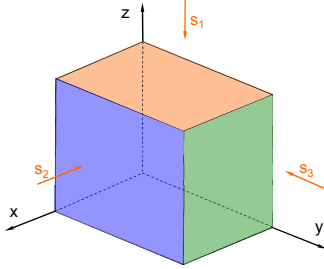# Introduction of Principle Views

Principle Views

It is very convenient and efficient to use the Cartesian system of coordinates for picturing objects.

To project a solid on an image plane π, lines of sight s are required.

If lines of sight are parallel to each other and perpendicular to the image plane π, the projection will be a special parallel projection, called normal projection.

If normal projections along the coordinate axis are considered, three main views of the object are obtained, which are called principle views or main views.

1

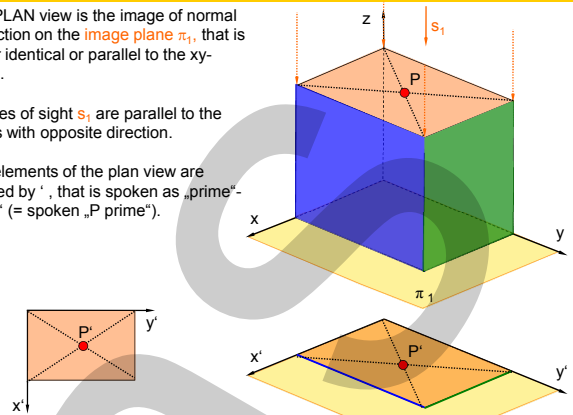## Plan View

The PLAN view is the image of normal projection on the image plane π_1, that is either identical or parallel to the xy-plane.

All lines of sight s_1 are parallel to the z-axis with opposite direction.

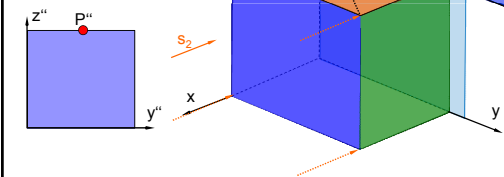The elements of the plan view are lettered by ' , that is spoken as „prime"- like P' (= spoken „P prime").

2

Front View

The FRONT view is the image of normal projection on the image plane π_2, that is either identical or parallel to the yz-plane.

All lines of sight s_2 are parallel to the x-axis with opposite direction.

The elements of the front view are lettered by '' , that is spoken as „double prime"- like P'' (= spoken „P double prime").
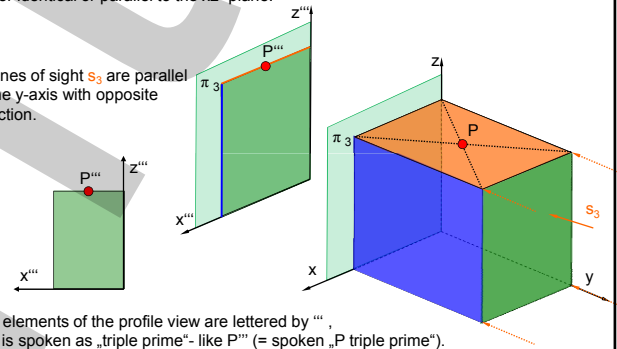
3

Profile View

The PROFILE view is the image of normal projection on the image plane π_3, that is either identical or parallel to the xz- plane.

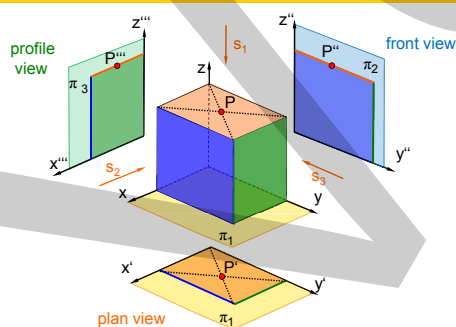All lines of sight s_3 are parallel to the y-axis with opposite direction.

The elements of the profile view are lettered by ''' , that is spoken as „triple prime"- like P''' (= spoken „P triple prime").

4

Plan, Front and Profile View

normal projection	lines of sight	image plane	orientation	label
Plan view projection	s_1 // z-axis	π_1 // xy- plane	z^-	P'
Front view projection	s_2 // x-axis	π_2 // yz- plane	x^-	P''
Profile view projection	s_3 // y-axis	π_3 // zx- plane	y^-	P'''

5

European Positioning Scheme

Related principle views:

profile view right hand side — P'''

front view — P''

profile view left hand side — P'''

folding lines

plan view
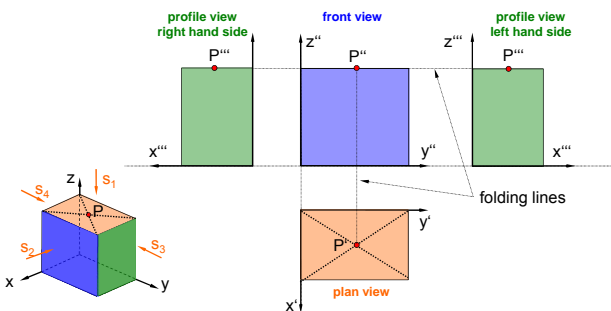
To obtain the „left hand side" profile view, s_4 in y^+ direction is required.

6

02_03_00_t

Plane Appearing as an Edge - Edge View of a Plane

Plane Appearing as an Edge - Edge View of a Plane

If a plane ABC has the **same direction as lines of sight s**, the image $A^pB^pC^p$ of that plane will be a line. Such plane is called **edge view of a plane**.
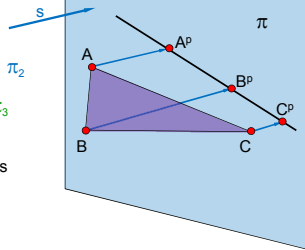
Special case: If a plane appears as a plane by using an orthographic projection, the plane must be perpendicular to the image plane:

Plane of "**first**" edge view: ABC $\perp$ π_1

Plane of "**second**" edge view : ABC $\perp$ π_2

Plane of "**third**" edge view: ABC $\perp$ π_3

Generally a plane of edge view appears distorted.

1

Plane Appearing as an Edge - Edge View of a Plane

A plane of **first edge** view: ABC $\perp$ π_1

The plane is parallel to s_1, i.e. the plane is perpendicular to π_1.

2

Plane Appearing as an Edge - Edge View of a Plane

A plane of **second edge** view: ABC $\perp$ π_2

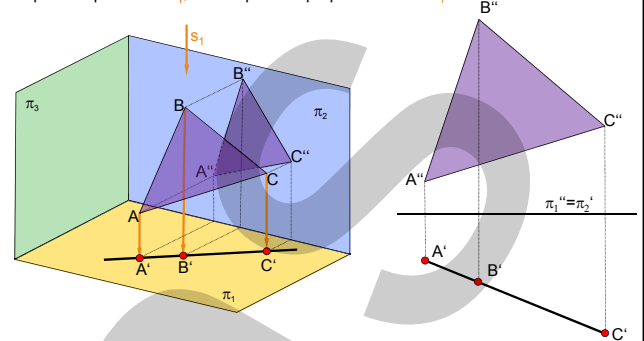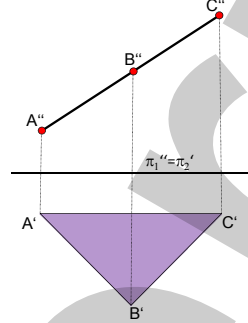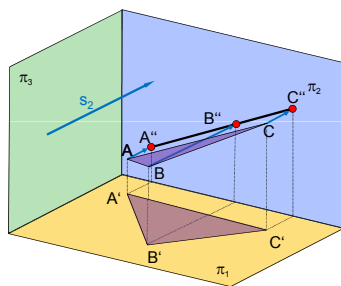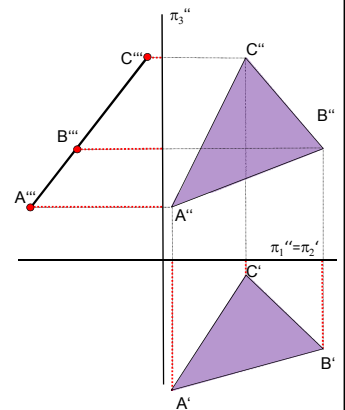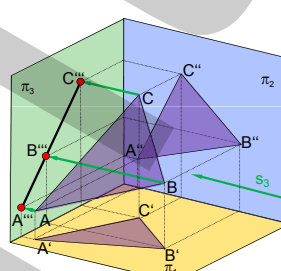The plane is parallel to s_2, i.e. the plane is perpendicular to π_2.

3

Plane Appearing as an Edge - Edge View of a Plane

A plane of **third edge** view: ABC $\perp$ π_3

The plane is parallel to s_3, i.e. the plane is perpendicular to π_3.

4

05_01_03_t

Lage zweier Geraden zueinander

Slide 1

Lage zweier Geraden zueinander

Zwei Geraden im R³ können 3 verschiedene Lagen zueinander haben (oder identisch sein).

π_2 · π_2 · π_2

q'' · q · S'' · S · p · $\pi_1''=\pi_2'$ · q' · S' · p' · π_1

π_2 · p'' · q'' · q · p · $\pi_1''=\pi_2'$ · p' · q' · π_1

π_2 · D'' · D · A'' · A · B'' · C'' · $\pi_1''=\pi_2'$ · D' · B' · C' · π_1

schneidend · parallel · windschief

VER TAS · 1

Slide 2

Lage zweier Geraden zueinander

Schneidende Geraden:

Das Bild des wirklichen Schnittpunkts liegt in Grund- und Aufriss auf einem Ordner

π_2 · q'' · q · S'' · S · p'' · p · $\pi_1''=\pi_2'$ · S' · q' · p' · π_1

q'' · S'' · p'' · $\pi_1''=\pi_2'$ · q' · S' · p'

VER TAS · 2

Slide 3

Lage zweier Geraden zueinander

Parallele Geraden:

Die Bilder paralleler Geraden sind in jeder Parallelprojektion parallel – daher auch in Grund- und Aufriss.

π_2 · p'' · q'' · p · q · $\pi_1''=\pi_2'$ · p' · q' · π_1

p'' · q'' · $\pi_1''=\pi_2'$ · p' · q'

VER TAS · 3

Slide 4

Lage zweier Geraden zueinander

Windschiefe Geraden:

Die Punkte P_1 und Q_1 liegen auf dem gleichen Sehstrahl s_1
$\Rightarrow$ Sie haben denselben Grundriss.

π_2 · D · A · s_1 · P_1 · Q_1 · A' · $\pi_1''=\pi_2'$ · D' · B' · $Q_1'=P_1'$ · C' · π_1

D'' · A'' · s_1'' · P_1'' · B'' · Q_1'' · C'' · $\pi_1''=\pi_2'$ · D' · A' · $Q_1'=P_1'$ · C' · B'

VER TAS · 4

Slide 5

Lage zweier Geraden zueinander

Windschiefe Geraden:

Die Punkte P_1 und Q_1 liegen auf dem gleichen Sehstrahl s_1
$\Rightarrow$ Sie haben denselben Grundriss.

Die Punkte P_2 und Q_2 liegen auf dem gleichen Sehstrahl s_2
$\Rightarrow$ Sie haben denselben Aufriss.

π_2 · D'' · D · A'' · A · $Q_2''=P_2''$ · s_1 · B'' · P_2 · Q_2 · $\pi_1''=\pi_2'$ · C'' · D' · A' · C · s_2 · B' · C' · π_1

s_1'' · A'' · P_1'' · $Q_2''=P_2''$ · B'' · Q_1'' · C'' · $\pi_1''=\pi_2'$ · D' · P_2' · A' · $Q_1''=P_1'$ · C' · B' · Q_2' · s_2'
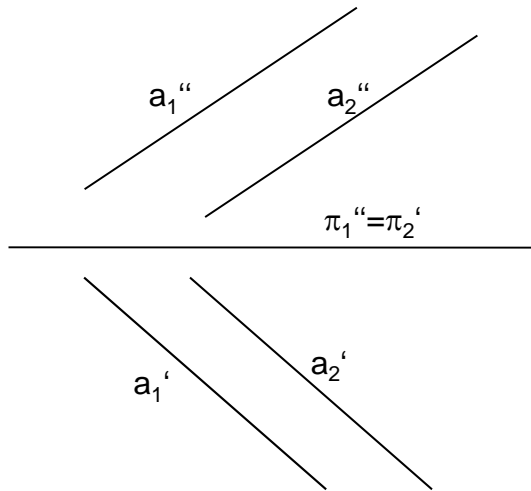
VER TAS · 5

Slide 6

Lage zweier Geraden zueinander

Bestimme die Lage der beiden in Grund- und Aufriss gegebenen Geraden zueinander. (Arbeitsblatt 05 05 00)

a) parallel

a_1'' · a_2'' · $\pi_1''=\pi_2'$ · a_1' · a_2'

b) windschief

b_1'' · b_2'' · $\pi_1''=\pi_2'$ · b_1' · b_2'

c) windschief

c_1'' · c_2'' · $\pi_1''=\pi_2'$ · c_2' · c_1'

d) schneidend

d_1'' · d_2'' · $\pi_1''=\pi_2'$ · d_1' · d_2'

e) parallel

e_1'' · e_2'' · $\pi_1''=\pi_2'$ · $e_2'=e_1'$

f) parallel oder windschief

$f_1''=f_1'$ · $f_2''=f_2$ · $\pi_1''=\pi_2'$

VER TAS · 6

05_05_00_t

Arbeitsblatt 05 05 00: **Lage zweier Geraden zueinander**   Name:
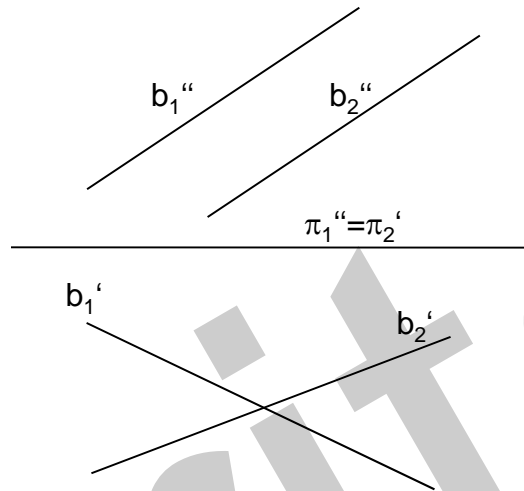
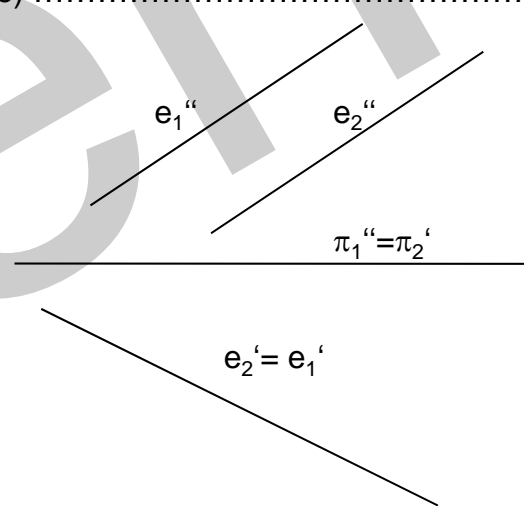Bestimme die Lage der beiden in Grund- und Aufriss gegebenen Geraden zueinander.

a) …………………………………………

a_1'' a_2''

$\pi_1''=\pi_2'$

a_1' a_2'

b) …………………………………………

b_1'' b_2''

$\pi_1''=\pi_2'$

b_1' b_2'

c) …………………………………………

c_1'' c_2''

$\pi_1''=\pi_2'$

c_2'

c_1'

d) …………………………………………

d_2''

d_1''

$\pi_1''=\pi_2'$

d_1' d_2'

e) …………………………………………

e_1'' e_2''

$\pi_1''=\pi_2'$

$e_2'=e_1'$

f) …………………………………………

$f_1''=f_1'$ $f_2''=f_2'$

$\pi_1''=\pi_2'$