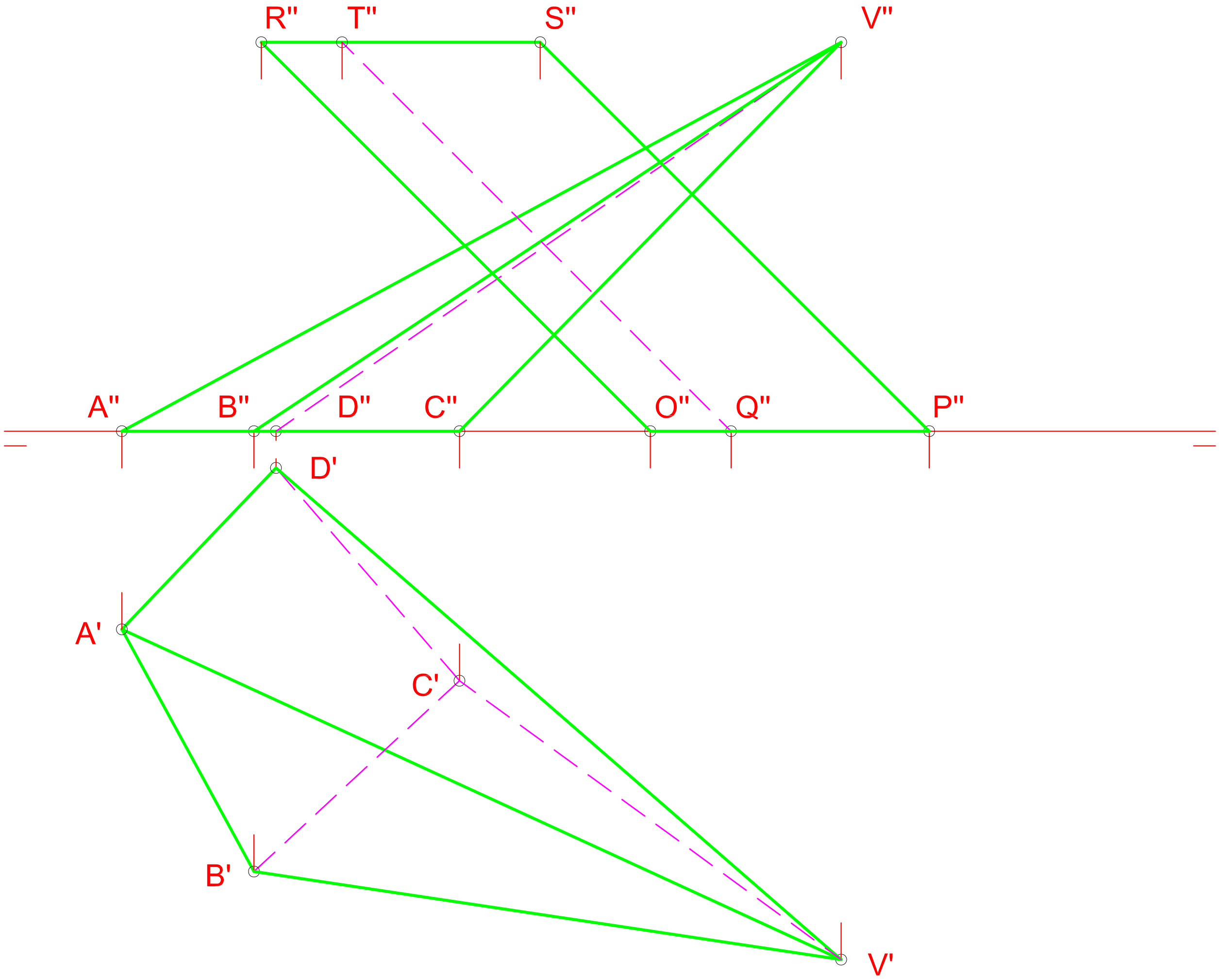


407) Na épura a segir determine:
a) a intersecção entre os poliedros;
b) o sólido comum;
c) os destaques;
d) a planificação com a transformada do polígono (s) de intersecção.



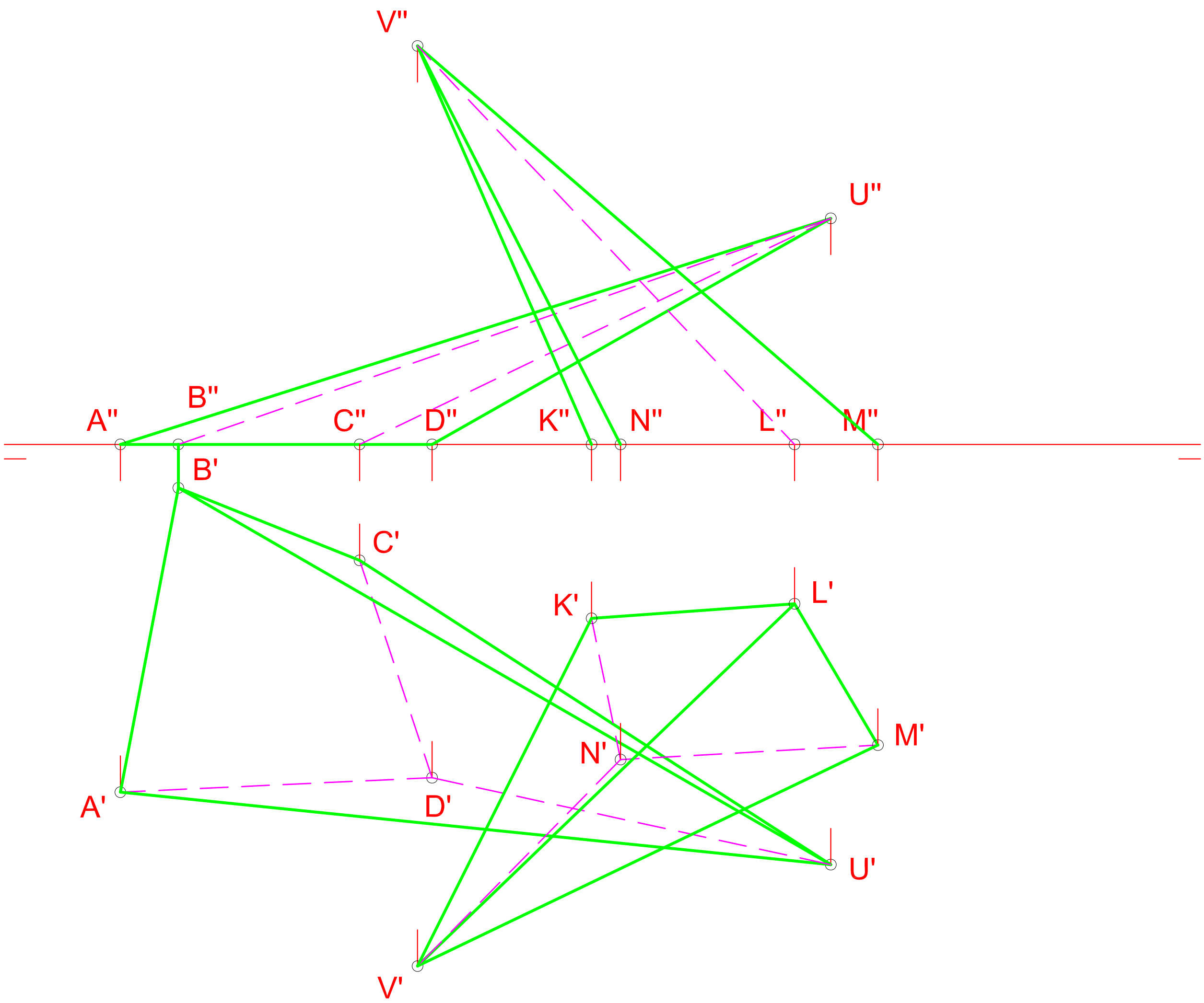
408) Na épura a segir determine:

a) a intersecção entre os poliedros;
b) o sólido comum;
c) os destaques;
d) a planificação com a transformada do polígono (s) de intersecção.



409) Na épura a segir determine:

a) a intersecção entre os poliedros;
b) o sólido comum;
c) os destaques;
d) a planificação com a transformada do polígono (s) de intersecção.



410) Na épura a segir determine:

a) a intersecção entre os poliedros;
b) o sólido comum;
c) os destaques;
d) a planificação com a transformada do polígono (s) de intersecção.