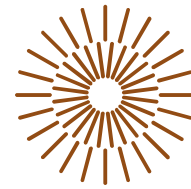
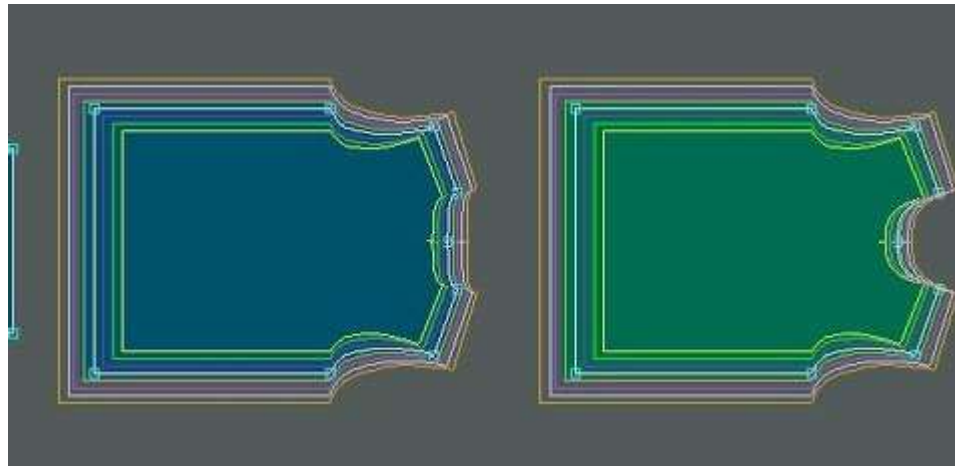


FACULTY OF TEXTILE ENGINEERING TUL

DEPARTMENT OF CLOTHING TECHNOLOGY



Grade rule calculation



Pattern Grading

- Grading means the stepwise increase or decrease of a master pattern piece to create larger or smaller sizes.
- The steps between sizes are the **grading increments**.
- The starting point for the grading operation is normally size 34 or 36 or 38 for ladieswear and 48 or 50 for menswear.
- Grading does not alter the overall look of the style, only the size.
- There are two basic methods:
 - Apportioning of **grading increments** to the X and Y coordinates of a series of grading points.
 - **Constructive design** using measurements taken from **body size tables**

[1]

The method of grade rules setting – computing method

The construction points are regarded as **grade points**

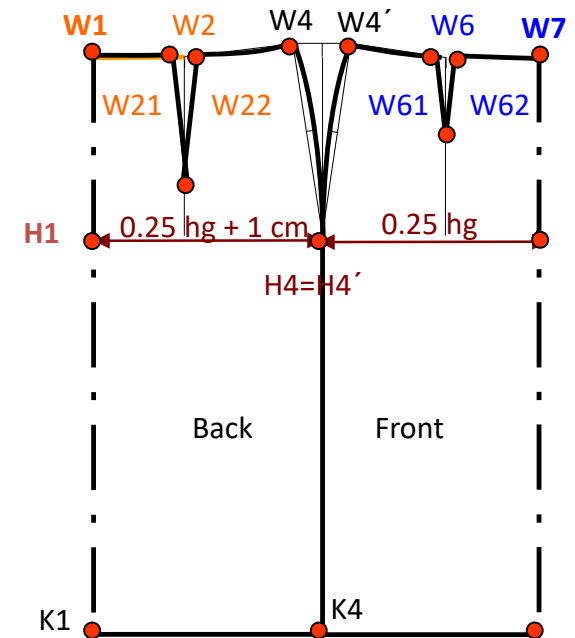
Steps:

1. Grading increments calculation

The difference in measurement of construction abscissa between two sizes, either in a size chart or a specific point on a pattern. Keep the construction steps as required.

Dimension	Size 36	38	Size 40	Increments
h [mm]	1680	1680	1680	0
wg [mm]	680	720	760	40
hg [mm]	920	960	1000	40
kl [mm]	580	580	580	0

Distance	Measurement	Size 36	Size 38	Size 40	Increments [mm]
H1H4	$0.25hg+1cm$	240	250	260	10
W1W4	$0.25wg+1cm$	180	190	200	10
W1W2	$0.4 H1H4$	96	100	104	4
H7 H4'	$0.25 hg$	230	240	250	10
W7W4'	$0.25 wg$	170	180	190	10
W7W6	$0.4 H7H4'$	92	96	100	4
W1 H1	$0.1 h+3 cm$	198	198	198	0
W1 K1	knee length	580	580	580	0
Sup		120	120	120	0



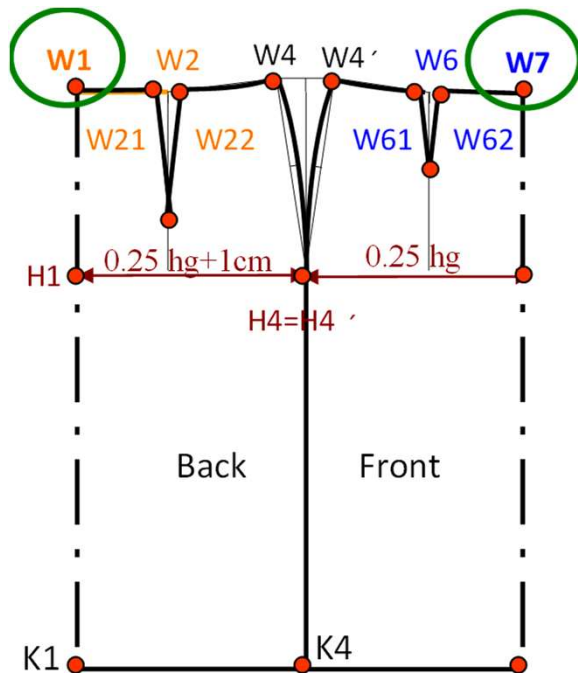
The method of grade rules setting – computing method

2. Grade points setting

Grade points mostly coincide with construction points on a pattern. These can be perimeter or internal. It can be an intersection point, notch, top of dart, etc.

3. Zero point (ZP) setting

The position of the zero point is mainly at the intersection point of one horizontal construction line and vertical construction line to each other situated on pattern construction. **ZP ($dx = 0; dy = 0$)**



4. Rule setting.

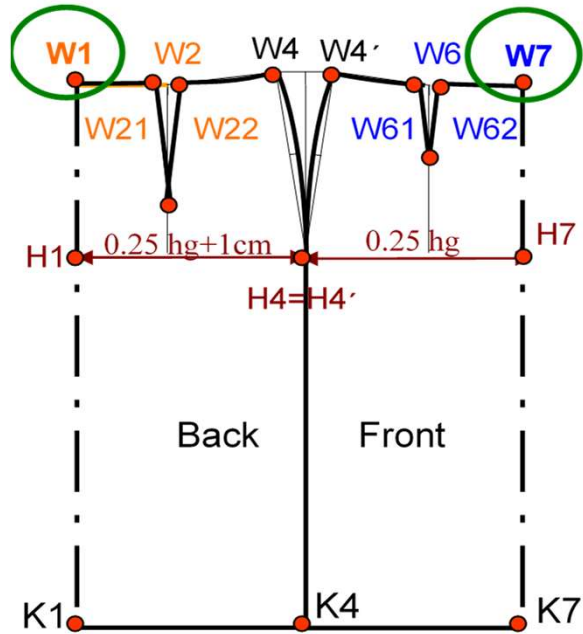
The rule is set for all points.

= movement of *grading increment value*. It is the difference - dy , dx . The direction of the grade point movement is marked in one of the four directions of $+X$, $-X$, $+Y$, $-Y$ recorded on an **X** axis and **Y** axis from a zero point (**ZP**) that is stationary at the junction of the axis.

SKIRT grading

ZP of Back skirt is **W1**

ZP of Front skirt is **W7**



Dimension	Size 36	38	Size 40	Increments
h [mm]	1680	1680	1680	0
wg [mm]	680	720	760	40
hg [mm]	920	960	1000	40
kl [mm]	580	580	580	0

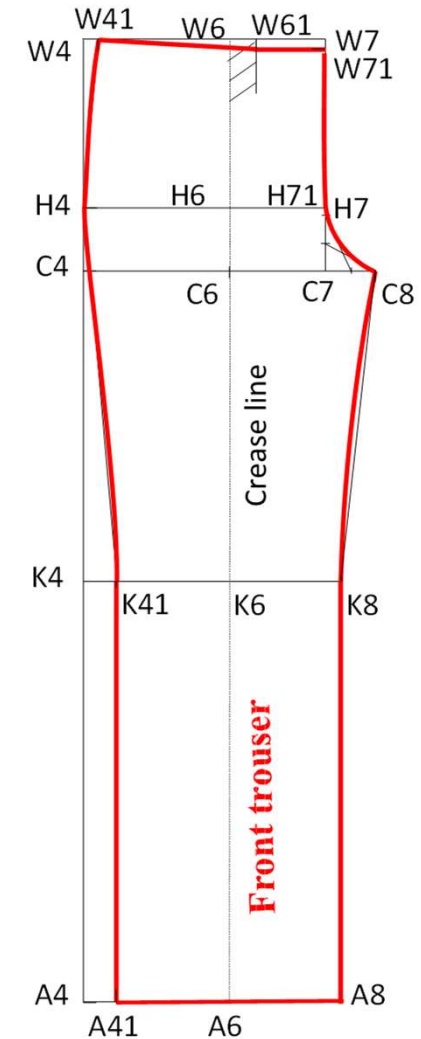
Distance	Measurement	Size 36	Size 38	Size 40	Increments [mm]
H1H4	$0.25hg + 1\text{cm}$	240	250	260	10
W1W4	$0.25wg + 1\text{cm}$	180	190	200	10
W1W2	$0.4 H1H4$	96	100	104	4
H7 H4'	$0.25 hg$	230	240	250	10
W7W4'	$0.25 wg$	170	180	190	10
W7W6	$0.4 H7H4'$	920	960	1000	4
W1 H1	$0.1 h + 3\text{cm}$	198	198	198	0
W1 K1	knee length	580	580	580	0
Sup		120	120	120	0

Grade point	Size 36		Size 38		Size 40	
	Δx	Δy	Δx	Δy	Δx	Δy
W1	0	0	0	0	0	0
H1	0	0	0	0	0	0
K1	0	0	0	0	0	0
W2	-4	0	0	0	+4	0
W4	-10	0	0	0	+10	0
H4	-10	0	0	0	+10	0
K4	-10	0	0	0	+10	0
W7	0	0	0	0	0	0
W6	4	0	0	0	-4	0
W4'	10	0	0	0	-10	0
H4'	10	0	0	0	-10	0
K4'	-10	0	0	0	-10	0 ⁵

Construction steps – TROUSERS BLOCK

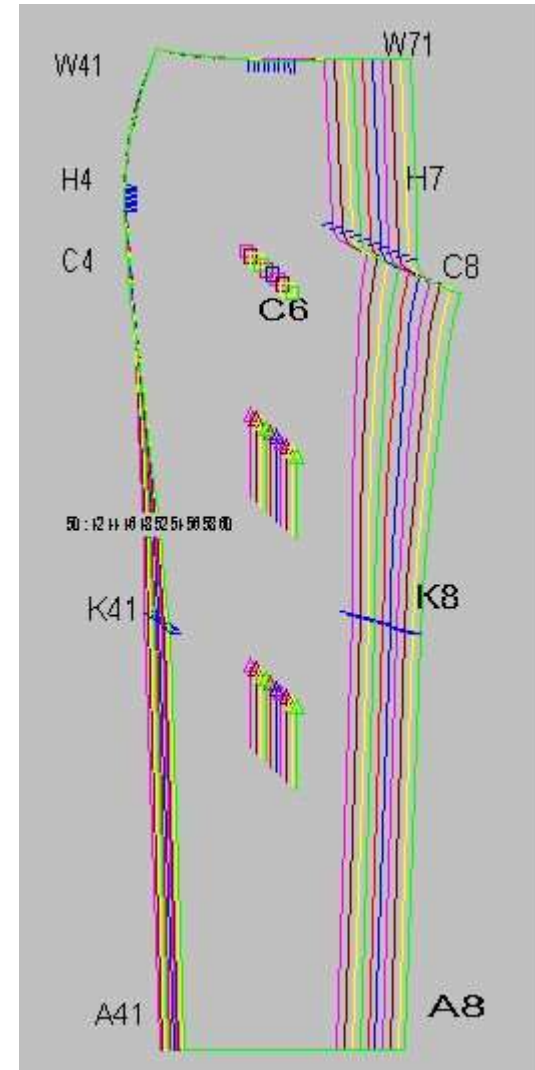
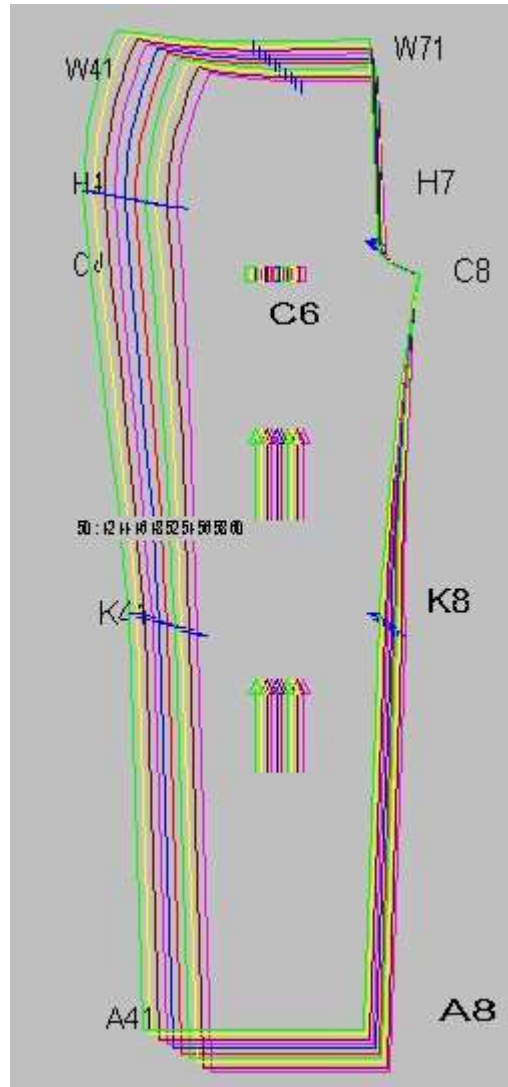
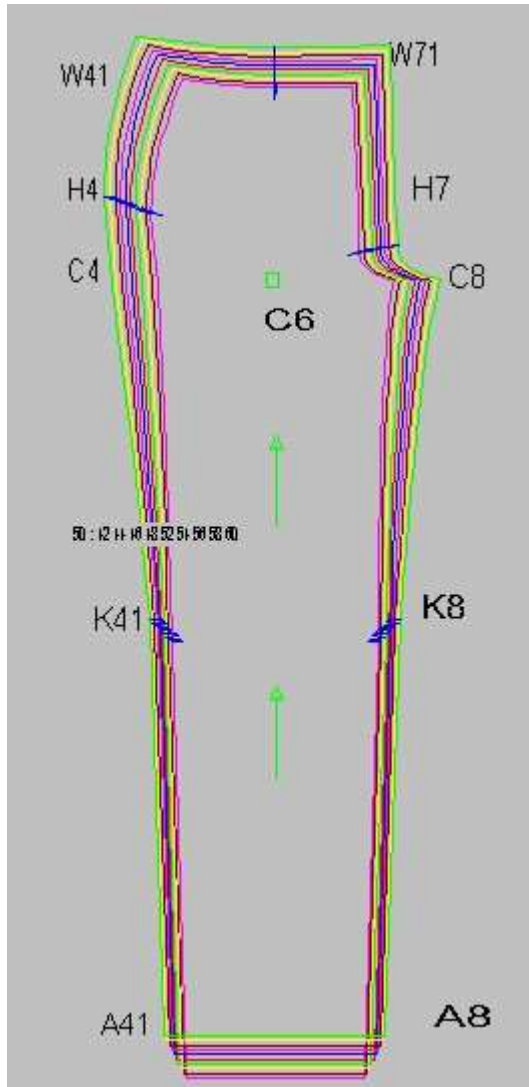
Front

1. side line 4
2. waist line $p \perp 4 \Rightarrow W4$
3. crutch line W4 C4 cd
4. hem line (ankle line) W4 A4 tlo
5. knee line A4 K4 $0.5 A4 C4 + 6$
6. hip line C4 H4 $0.05hg + 2$
7. front hip width H4 H7 $0.25hg - 1$
8. centre front line $7 \perp c$ in point H7 $\Rightarrow W7, C7$
9. crutch width C7 C8 $0.025hg + 2.5$
10. front crease line C8 C6 $0.5 C8 C4$
11. knee width K6 K8 = K6 K41 $0.5lw - 1$
12. leg width A6 A8 = A6 A41 $0.5lw - 1$
13. auxiliary line C7 C71 $0.5 C7 C8$
H7 H71 $k = 0.5$
14. projection waste line W7 W71 $\Rightarrow w'$ $k = 1$
15. waist width W71 W41 $0.25wg + 2.5 - 1$
16. fold width W6 W61 $k = 2.5$
17. fold width (or dart) W61 \perp w



Style line drafting

Zero point movement



The method of grade rules setting – computing method

The construction points are regarded as grade points

Steps:

1. Grading increments calculation

The difference in measurement of construction abscissa between two sizes, either in a size chart or a specific point on a pattern. Keep the construction steps as required.

2. Grade points setting

Grade points mostly coincide with construction points on a pattern. These can be perimeter or internal. It can be an intersection point, notch, top of dart etc.

3. Zero point (ZP) setting

The position of the zero point is mainly at the intersection point of one horizontal construction line and vertical construction line to each other situated on pattern construction.

ZP ($dx = 0$; $dy = 0$)

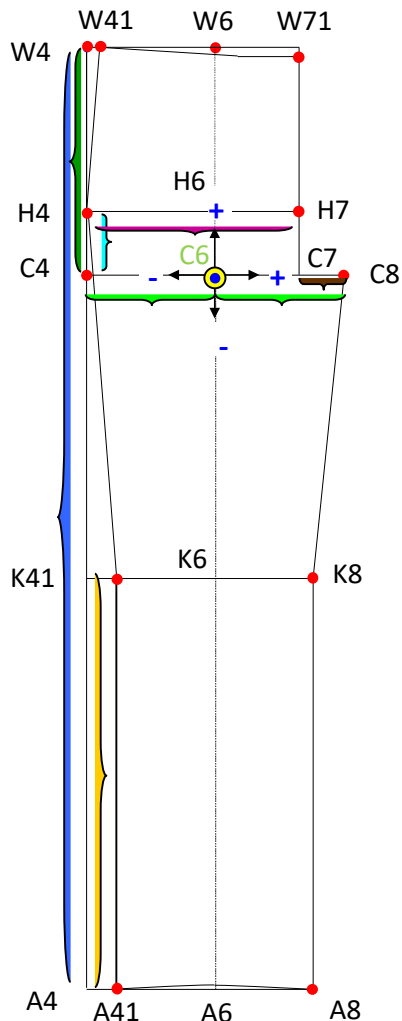
The method of grade rules setting – computing method

4. Rule setting

The rule is setting for all points = movement of *grading increment value*. It is the difference - dy , dx . The direction of the grade point movement is marked in one of the four directions of $+X$, $-X$, $+Y$, $-Y$ recorded on an X - axis and Y - axis from a zero point (**ZP**) that is stationary at the junction of the axis.

Front trousers grading

C6 is ZP



Dimension	Smaller size	Base size	Larger size	Increments
<i>h</i> [cm]	176	176	176	0
<i>wg</i> [cm]	78	82	86	4
<i>hg</i> [cm]	96	100	104	4
<i>cd</i> [cm]	25	25.5	26	0.5
<i>tlo</i> [cm]	106	106	106	0
<i>kl</i> [cm]	23.5	24	24.5	0.5

Distance	Measurement	Smaller size [cm]	Base size [cm]	Larger size [cm]	Increments [cm]
W4 C4	Body rise	25.0	25.5	26.0	0.5
C4 H4	$\uparrow 0,05 hg + 2$	6.8	7.0	7.2	0.2
C4 C7 = H4 H7	$0,25 hg - 1$	23.0	24.0	25.0	1.0
C7 C8	$0,025 hg + 2.5$	4.9	5.0	5.1	0.1
C6 C4 = C6C8	$0,5 C4 C8$	13.95	14.5	15.05	0.55
W71 W41	$0,25 wg - 1 + 2.5$	21.0	22.0	23.0	1.0

Grade point	176 Smaller size		176 Base size		176 Larger size	
	Δx	Δy	Δx	Δy	Δx	Δy
C6	0	0	0	0	0	0
W4	+0.55	-0.5	0	0	-0.55	+0.5
H4	+0.55	-0.2	0	0	-0.55	+0.2
H7	-0.45	-0.2	0	0	+0.45	+0.2
C4	+0.55	0	0	0	-0.55	0
C8	-0.55	0	0	0	+0.55	0
W71	-0.45	-0.5	0	0	+0.45	+0.5
W41	+0.55	-0.5	0	0	-0.55	+0.5
A61	0	-0.5	0	0	0	+0.5
A41	+0.25	-0.5	0	0	-0.25	+0.5
A8	-0.25	-0.5	0	0	+0.25	+0.5
K6	0	-0.25	0	0	0	+0.25
K41	+0.25	-0.25	0	0	-0.25	+0.25
K8	-0.25	-0.25	0	0	+0.25	+0.25

Literature

- [1] ALDRICH, Winifred. *Metric pattern cutting for women's wear*. 6th edition. Chichester: Wiley, 2015. ISBN 978-1-4443-3505-7.