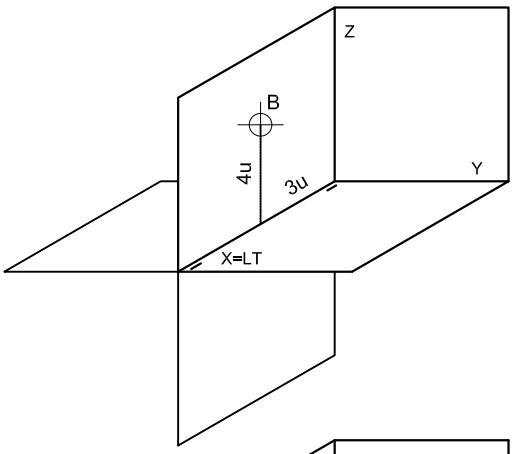
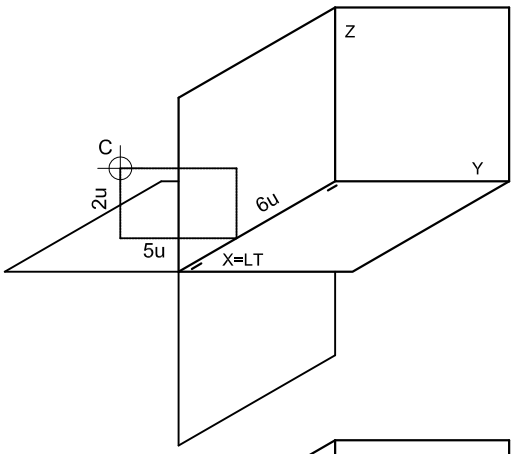
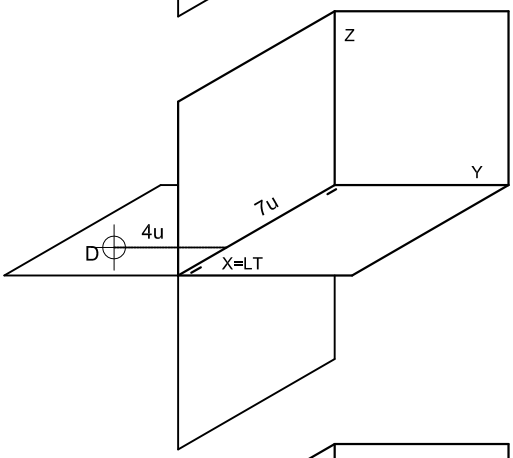
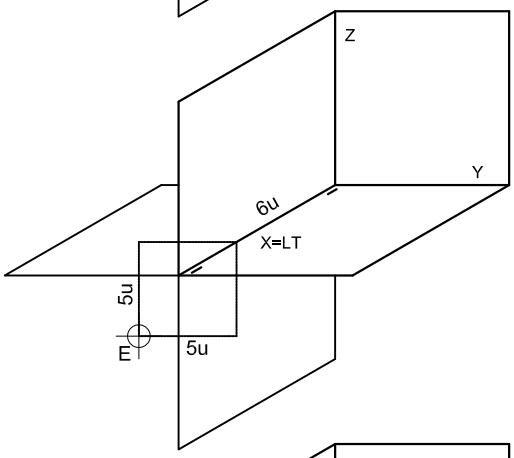
EXERCISE 1

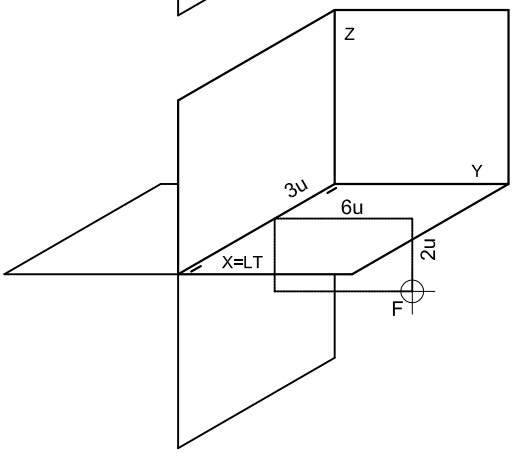
Represent the diedric projections of the points B, C, D, E, F and G.

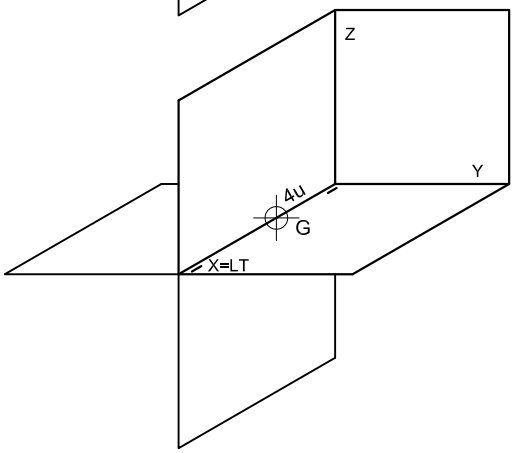


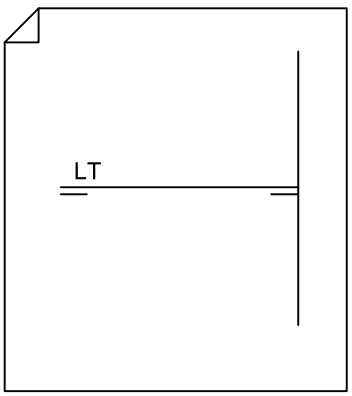












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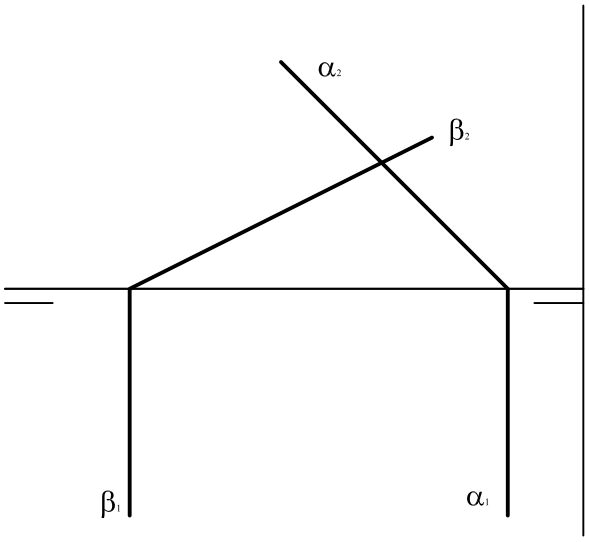
EXERCISE 2

Find the intersection of the plane α *determined by the points* $(4,0,3)$, $(1,0,0)$ *and* $(1,1,0)$, *and the plane* β *determined by* $(2,0,2)$, $(6,0,0)$ *and* $(6,3,0)$.

Find the intersection between the planes α *and* β.



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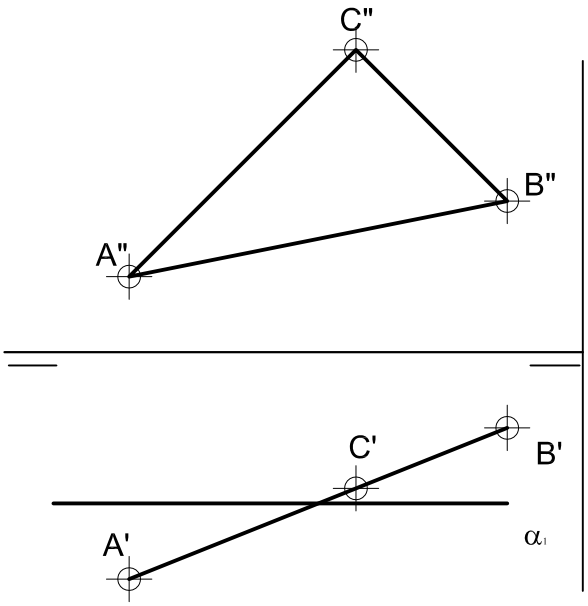
EXERCISE 3

Calculate the intersection between the planes β and α. β contains the points A=(6,3,1), B=(1,1,2) and C=(3,y,4), and it is perpendicular to the plane XOY. α contains the point P(1,1,2), and it is parallel to the plane XOZ.

Find the intersection between the planes ABC and α. Which kind of line is it?



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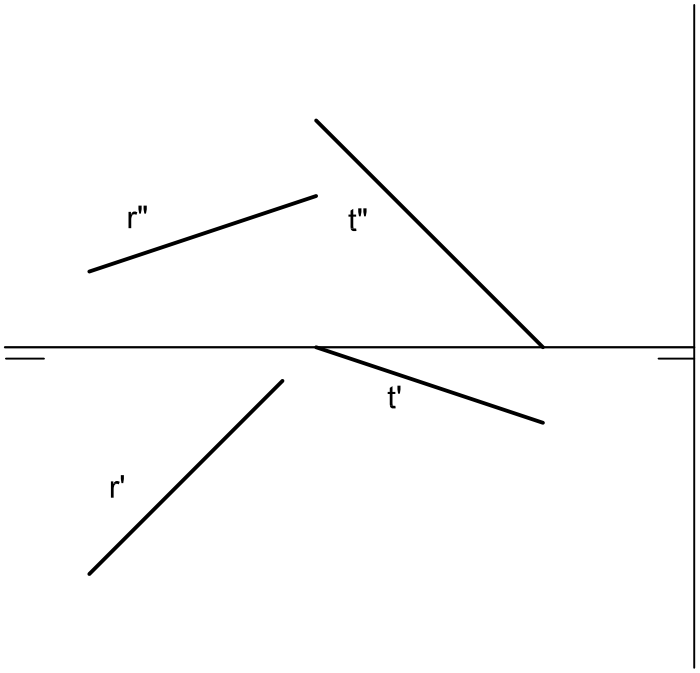
EXERCISE 4

Find the parallel plane to the line r: $\begin{cases} x + 3z = 11 \\ y + 3z = 6 \end{cases}$ *which contains the line* t: $\frac{x-2}{3} = 1 - y = \frac{z}{3}$.

Draw the plane that being parallel to the line r , contains the line t.



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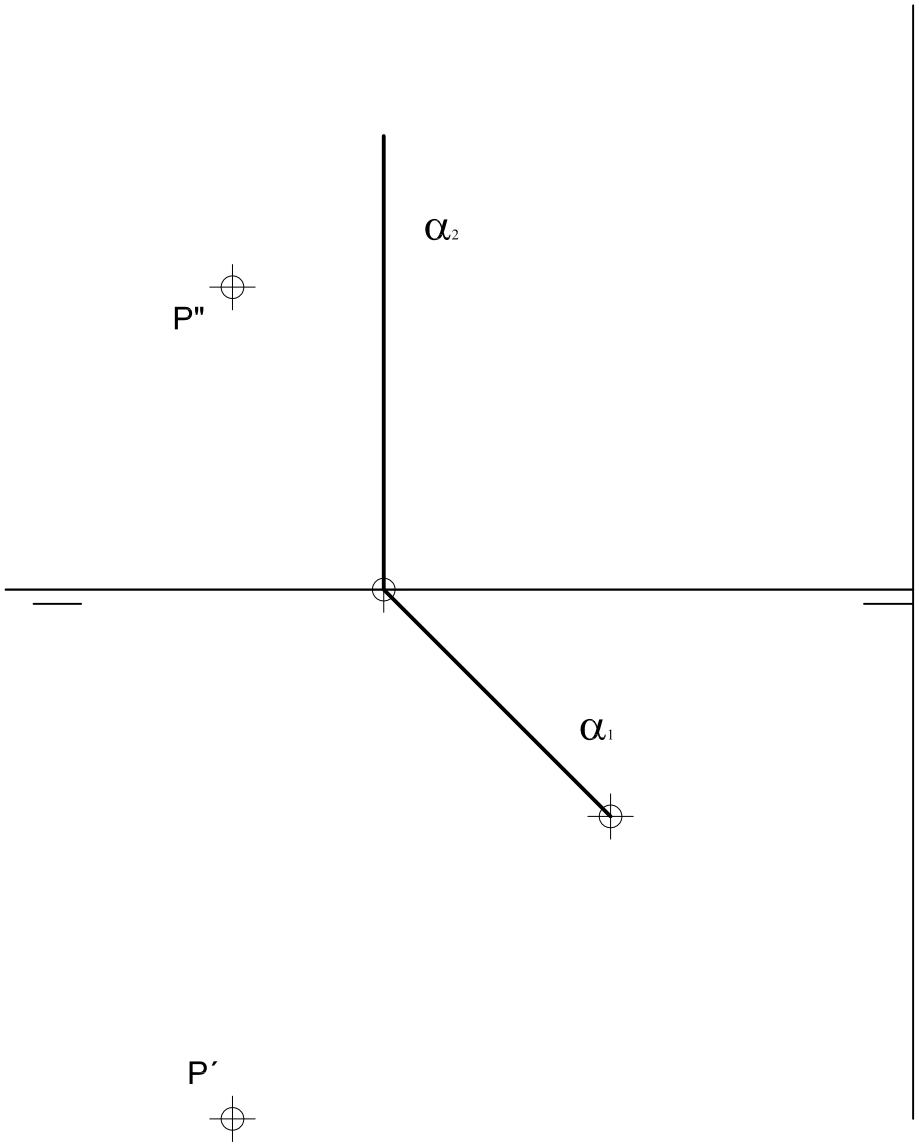
EXERCISE 5

Find the line that passing through the point $P(9,7,4)$*, is perpendicular to the plane* α*. This plane contains the points* $(7,0,0)$ *and* $(4,3,0)$*, and it is perpendicular to the plane* $z=0$*. Calculate the point of intersection between them*

Draw the line p *that passing through the point* P *is perpendicular to the plane* α*. Calculate the point of intersection* I *between them.*



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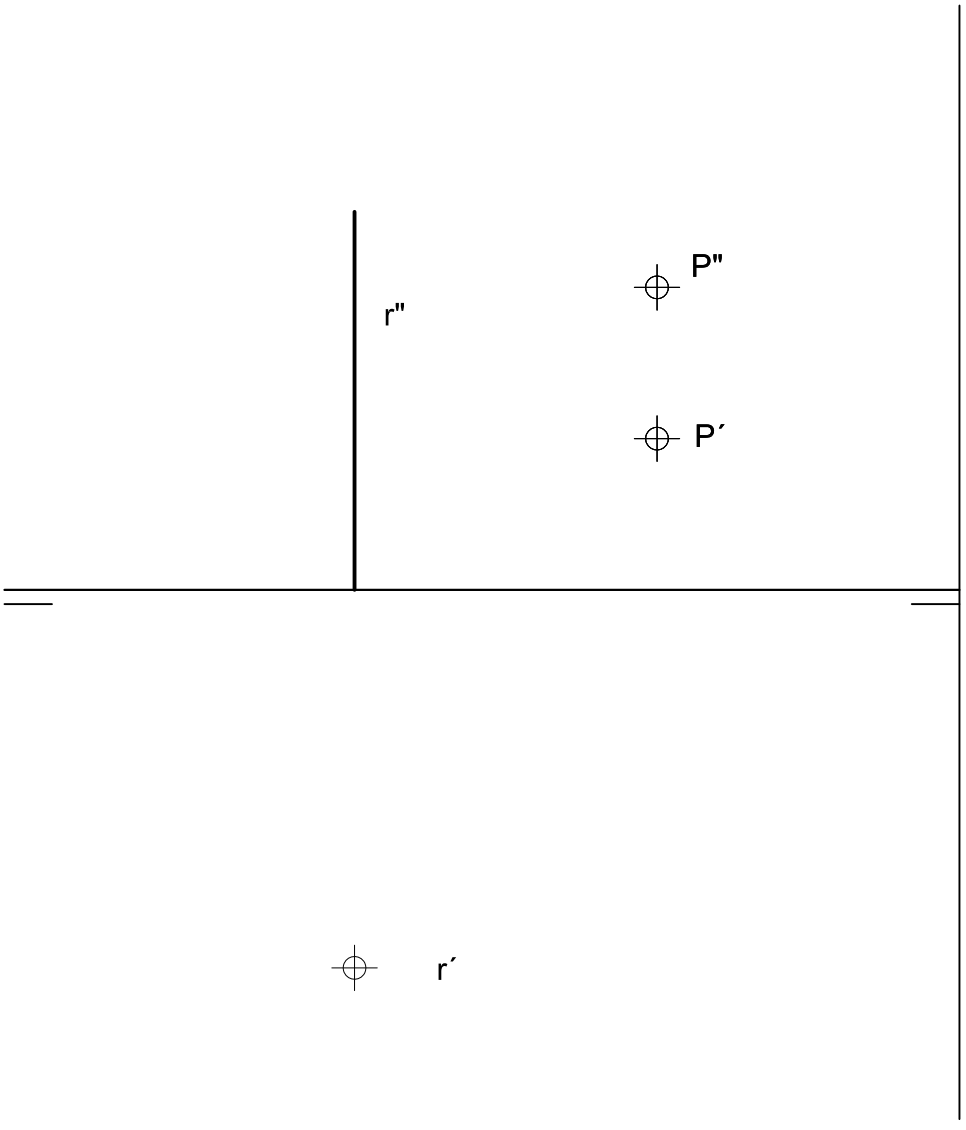
EXERCISE 6

Find the plane that passing through the point $P(2,-2,4)$ *is perpendicular to the line that passing through the point* $(8,5,2)$ *is perpendicular to the plane XOY. Calculate the point of intersection between them.*

Draw the plane α that contains the point P and is perpendicuar to the line r.
Find the intersection between them (I).



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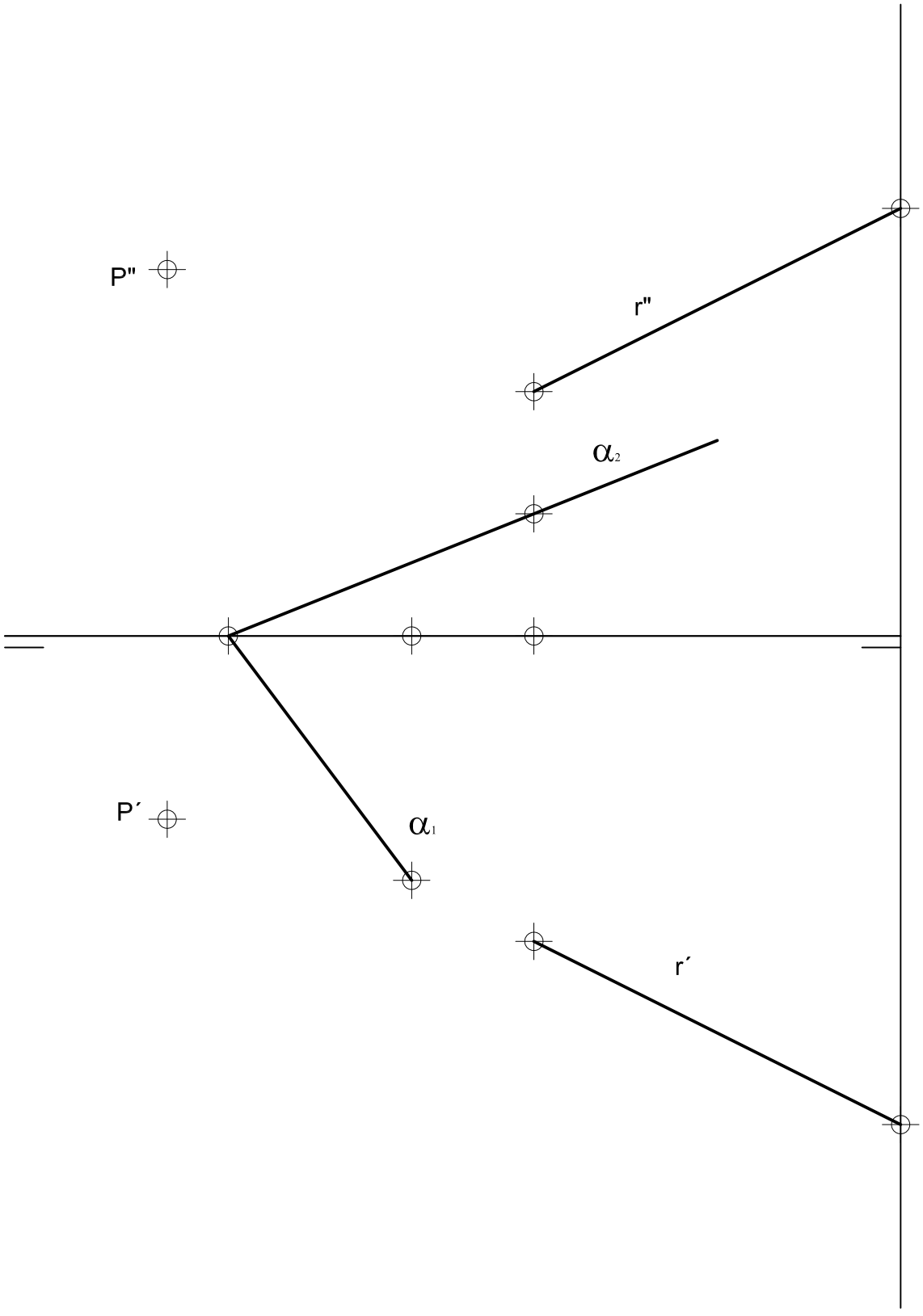
EXERCISE 7

Draw the line that passing through the point P(12,3,6) is perpendicular to the line r that passes through (6,5,4) and (0,8,7), and is parallel to the plane α determined by the points (11,0,0), (6,0,2) and (8,4,0).

Draw the line r that passes through the point P and it is parallel to the plane α.



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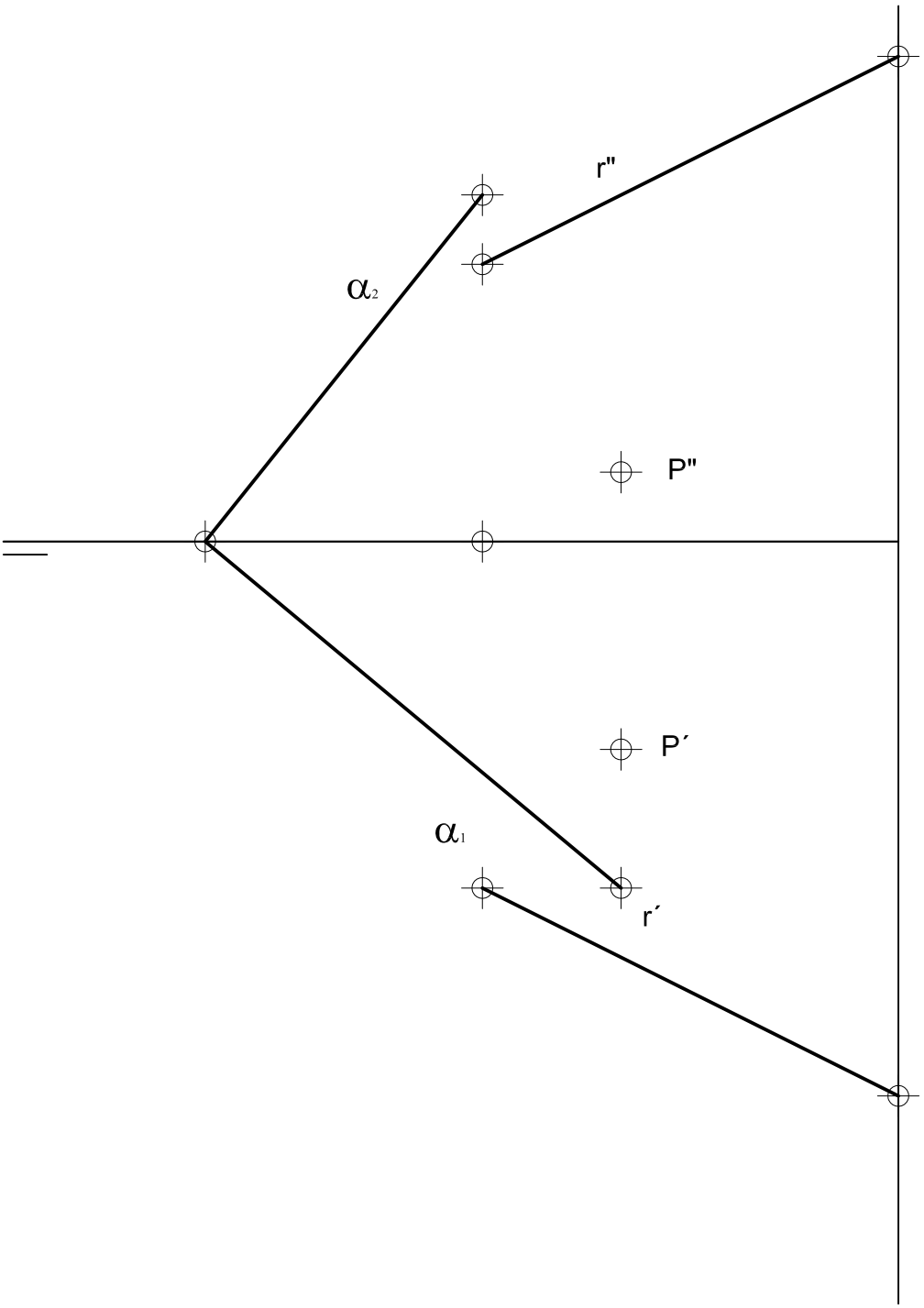
EXERCISE 8

Find the planes that contain the point $P(4,3,1)$, *are perpendicular to the plane* $\alpha: 5x+6y+4z=50$ *and parallel to the line* r *that passes through the points* $(6,5,4)$ *and* $(0,8,7)$.

Draw the planes that contain the point P, are perpendicular to α and parallel to the line r.



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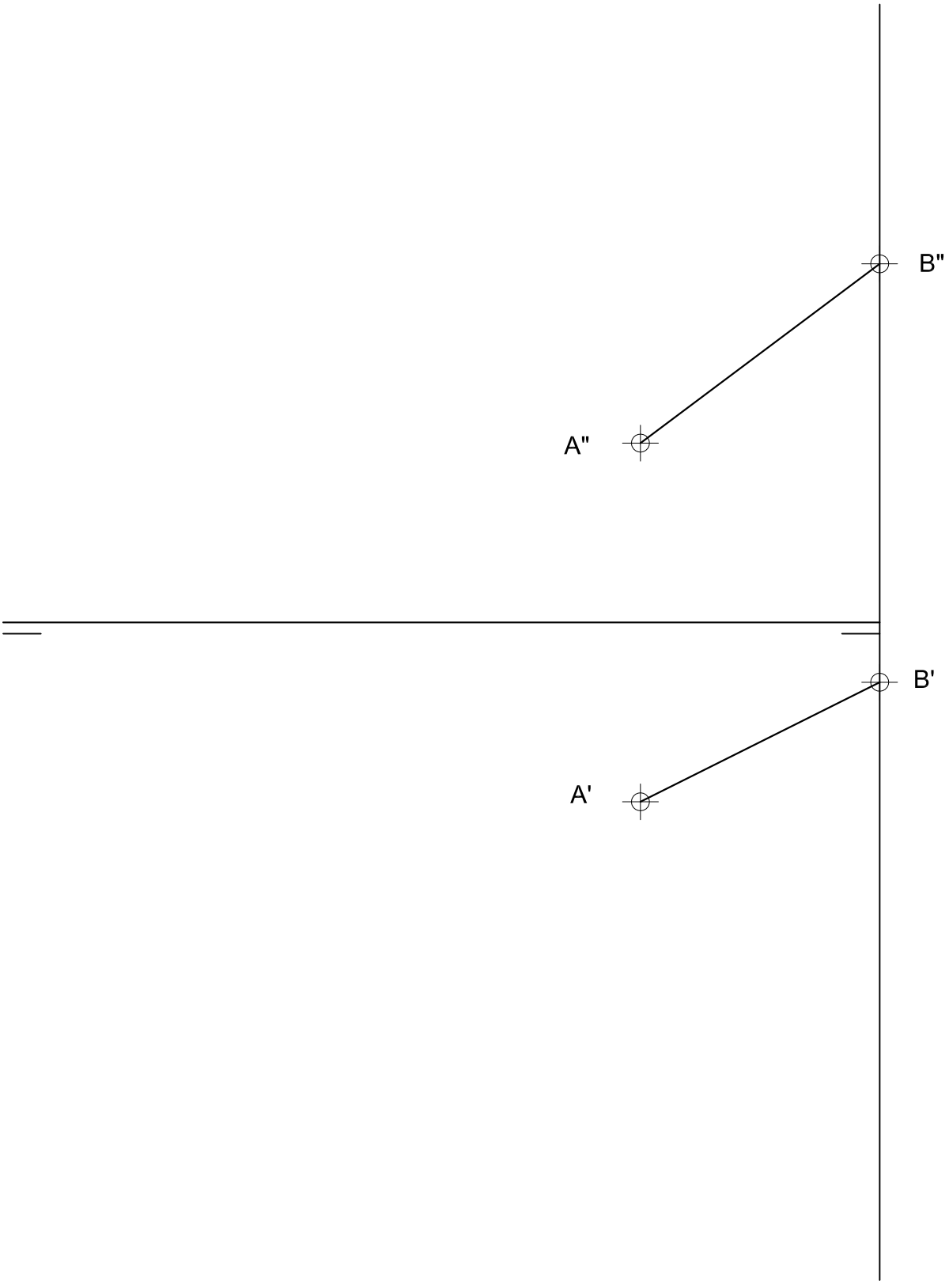
EXERCISE 9

Calculate the distance between the points $A(4,3,3)$ *and* $B(0,1,6)$.

Calculate the distance between the points A and B.



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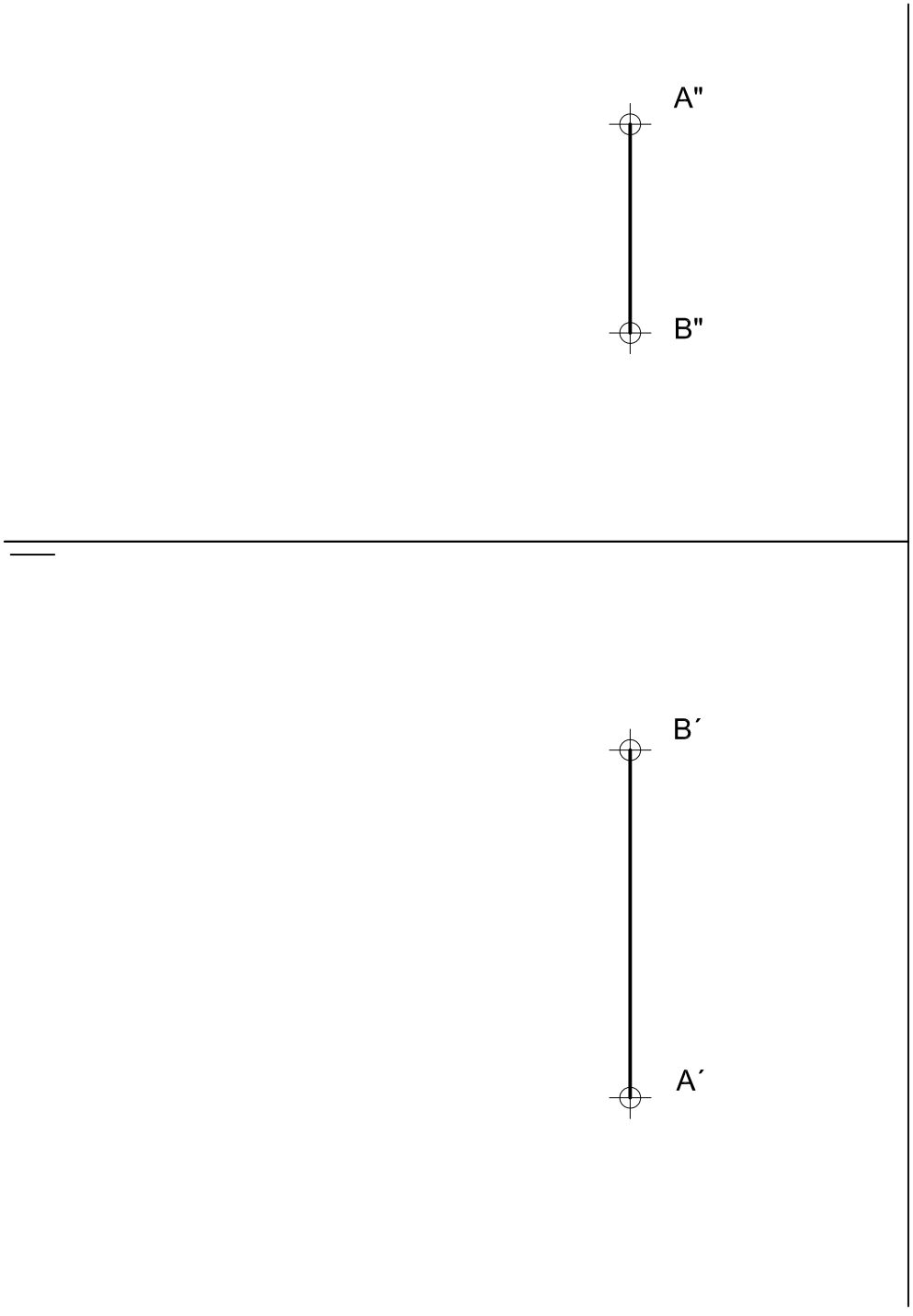
EXERCISE 10

Calculate the distance between the points $A(4,8,6)$ *and* $B(4,3,3)$.

Calculate the distance between the points A (4,8,6) and B (4,3,3) .



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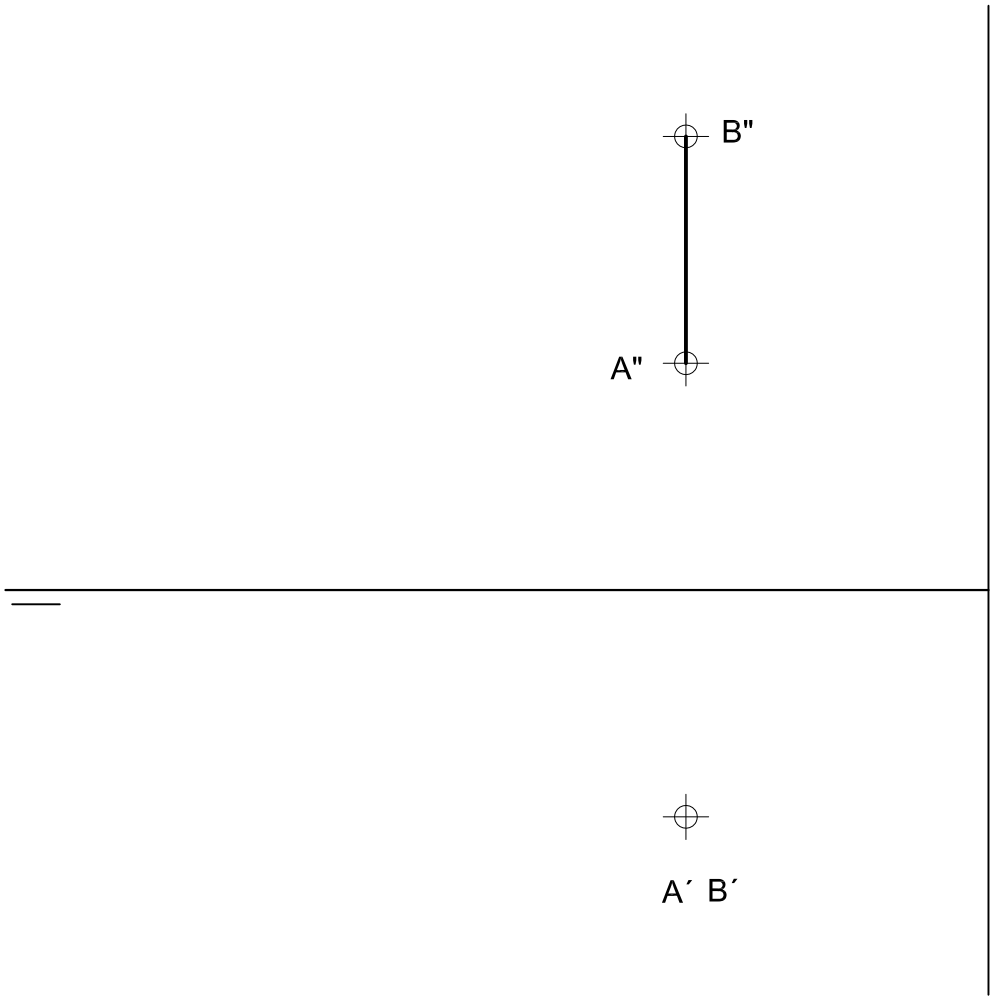
EXERCISE 11

Calculate the distance between the points $A(4,3,3)$ *and* $B(4,3,6)$.

Calculate the distance between the points A and B.



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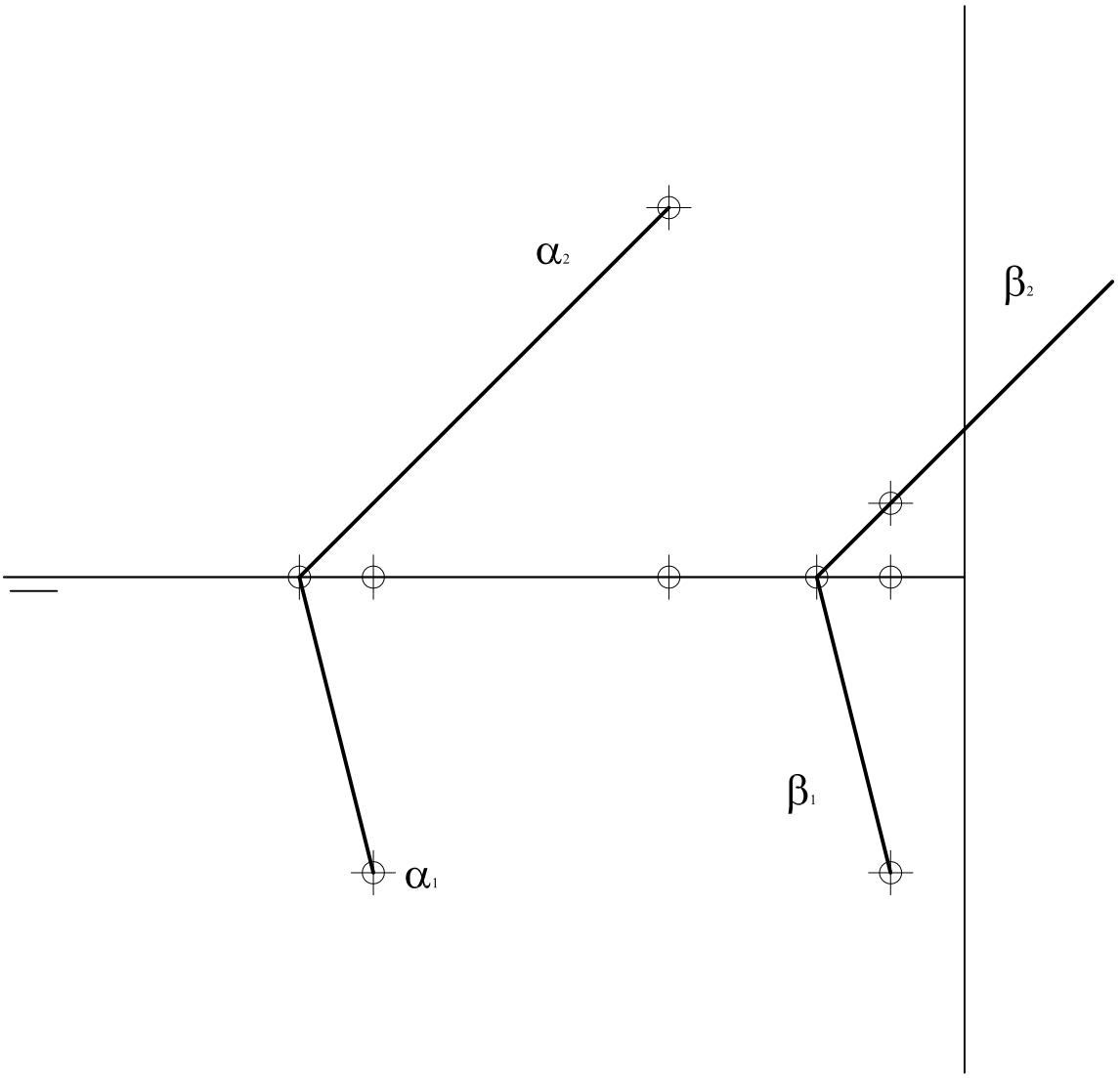
EXERCISE 12

Calculate the distance between the plane $\alpha : 4x + y + 4z = 36$ *and the plane* β *determined by the points* $(2,0,0)$, $(1,0,1)$ *and* $(1,4,0)$.

Calculate the distance between the planes α and β .



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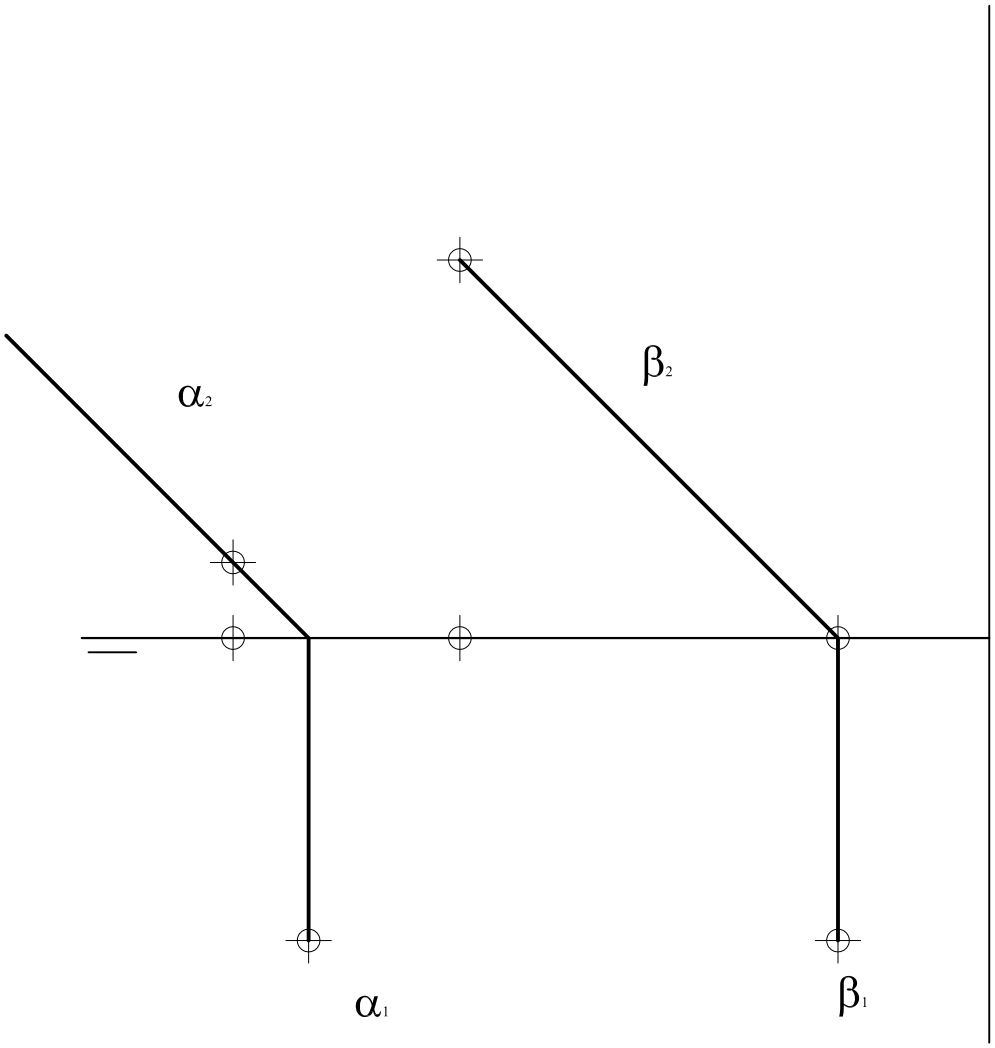
EXERCISE 13

Let α be a plane determined by the points, $(9,0,0)$, $(10,0,1)$ and $(9,4,0)$, and β determined by $(2,0,0)$, $(7,0,5)$ and $(2,4,0)$. Calculate the distance between these planes.

Calculate the distance between the planes α and β .



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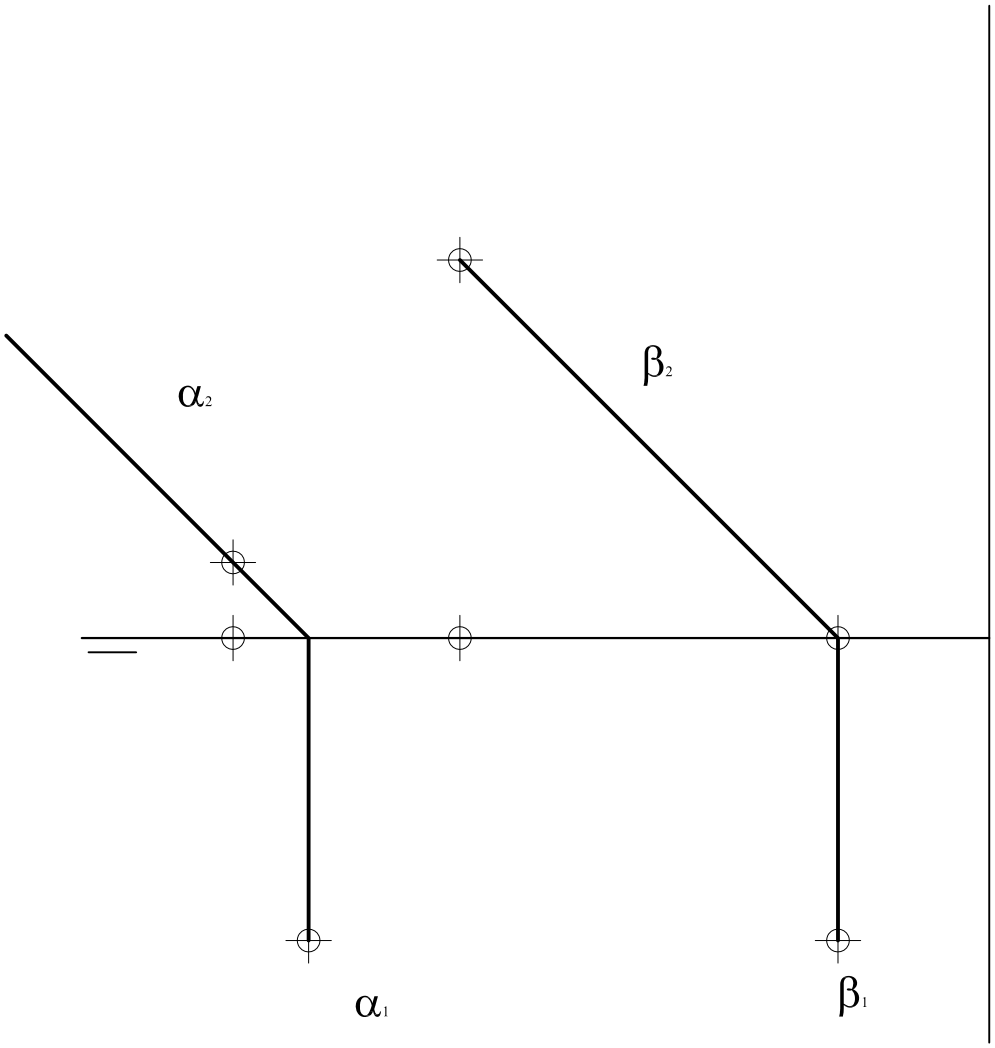
EXERCISE 14

Let α be a plane determined by the points $(9,0,0)$, $(10,0,1)$ and $(9,4,0)$, and the plane β determined by $(2,0,0)$, $(7,0,5)$ and $(2,4,0)$. Calculate the bisector plane of α and β.

Calculate the bisector plane of the planes α and β .



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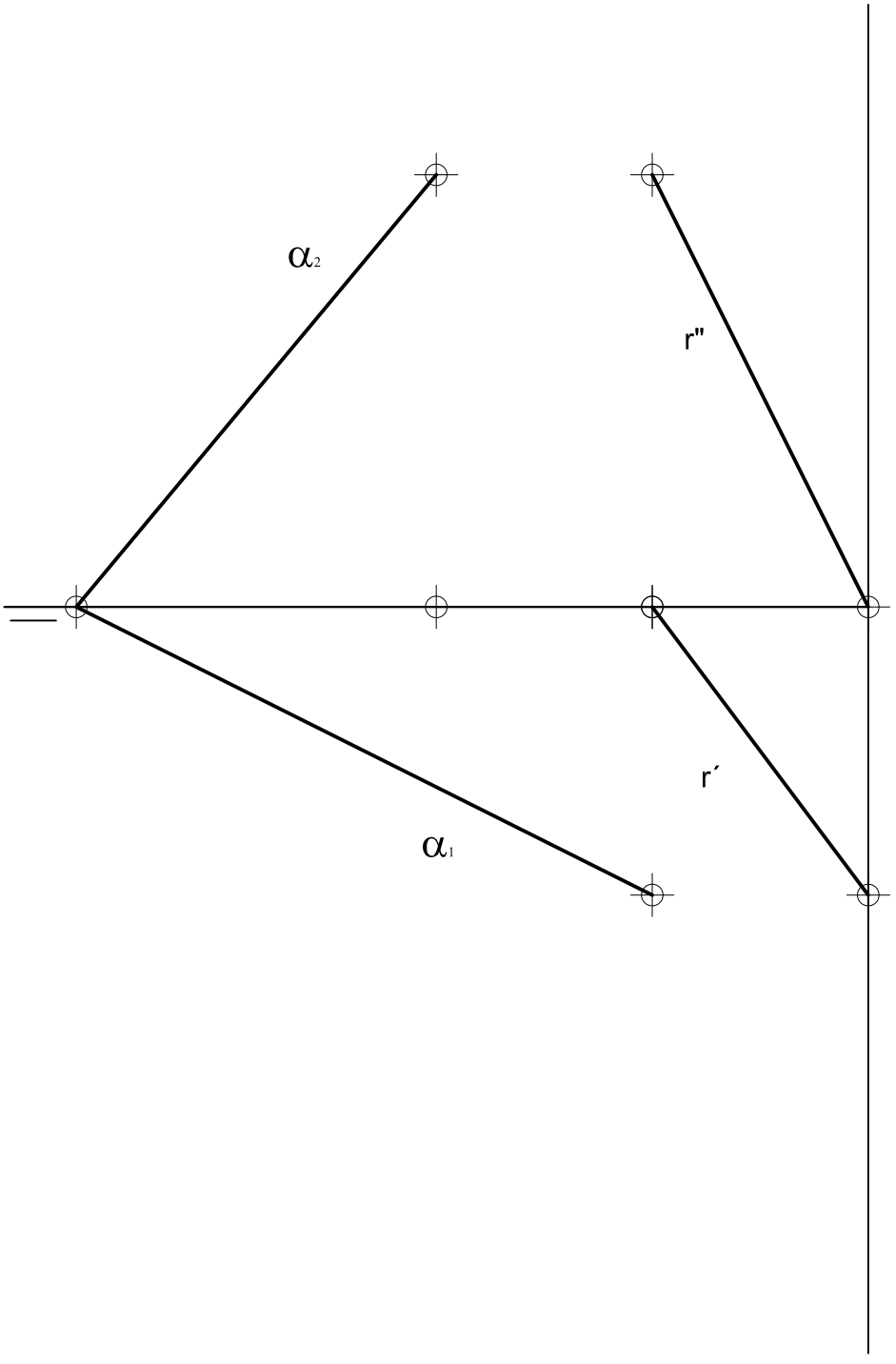
EXERCISE 15

Calculate the distance between the line $r:\begin{cases} x=3-3t \\ y=6-t \\ z=6t \end{cases}$ *and the plane*

$\alpha: 6x+12y+5z-66=0$ *which is parallel to the line.*

Calculate the distance between the the line r and the plane β .



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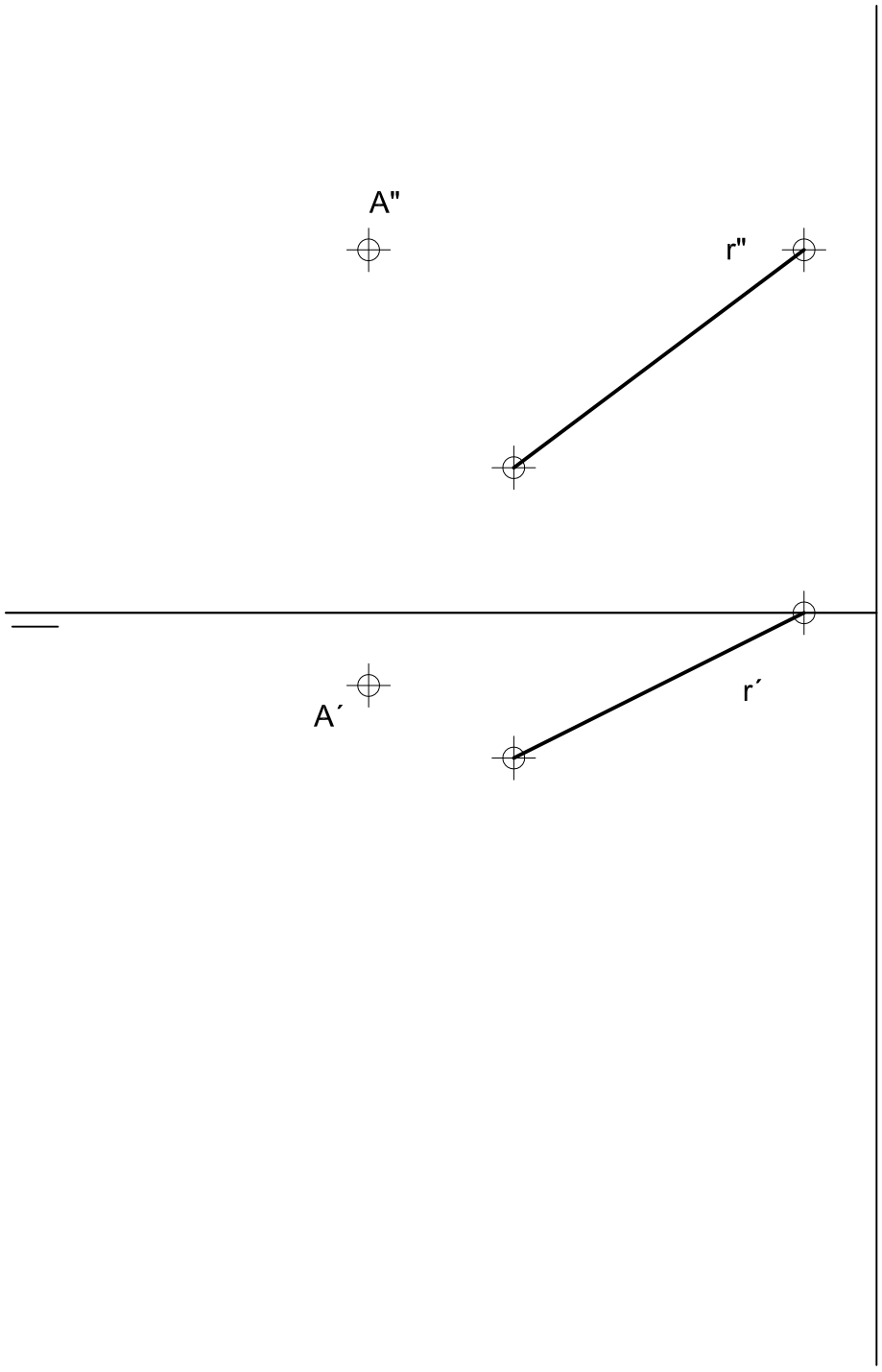
EXERCISE 16

Calculate the distance from the point $A(7,1,5)$ *to the line* $r: \dfrac{x-1}{4} = \dfrac{y}{2} = \dfrac{z-5}{-3}$.

Calculate the distance between the line r and the point A.



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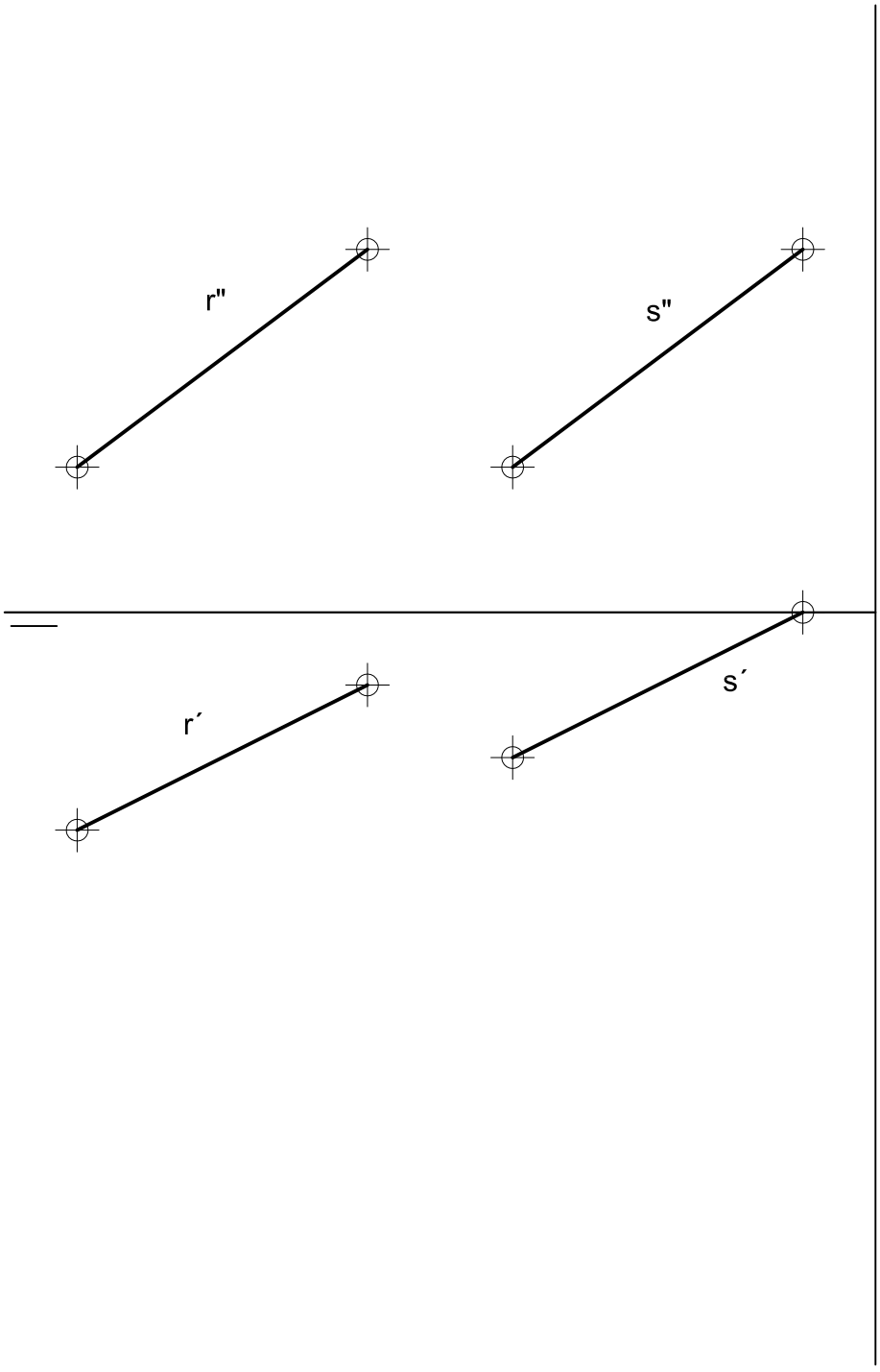
EXERCISE 17

Calculate the distance between the lines $r: \dfrac{x-1}{4} = \dfrac{y}{2} = \dfrac{z-5}{-3}$ *and* $s: \begin{cases} x = 7 + 4t \\ y = 1 + 2t \\ z = 5 - 3t \end{cases}$.

Calculate the distance between the lines r and s.



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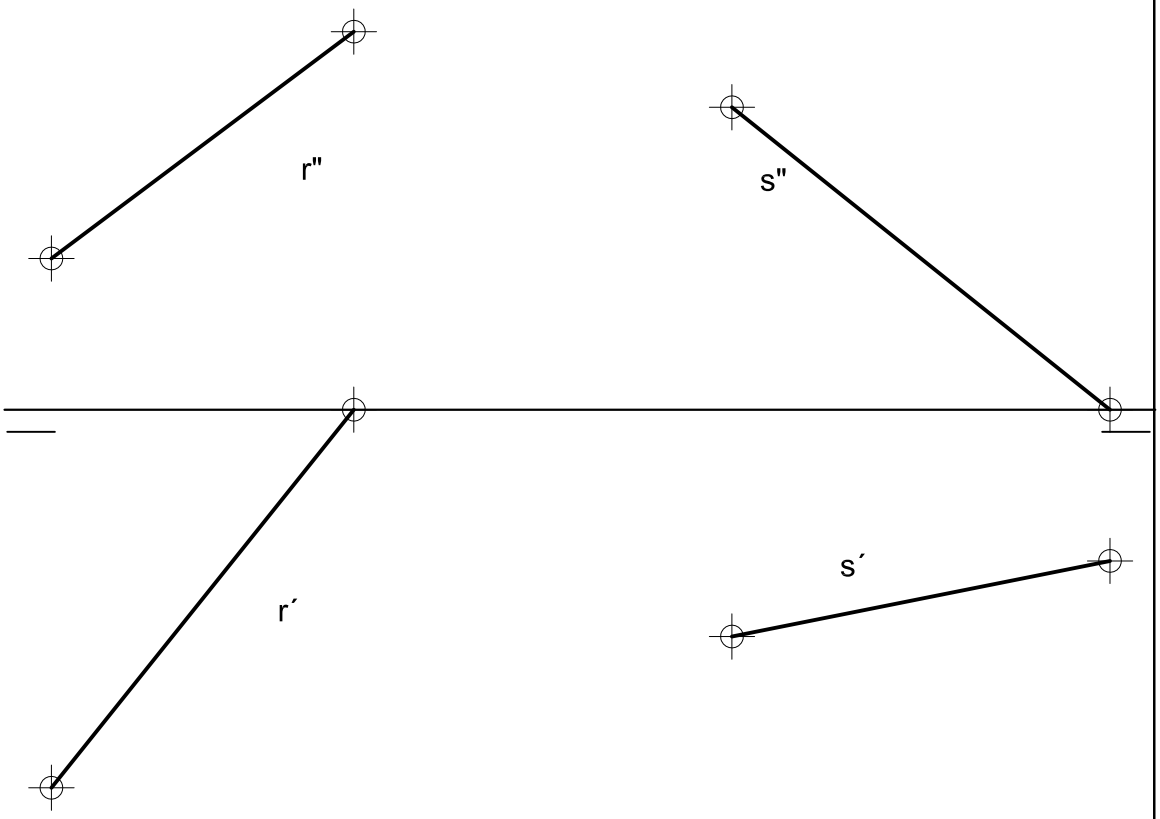
EXERCISE 18

Calculate the distance between the lines $r\left((13,0,5)(17,5,2)\right)$ *and* $s\left((3,2,0)(8,3,4)\right)$.

Calculate the distance between the lines r and s.



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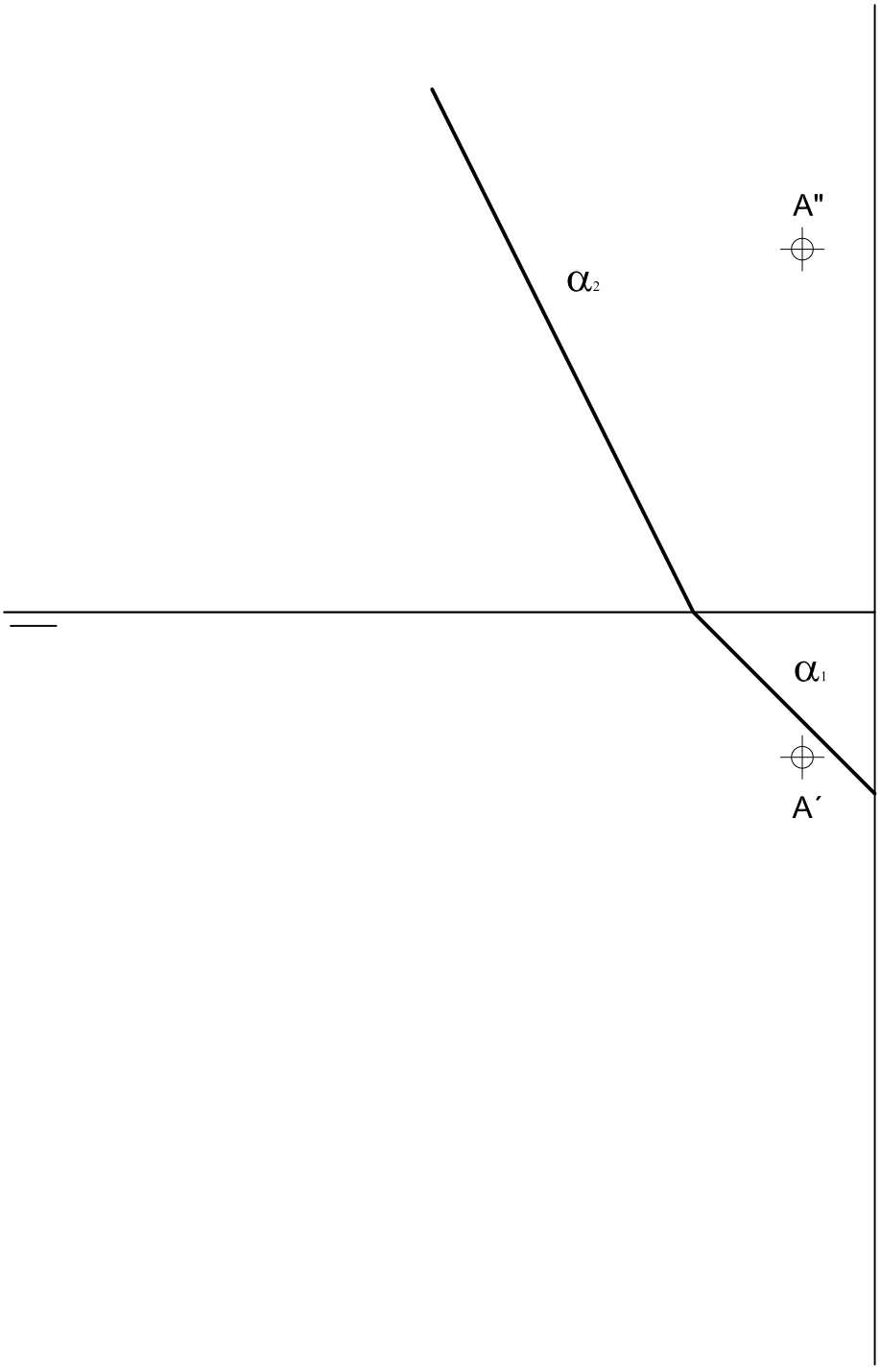
EXERCISE 19

Calculate the distance from the point $A(1,2,5)$ *to the plane* $\alpha : 2x + 2y - z - 5 = 0$.

Calculate the distance between the point A and the plane α .



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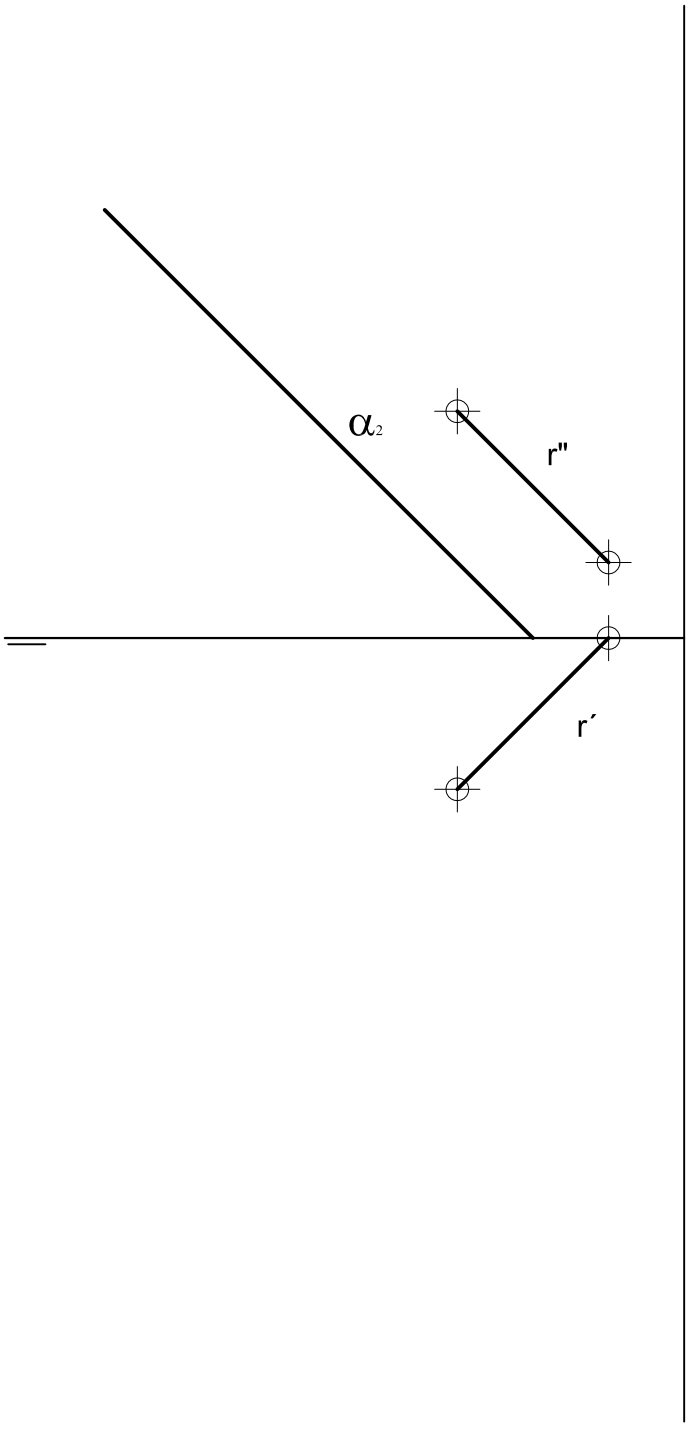
EXERCISE 20

Calculate the distance from the line $r: \frac{x-1}{2} = \frac{y}{2} = \frac{z-1}{2}$ *to the plane* $\alpha: x - z = 2$.

Calculate the distance between the plane α (perpendicular to PV) and the line r.



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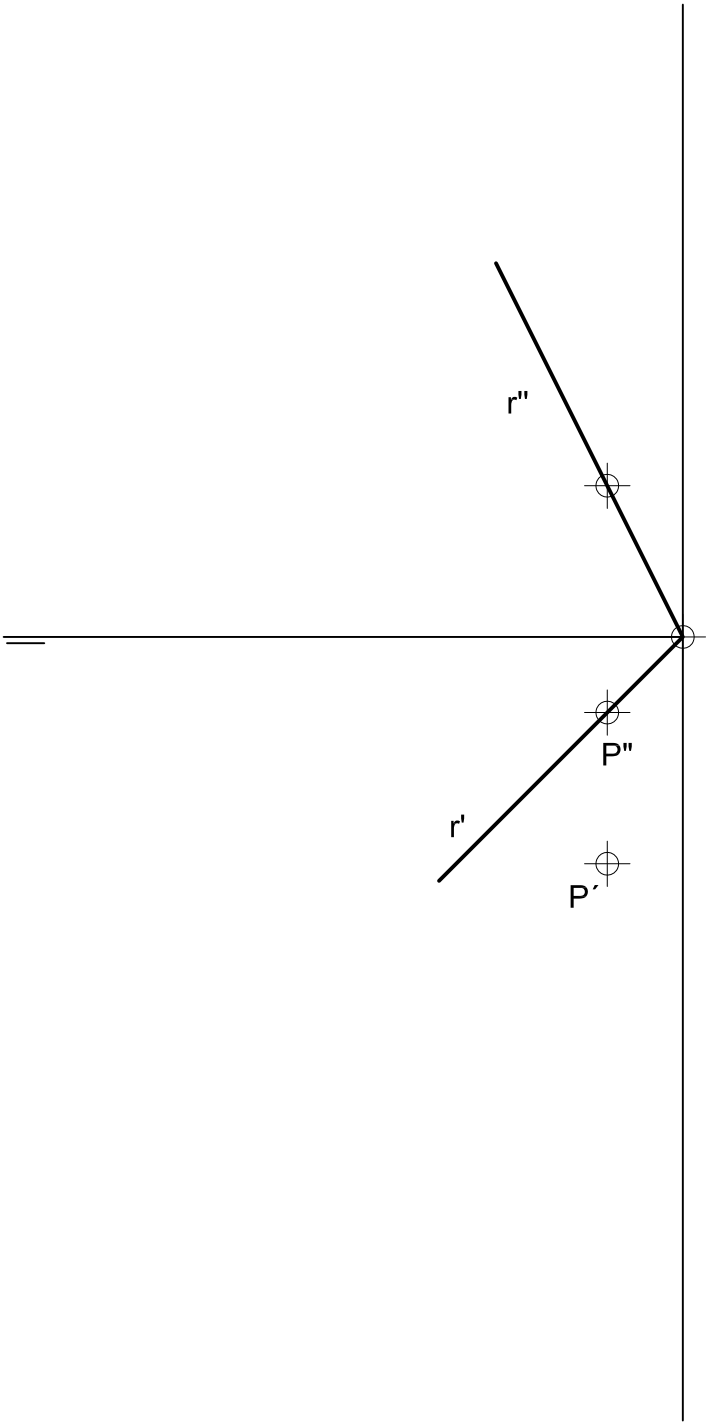
EXERCISE 21

Calculate the distance from the point $P(1,3,-1)$ *to the line* $r:\begin{cases} x-y=0 \\ x+y-z=0 \end{cases}$.

Calculate the distance between the point P and the line r.



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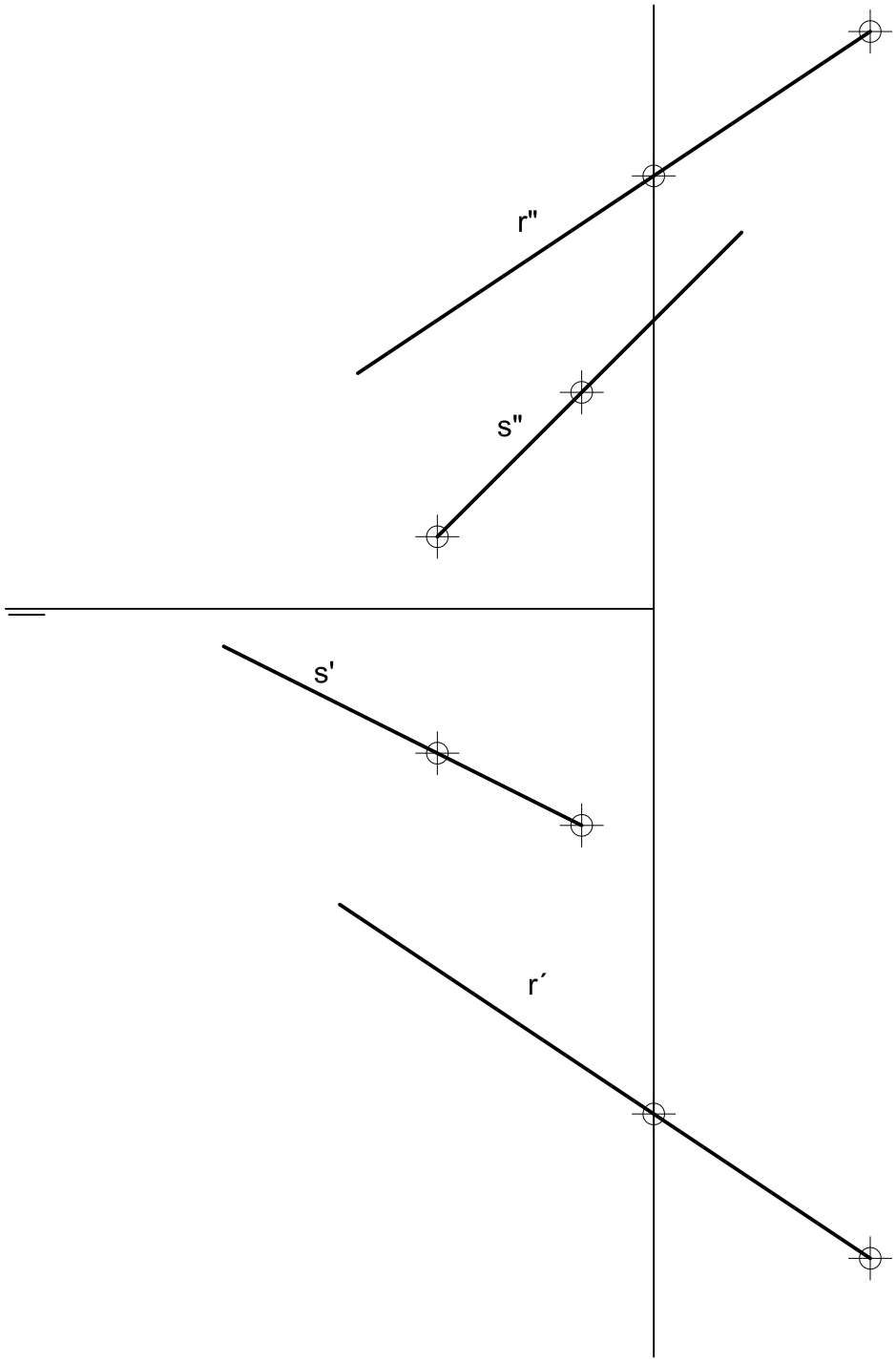
EXERCISE 22

Calculate the distance between the lines $r: \frac{x+3}{3} = \frac{y-9}{-2} = \frac{z-8}{-2}$ *and* $s: \frac{x-3}{-2} = \frac{y-2}{1} = \frac{z-1}{2}$.

Calculate the distance between the lines r and s.



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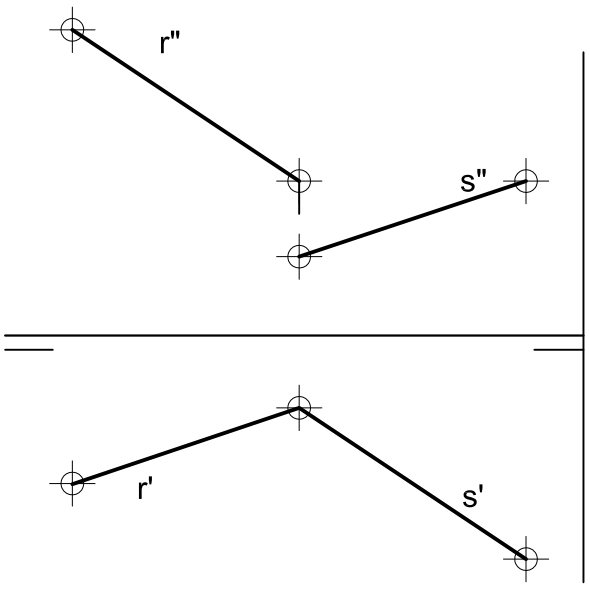
EXERCISE 23

Calculate the angle between the line $r: \begin{cases} x-3y=1 \\ 2y=z \end{cases}$ *and the line* s *that passes through the points* $(4,1,1)$ *and* $(1,3,3)$.

Find the angle between the lines r and s.



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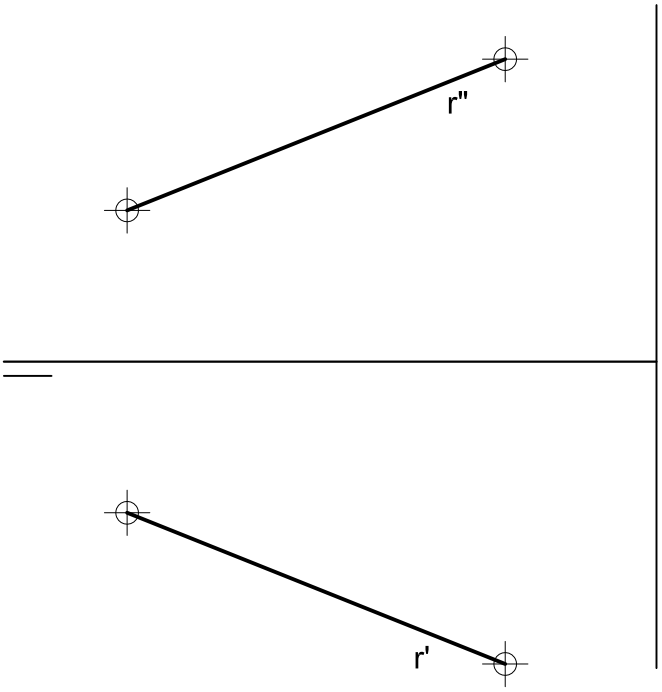
EXERCISE 24

Calculate the angles that the line $r: \begin{cases} 2x + 5z = 24 \\ y = z \end{cases}$ *form with the horizontal plane* $(z = 0)$

and with the vertical one $(y = 0)$.

Find the angle between the line r with the projection planes PH and PV.



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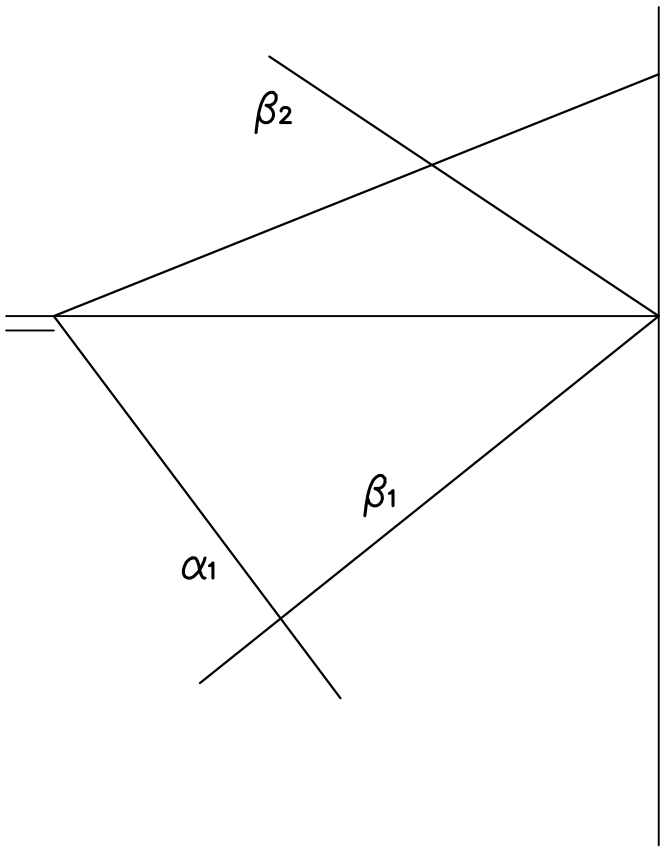
EXERCISE 25

Calculate the angle between the planes $\alpha : 4x + 3y + 10z = 32$ *and* $\beta : 4x - 5y - 6z = 0$.

Find the angle between the planes α and β .



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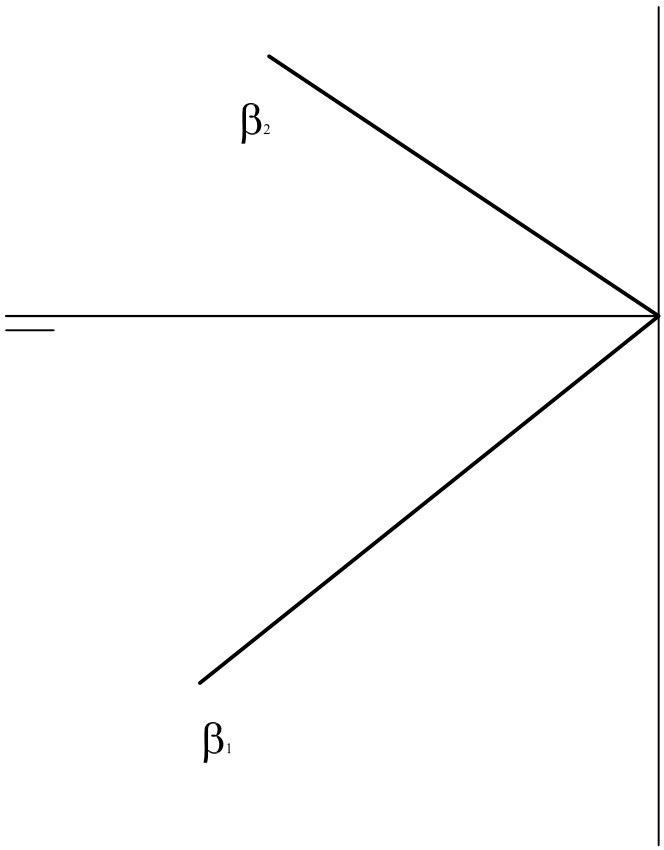
EXERCISE 26

Calculate the angle between the plane $\pi : 4x - 5y - 6z = 0$ *and the vertical plane* $(y = 0)$.

Find the angle between the plane β *and the projection plane PV.*



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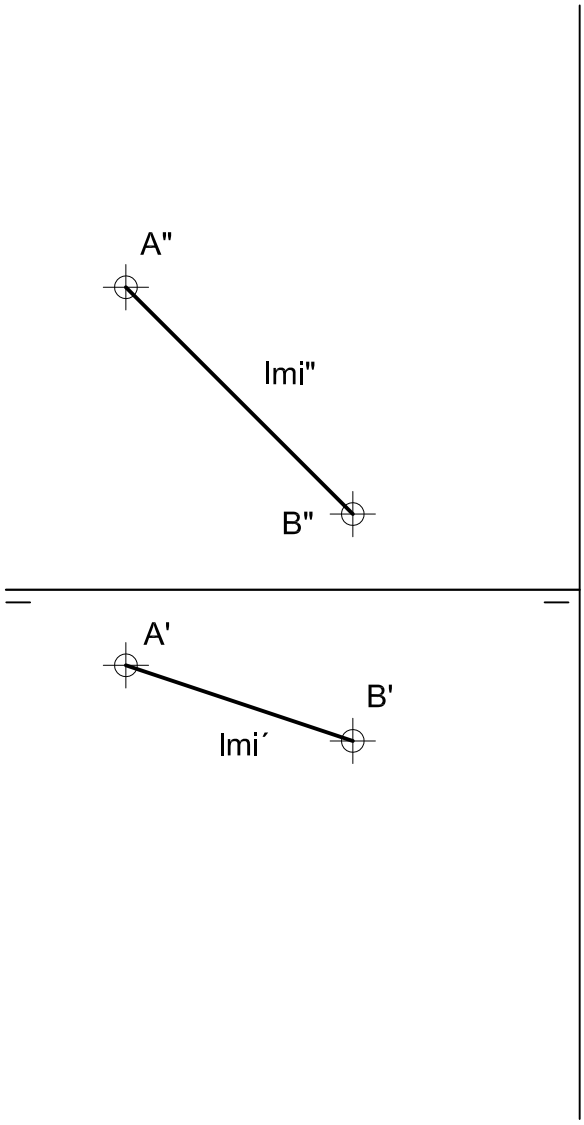
EXERCISE 27

Define the plane α , being the line $s:\begin{cases} x+3y=9 \\ 3y+z=7 \end{cases}$ its line of maximum inclination.

Find the plane α , being lmi its line of maximum inclination.



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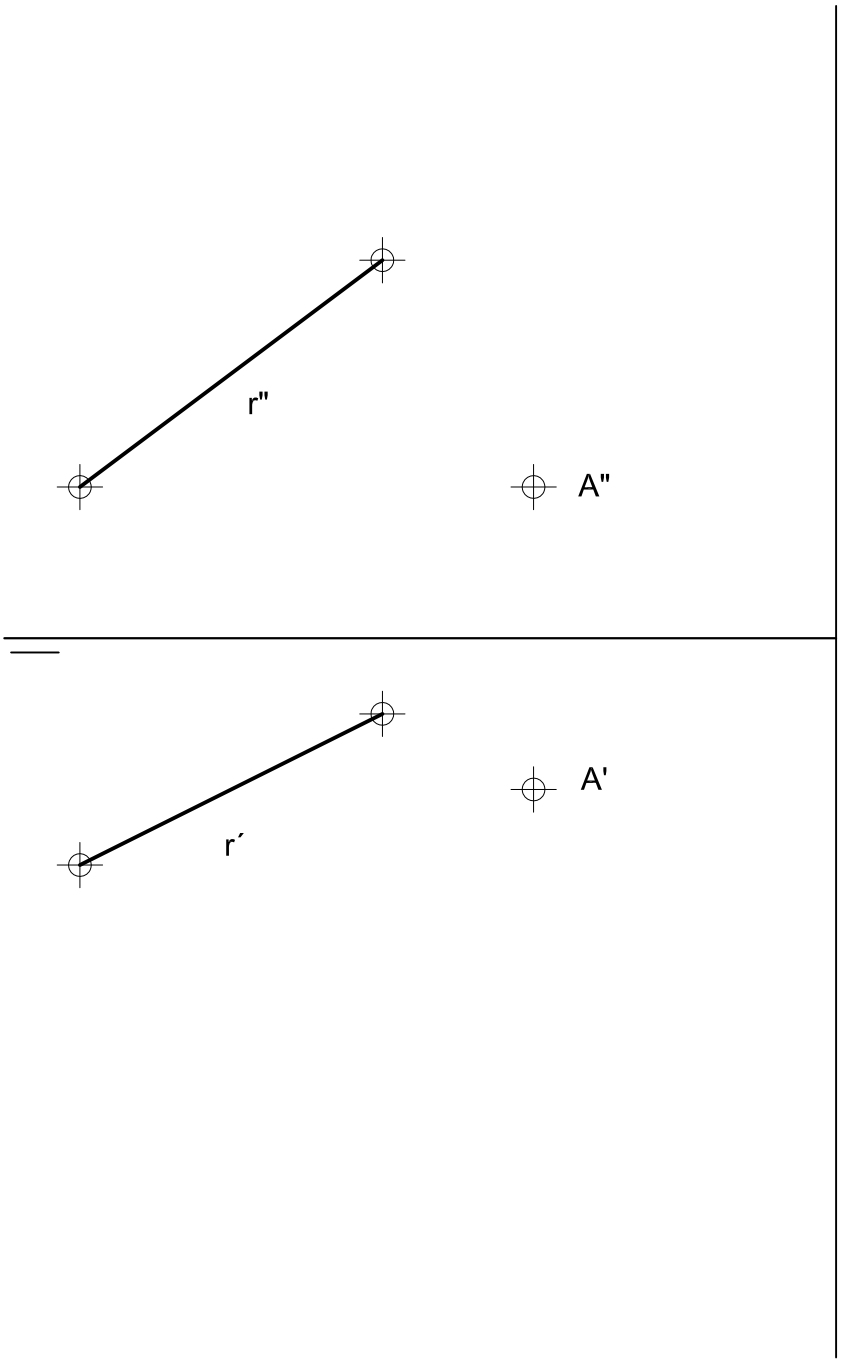
EXERCISE 28

Calculate the symmetric point of $A(4,2,2)$ *with respect to the line*

$$r: \frac{x-6}{4} = \frac{y-1}{2} = \frac{z-5}{-3}.$$

Find the symmetric point of A with respect to the line r.



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EXERCISE 29

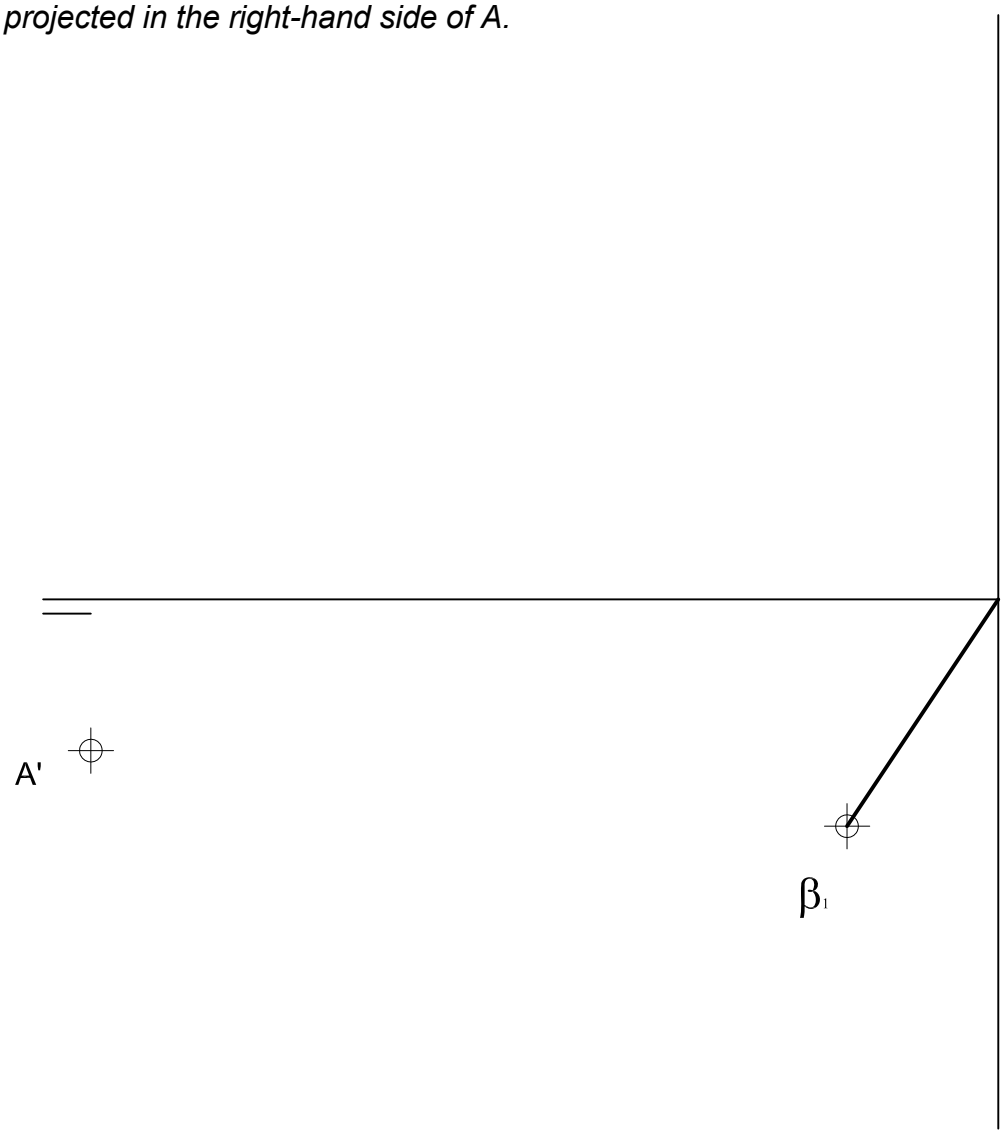
Define the coordinates of a square ABCD knowing that:

- *The line AB is included in the plane* $y = z$.
- *The line BC is parallel to a plane* β *that is perpendicular to the horizontal plane.*
- *The intersection between the planes* β *and XOY is the line that passes through the points* $(0,0,0)$ *and* $(2,3,0)$.
- *The third coordinate of the vertex* B *(height) is 4.*
- *The distance between the points* A *and* B *is 6,5.*
- *The* x *coordinate of the point* A *is 12 and its* y *coordinate is 2.*

Draw the rectangle ABCD that is in the first quadrant.

Data:

1. *The segment AB is in the first bisector.*
2. *BC is parallel to the plane* β*, that is perpendicular to the PH.*
3. *The elevation of B is 4.*
4. *The distance between the points A and B is 6,5.*
5. *B is projected in the right-hand side of A.*



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EXERCISE 30

Let $P(11,-3,3)$ and $Q(\text{--},-3,-3)$ be two points. Define the vertex of a square ABCD knowing that:

- *The vertex of the square are equidistant from P and Q.*
- *The distance between the points P and Q is 10.*
- *The point A is included in the plane $y=0$.*
- *The third coordinate of the point A (its height) is 4.*

Draw the square of vertexes ABCD equidistant to the points P and Q.

Data:

1. *The elevation of Q is -3 and it is in the first bisector.*
2. *The distance between P and Q is 10.*
3. *A is in the PV and its elevation is 4.*

P" P'

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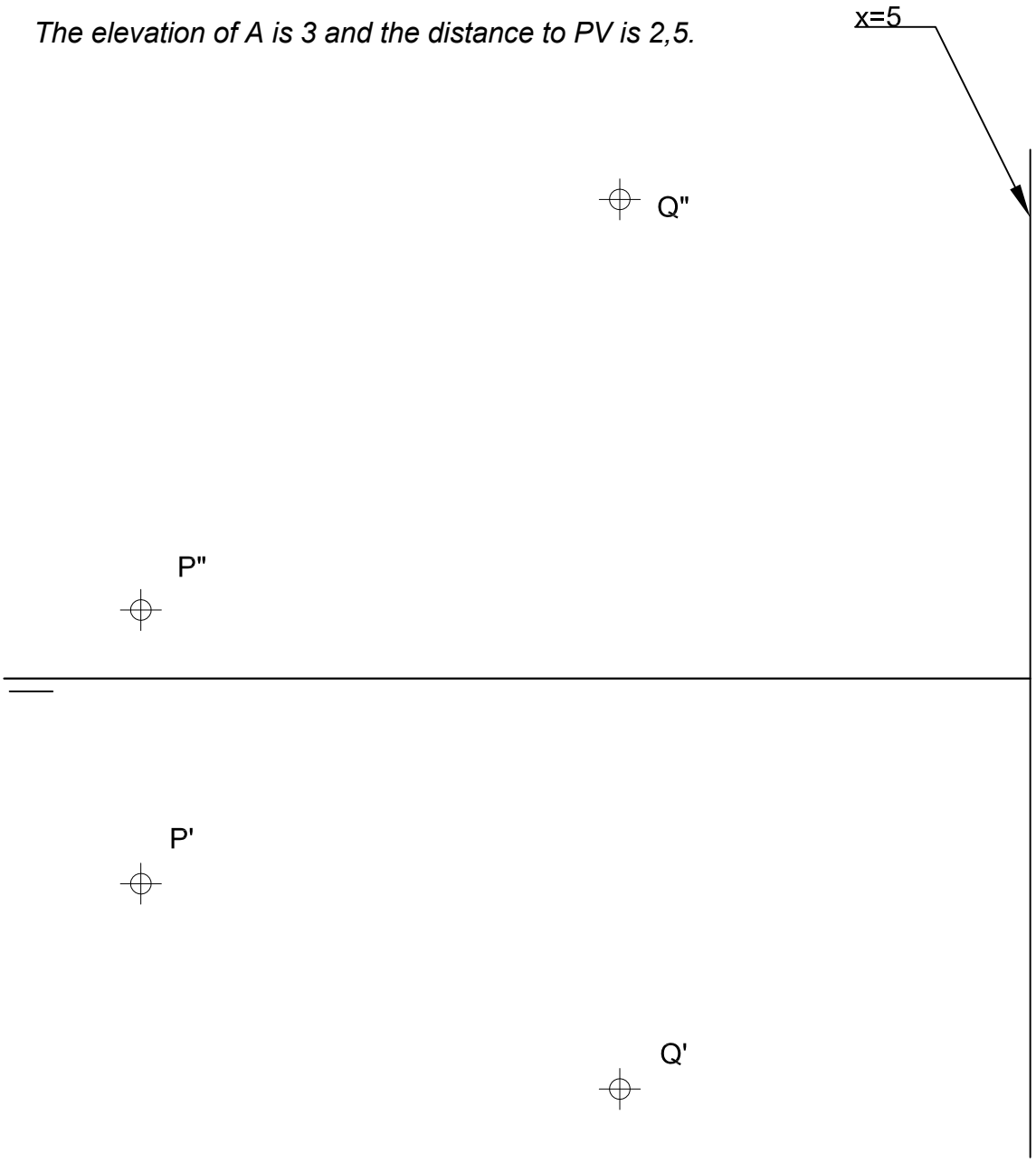
EXERCISE 31

Let $P(18,3,1)$ *and* $Q(11,6,7)$ *be two points. Define the equilateral triangle ABC equidistant to the points* P *and* Q*, being* $A(\text{--},2'5,3)$.

Draw the equilateral triangle ABC, equidistant to the points P and Q.
Data:

The elevation of A is 3 and the distance to PV is 2,5.



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