Chapter 10 "Transformation"

**Content**

_____

Transformation of objects, such as move, turn or mirror are essential construction tools you will find in any CAD system. Only with the transformation functions can yokes be relocated or other pieces be positioned in the construction or mirrored. Each explanation of the 8 transformation types is followed by an exercise.

The emphasis in this chapter lies on the complex exercises. Invest plenty of time into these exercises to gain confidence in the use of Grafis.
After having finished this chapter you should begin to design your own styles with Grafis to gain practical experience.
This chapter forms the end of the Grafis I teaching complex. In the following teaching complex Grafis II you will learn about modifying styles with construction parameters, work with parts, heredity automatic and generation of production patterns.

_____
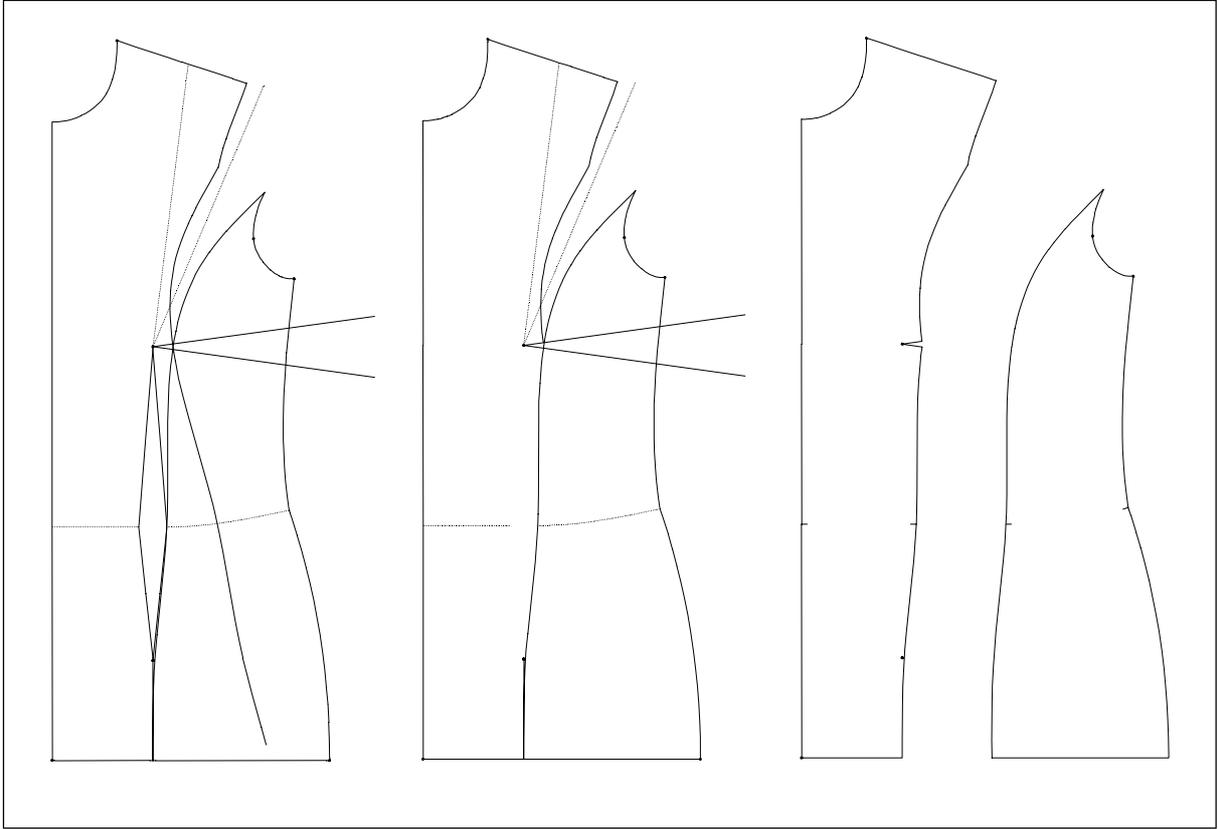
10.1 Transformation

The *transformation* menu

The functions of this menu allow for moving, rotating, scaling and mirroring of Grafis objects. The eight transformation types are:

* 2 move transformations
* 2 turn transformations
* 1 turn and move transformation
* 1 scale transformation
* 2 mirror functions

Object types

You can transform:

* the complete part,
* points -individually-,
* lines -individually-.

Step-by-step guide

⇒ Adjust the transformation parameters
⇒ Select the type of object (*part, points,...*)
⇒ Activate the transformation
⇒ Adjust +/-*copy:* the original objects remains/ does not remain existent
⇒ Set the transformation direction with +/-*rev trans.* transformation in reverse/ normal direction (e.g. change of sign for set angle). No significance with *mirror*!
⇒ Click the objects to be transformed.

Further functions

reset   resets the last transformation step
*measure*   calls the *measure* menu

move (dx,dy)

This move function (translation) with preset values requires the entry of the move value in x direction dx and y direction dy (Picture 10-1). A detailed explanation on the co-ordinate system can be found in chapter 4.3. The move values can be positive or negative:

dx= - ....mm	to the left
dx=+ ....mm	to the right
dy= - ....mm	downwards
dy=+ ....mm upwards	

Move the shoulder and armhole in basic block „Grafis Bodice 10" by dx=+200 and dy=-50 (Picture 10-1).

Menu (right column of left section):

```
        transform


move
 dx=200.
 dy= 0.
move
 p==>p
turn
 turnp. +
 ang=90.0
turn
 tp+p=>p
turn+move
p+p=>p+p
scale
 Fx=1.000
 Fy=1.000
mirror
 p==>p
mirror
 click l

+rev trans.
What ? :
 part
 points
 lines

-copy
reset
measure
```
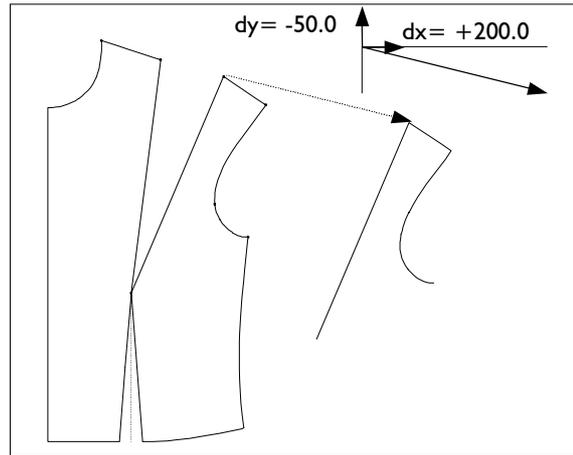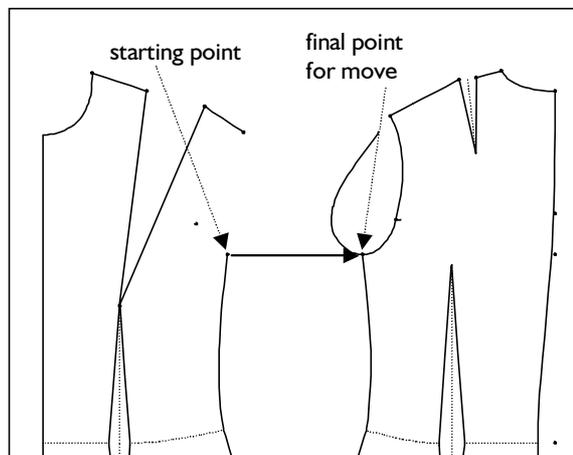

First, enter the values for dx and dy, select *lines* and set the switches to +*copy* and -*reverse transformation*. The move transformation *move* is active. You can now click the lines to be moved. Activate *points* and also move the corresponding points. Set the switch to +*reverse transformation*. You can now transform the objects back again. The transform settings remain in place also after quitting the *transformation* menu.

move p==>p

The objects are moved about the connecting line between two points of the construction (Picture 10-2).


After having clicked *p==>p* the starting and final point of the move line have to be constructed. Then, the line *move* (with *p==>p*) is active and the move of objects can begin. Move the front armhole of „Grafis Bodice 10" towards the back armhole. Grade the construction.

_____

turn with turnp. + ang

With the transformation function "turn with turning point and angle" the objects are rotated about a constructed pivot point by a given angle (Picture 10-3).

*Note: The set angle remains constant throughout all sizes!*
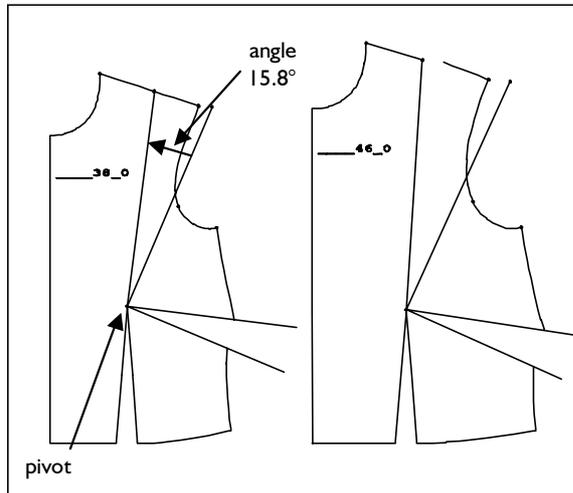
Picture 10-3

After having activated *turnp.+ang* the pivot point is to be constructed and the angle in ° is to be entered. Then, the line *turn* (with *turnp.+ang*) is active and turning of objects can begin.

Measure the bust dart of „Grafis Bodice 10" in your base size and relocate it into the side seam (Picture 10-3). First, construct an auxiliary line at the side seam for the position of the dart and separate the side seam at the auxiliary line. Then, click on *turnp.+ang*, select the bust point and enter the measured angle. Now active *lines* or *points* and transform the objects of the shoulder, the armhole and the upper side seam. Grade.

Use this type of transformation only if the angle is to be constant across all sizes or in connection with x values.

turn tp+p=>p

This transformation rotates the objects about a constructed pivot point. The angle is determined by the angle between turning point -> starting point of the rotation angle and turning point -> final point of the rotation angle.
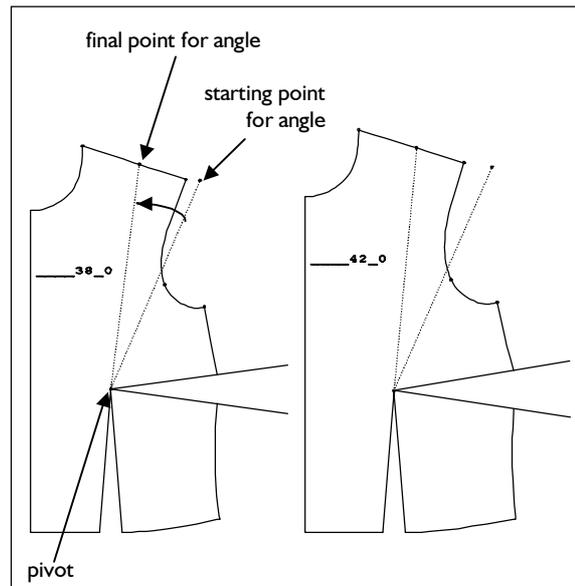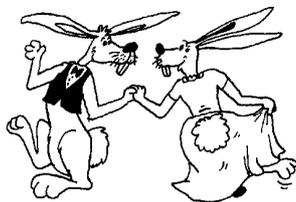
Picture 10-4

After having activated *tp+p=>p* the points are to be clicked in the following order: turning point --> starting point of the angle --> final point of the rotation angle. Then, the line *turn* (with *tp+p=>p*) is active and the rotation of objects can begin.
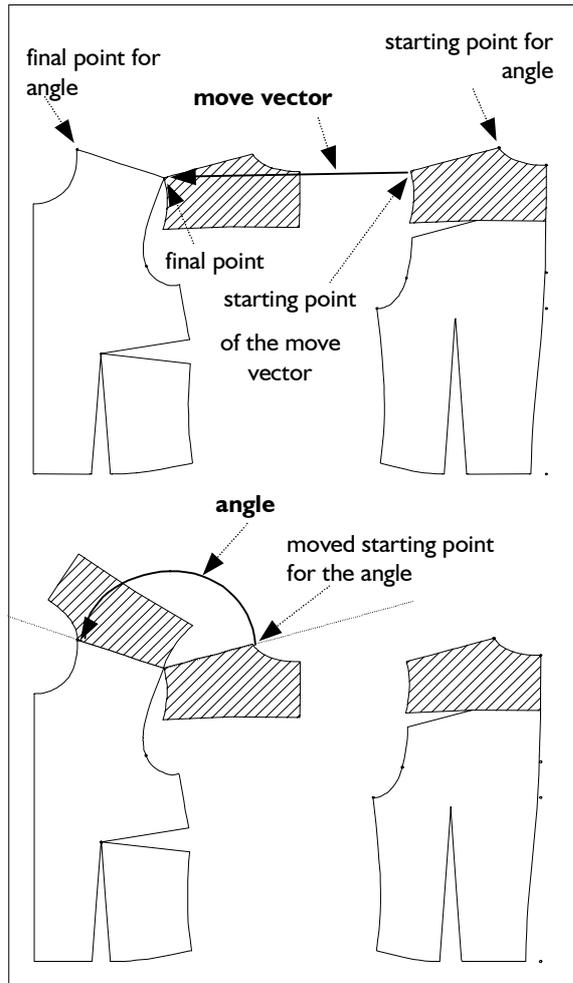
Relocate the bust dart into the side seam (see Picture 10-4). First, construct an auxiliary line for the position of the dart in the side seam and separate the side seam at the auxiliary line. Then, click on *tp+p=>p* in the *transformation* menu. Click the bust point with *click p* or *click pl*, the right dart line and the left dart line. Now activate *lines* or *points* and transform the objects of the shoulder, the armhole and the upper side seam. Grade.

turn+move p+p=>p+p

The objects are moved and rotated in one operation. For this function four points are to be clicked. The move vector is defined by its starting and final point (Picture 10-5 top). The rotation angle is defined by the moved starting point and the final point of the angle (Picture 10-5 bottom).

After having activated *p+p=>p+p* the points are to be clicked in the order: starting point of the move vector, starting point of the rotation angle, final point of the move vector, final point of the angle. Then, the line *turn+move* (with *p+p=>p+p*) is active and the transformation of objects can begin.

This function is especially useful for relocating yokes or relocating the shoulder seam.

Picture 10-5

Turn and move a yoke in the back according to Picture 10-5. Relocate the front and back dart into the respective side seam. Drop a perpendicular onto the centre back and separate the centre back. Transform the yoke by selecting *p+p=>p+p* from the *transformation* menu and clicking the following points one after the other with *click p* or *click pl*:

• starting point for move,
• starting point for rotation,
• final point for move,
• final point for rotation.

Click the construction lines of the back yoke. Transform the corresponding points <u>with</u> *+copy*.

Scale

The objects are reduced and increased relative to absolute zero (Picture 10-6).

The factor Fx=... applies to the x component of the objects only, the factor Fy=... to the y component.
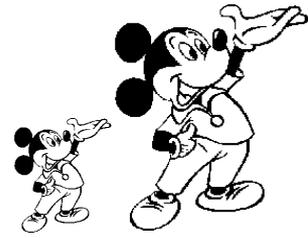
Increase/ reduction/ stretching/ shrinking of the pattern is required for stretch material for example, lining or under collar or for the correction of changes in length after washing. The following applies: $Fx=Fy=1.00$ - no change in scale; $Fx=1.10$, $Fy=1.00$ - stretching of the pattern by 10% in horizontal direction; $Fx=Fy=0.90$ - shrinking by 10% in all directions.

Different values in Fx and Fy distort the construction in width and height. The same values increase or reduces the construction to scale; Fx=Fy=0.5 halves the dimension of the construction and Fx=Fy=2 doubles it.
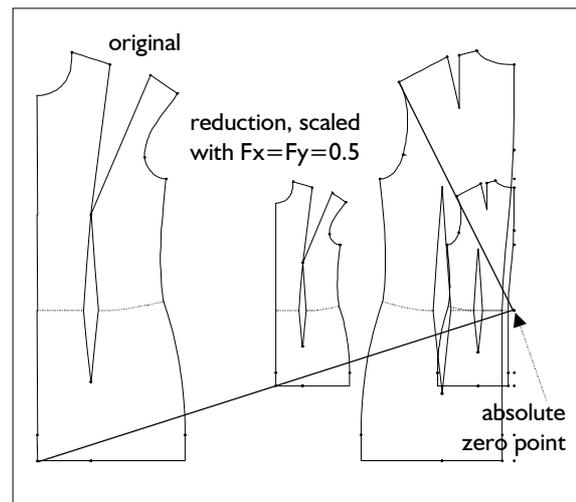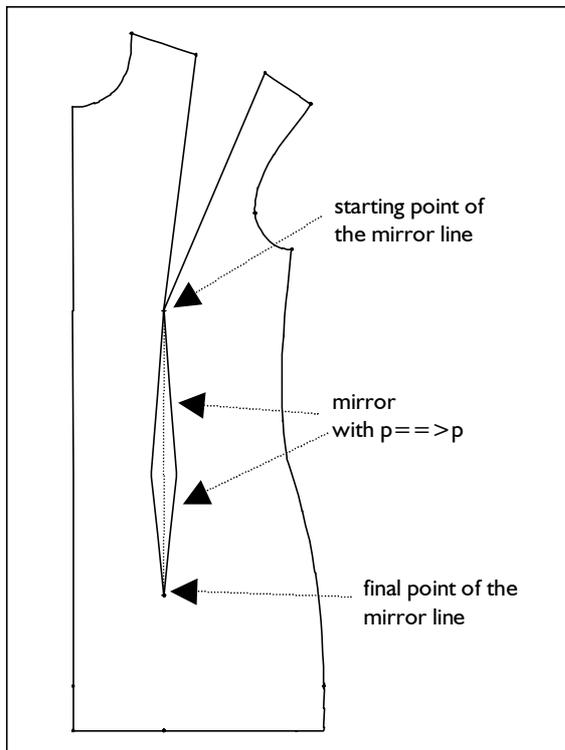

Picture 10-6

Scale the „Grafis Bodice 10" by half. The zero point of this construction is positioned at the centre back at waist height. Enter the values *Fx=Fy=0.5* in the *transformation* menu and activate *scale*. Set the switch to *+copy,* click on *part* and click on a line of the construction. The construction is now reduced by 50% in x and y direction in all sizes.

Reset the record to 002 and repeat with the values Fx=1.00 and Fy=1.10. Now increase single lines in y direction.

_____

mirror p==>p

The objects are mirrored at the connecting line of two points (Picture 10-7).
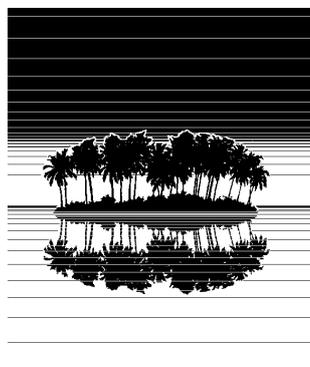

Picture 10-7

To activate this function the line *p==>p* (below *mirror*) is to be clicked and the points of the mirror line are to be defined with the sub-menu point construction. Then, the objects to be mirrored can be clicked.

Draw new waist dart lines in „Grafis Bodice 10". Construct the waist dart points using the point construction *rlg on l* with *rlg=0.*, as the waist darts are shaped. Then, delete the waist dart lines and construct a new left waist dart with *curves*. Mirror the new left waist dart line to the right.

mirror with click l

The objects are mirrored at an existing line of the construction (Picture 10-8).

To activate this function the line *click l* is to be clicked and the mirror line is to be defined. Then, the objects to be mirrored can be clicked.

Mirror the displayed lines in „Grafis Bodice 10" at the centre front for a facing. Select *mirror click l* in the *transformation* menu and click on the centre front. Set the switch to +*copy* and *lines* and click the lines to be mirrored.
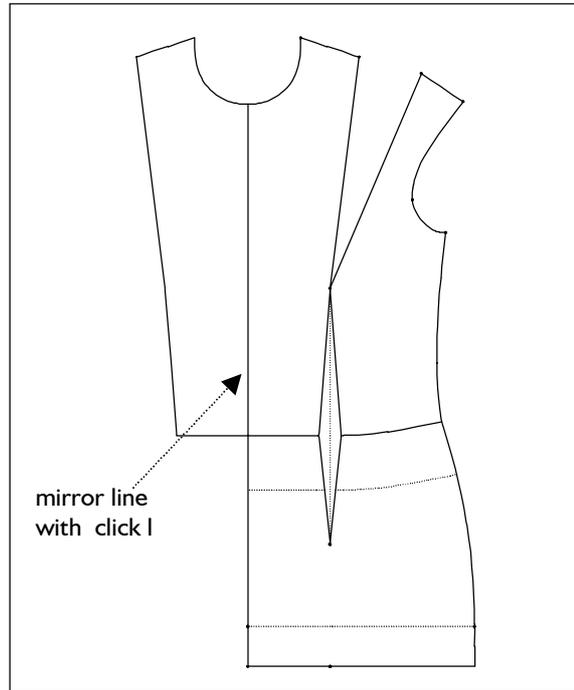

Picture 10-8

If you mirror the whole part the centre front is doubled and cannot be seen. In this case delete one of the centre front lines.

10.2 Complex Exercises

1st Exercise

Construct a yoke in the style „Straight skirt" from Section 2.4 starting at 150mm on the centre front or centre back and ending at 75mm on the hip curve, measured from the waist respectively. Then, move the yoke away from the skirt with *move dx=0* and *dy=60*.
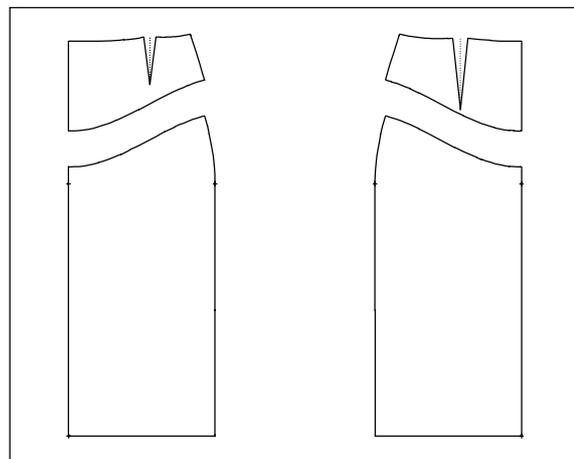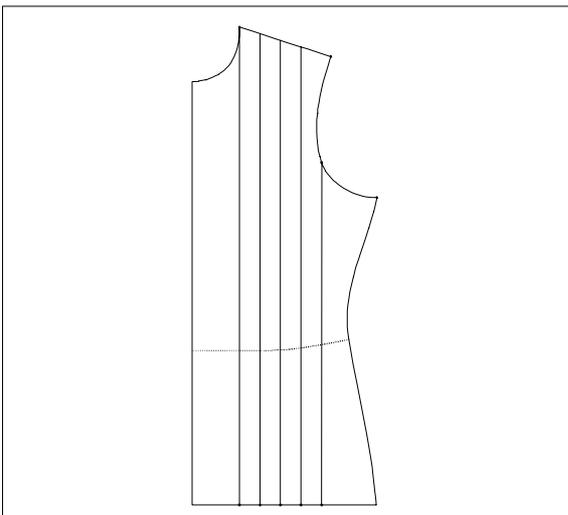
2nd Exercise

In the construction „Grafis Bodice 10" move the waist dart in the front by 25mm towards the side seam and in the back by 30mm towards the side seam. Use the transformation type *move dx dy*. Grade in a number of sizes.
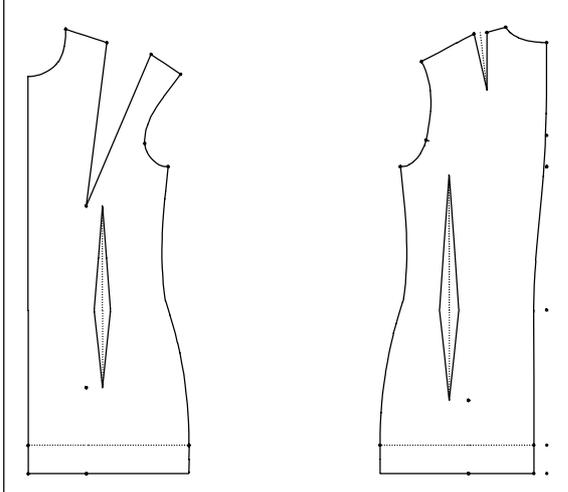
Reset the move and now move the darts by the respective dart width at waist height. Use the transformation type *move p==>p*.
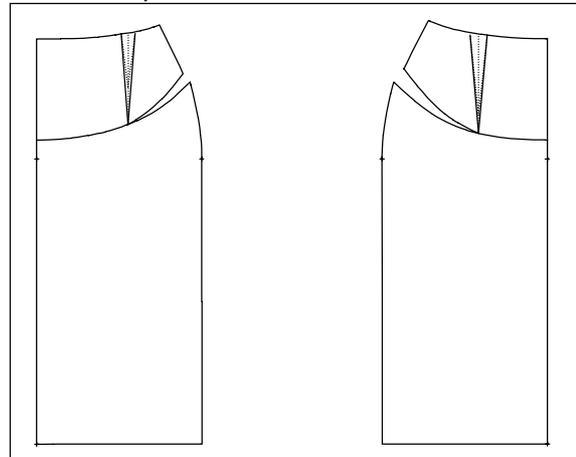
3rd Exercise

In the construction „Grafis Bodice 20" construct two lines parallel to the centre front from the neck/shoulder point and from the sleeve pitch to the hem. Perpendiculars are unsuitable, here in case the hem line is altered interactively at a later time. Separate the hem line at both lines and raster the hem line piece in between with 5 points. Move one of the two lines to the new raster points using the transformation type *move p==>p* with the setting +*copy*. Cut the spread lines at the shoulder.

4th Exercise

In the style „Straight skirt" from Section 2.4 move the dart into the panel seam. Construct a panel seam at 33.3% from the centre front and centre back, measured along the hem. Cut the panel seams at the waist. Move the darts with *move p==>p* into the panel seams. Draw new waist curves. Note that the waist curves are to end at the dart lines in a right angle.
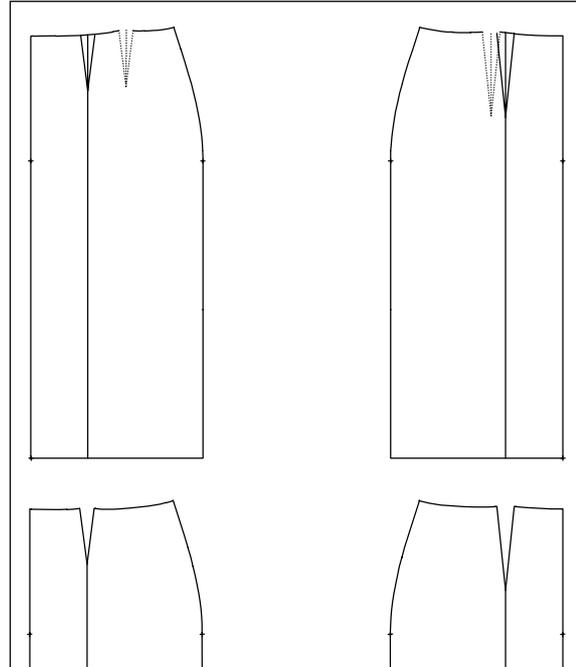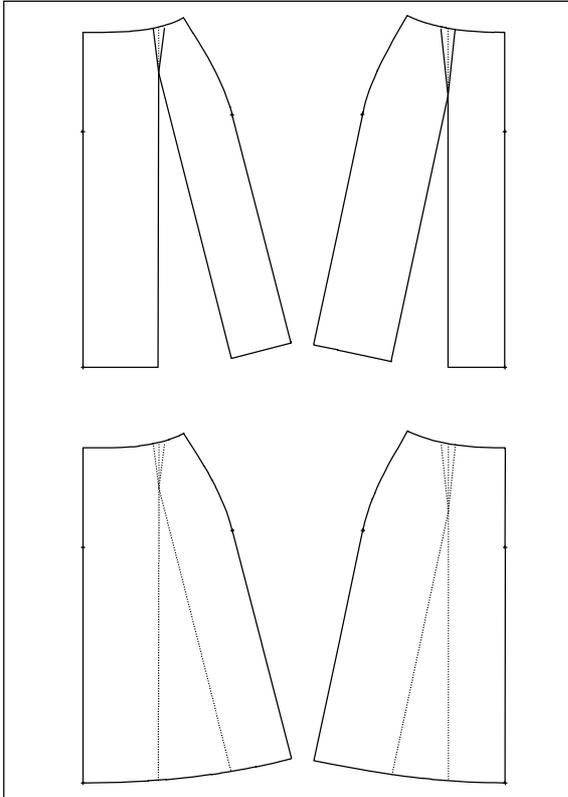
5th Exercise

In the style „Straight skirt" from Section 2.4 rotate the dart into the yoke. Construct a yoke starting at 150mm on the centre front and centre back, measured from the waist and ending at 80mm on the side seam, measured from the waist. Lengthen the dart to the yoke and close the dart with the transformation type *turn tp+p==>p*. Make a copy of the yoke curve in the process.
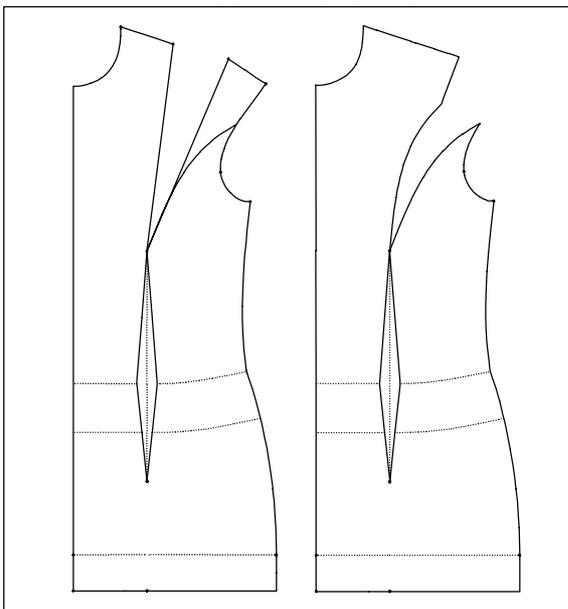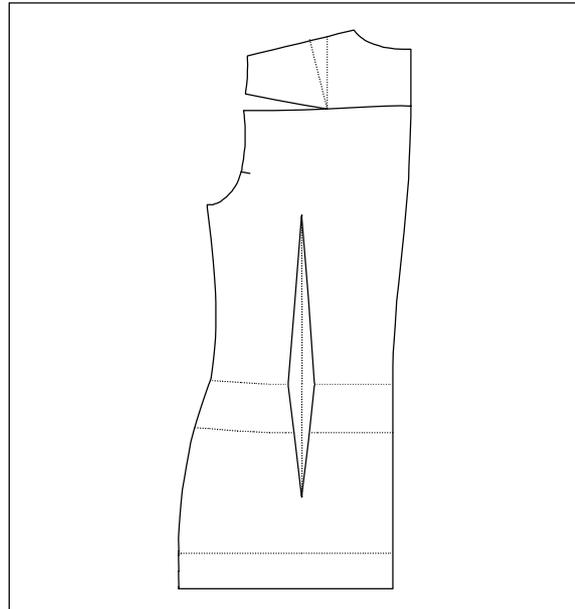
<u>6th Exercise</u>

In the style „Straight skirt" from Section 2.4 rotate the dart into the hem. Delete the hip line and drop a perpendicular from the dart apex onto the hem. Close the dart with the transformation type *turn tp+p=>p*. You need a copy of the perpendiculars. Close the hem.
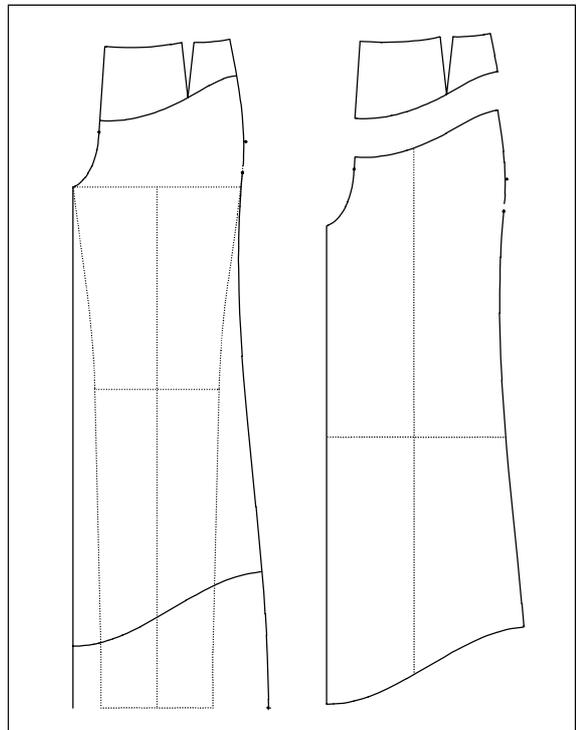

<u>7th Exercise</u>

In the „Grafis Bodice 10" construct a princess line and rotate the bust dart into the panel seam. Use the transformation type *turn tp+p=>p*.

<u>8th Exercise</u>

Construct a yoke in „Grafis Bodice 10" which runs through the shoulder dart apex and rotate the shoulder dart into the yoke line. Use the transformation type *turn tp+p=>p*.

<u>9th Exercise</u>

In the „Grafis Trouser 10" (turn-up 0.) construct a yoke beginning 60mm from the waist on the side seam and ending 120mm from the waist at the centre front. The yoke curve is to begin and end at right angles. Attach the yoke curve to the dart apex.


Flare the side seam by 90mm at the hem and construct a new side seam. The inside leg is to be vertical (*p=>py*). The new hem curve is to start 220mm from the hem at the side seam and end 10mm from

_____

the hem on the inside leg seam. The curve is to begin and end at right angles. Move the yoke upwards by 60mm.
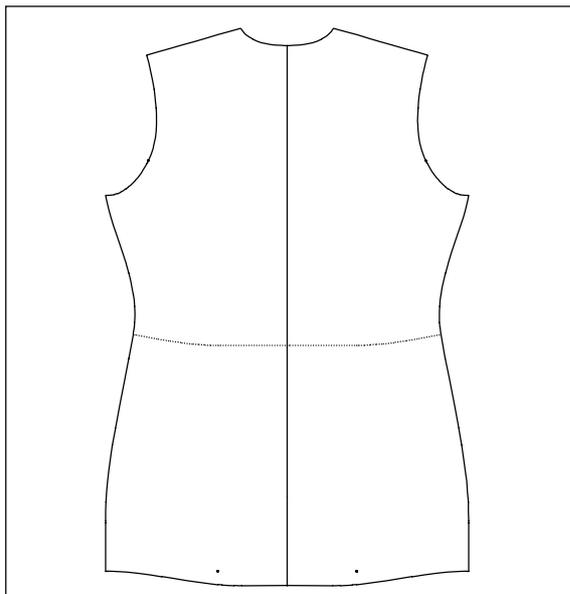
10th Exercise

In the „Grafis Bodice 10" relocate the bust dart into the side seam and the shoulder dart into the armhole. Construct a yoke in the front from the centre front to the armhole. Relocate the yoke to the back with the transformation type *turn+move p+p=>p+p*.
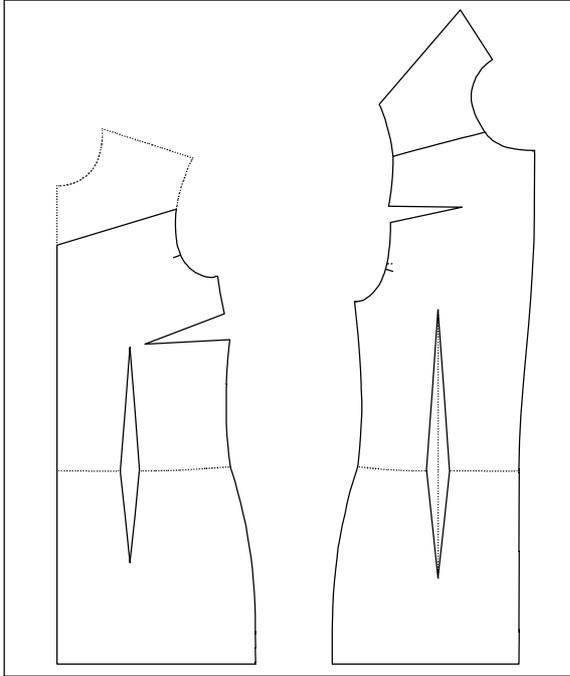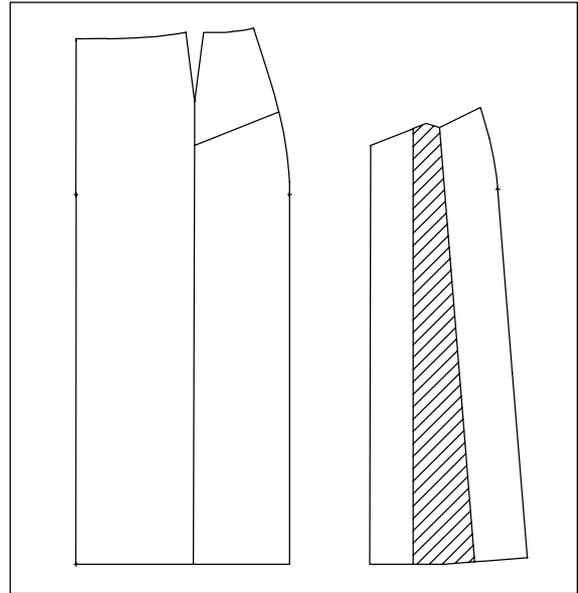
11th Exercise

Mirror the back of „Grafis Bodice 20" at the centre back. Use the transformation type *mirror click l*.
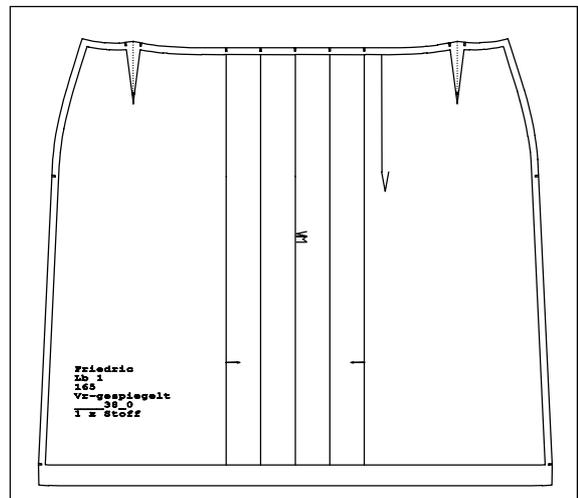
12th Exercise

In the style „Straight skirt" from Section 2.4 construct a side panel with one pleat. Construct a line from the dart apex parallel to the centre front. A perpendicular is unsuitable in case the hem curve is altered interactively at a later time. Then, construct a yoke line starting 100mm from the waist on the side seam and ending 50mm from the dart apex on the auxiliary line. Move the pleat piece to the right by 200mm and spread it at the auxiliary line from the centre of the yoke. The spread amount at the yoke is 30mm and 70mm at the hem.
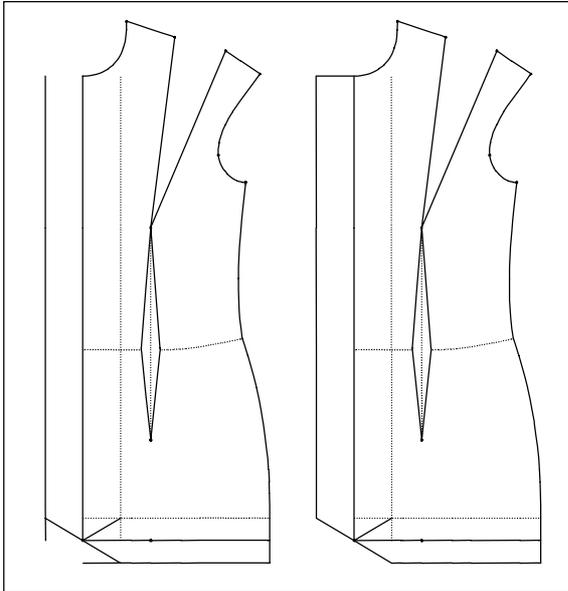
13th Exercise

In the style „Straight skirt" from Section 2.4 construct an inverted pleat with 50mm pleat content at the centre front and a flared side seam. The hem is to be mirrored. Set the text and the displayed symbols.

14th Exercise

In the front of „Grafis Bodice 10" construct an overlap of 50mm at the centre front and a hem of 30mm with a mitred corner at the centre front/hem.

Mirror the allowances at the respective seam lines, construct a diagonal line and mirror the diagonal line at the seam lines. Close the corners.
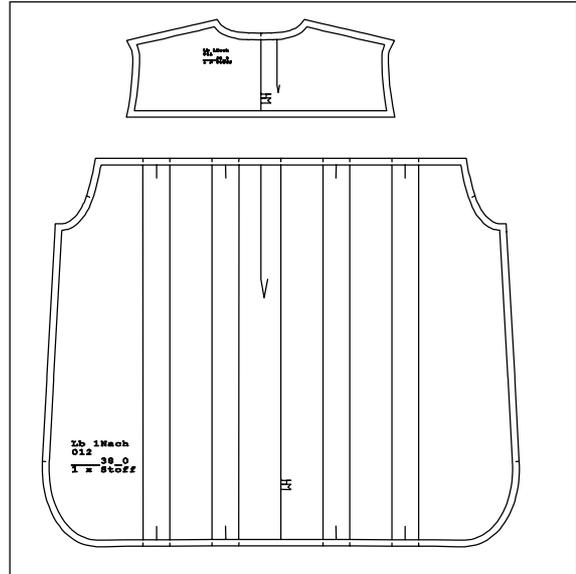
15th Exercise

Open the **style „*Blouse with pin-tucks*"** from Section 8.6 (6th Exercise in Chapter 8, Section 8.6):
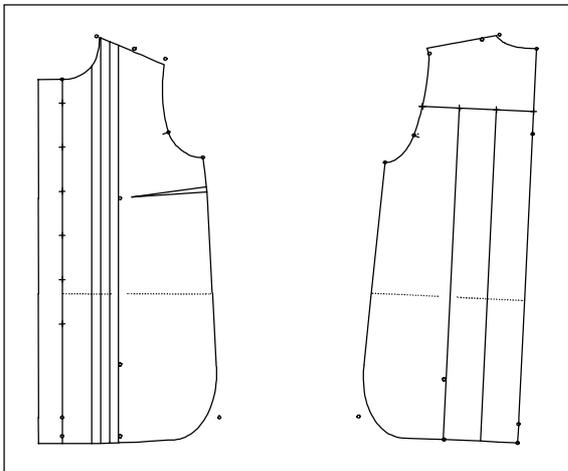
Open two new parts 003 „back yoke" and 004 „back". Insert all lines and points you need to construct a yoke into part 003. Construct the seam allowances and the notches, adjust the part vertically (*modify | part adjust vertical*) and mirror the part at the centre back. The centre back is now doubled and one of the lines must be deleted. Set the grain line symbol and a text.

Create part 004 „back" in the same way, adding 2 pleats spread with a pleat content of 25mm and construct the dart hoods.

16th Exercise

From „Grafis Trouser 10" design fashionable riding breeches with a curve shaped with 25mm at the hip line and 35mm at the crotch line and a separate lower leg panel starting 60mm below the knee line. Shorten the trouser by 60mm and reduce the hem of the lower leg panel by 20mm at the side seam and the inside leg respectively.