

## Table of Contents

### Part I (this article)

Principles of pant fit related to pattern design

1. Pant Torso: Comparison of pant torso as style gets more slim (CB/CF slope, the wedge, vertical ease, crotch seam curve, waist darts)
  - [Pant Back](#)
  - [Pant Front](#)
2. [Vertical grain line and creaseline](#)
3. [Levels, Lines & Matchpoints](#) (waistline, hipline, front crotch depth level, knee level and hem level)
4. [Sideseam & Inseam](#)
5. [Crotch seam](#)
6. [Lower pant leg](#) (includes knock knees and bow legs)

### Part II (See [menu for separate article](#))

Determine your Saddle (Torso cross-section profile)

### Part III (See [menu for separate article](#))

Drafting Method: from Skirt Block to Pants

1. Preliminary determinations
2. Let's begin with the back
3. And now to the pant front

NOTE: this article is not finished; more text and more drawings need to be added, but I've lost my drawing software and am still learning the new one.

Return to [Sewing and Crafts Menu](#)

## Principles of Pant Fit Relating to Pattern Design

### 1. **Pant Torso**

As the pant design slims in the torso, certain changes in the pattern are observed:

#### **Pant Back Torso**

As the fit of the pant becomes more slim (tighter):

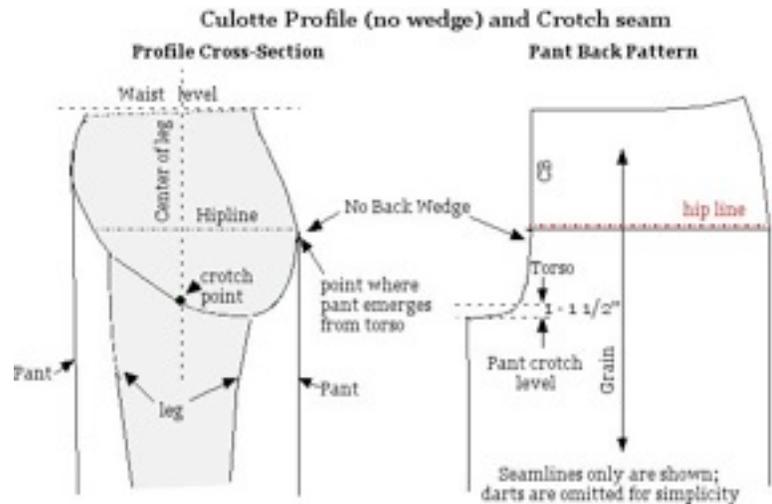
- ▶ The **slope** of center back (CB) increases (relative to grain); the slope of center front (CF) changes by a much smaller amount than for the CB.
  - The loose-fitting culotte, which is really a skirt that also goes between the legs, has the loosest fit and so has both CF and CB parallel to grain.
  - Tight-fitting jeans (at least through the torso and upper leg) have a pronounced slope of CB relative to grain, with less slope on CF.
- ▶ The **wedge** on the back at the hipline\* gets taller so the pant can hug the buttocks for a longer distance. The wedge on the front at the pubic bone is very small, even on tight-fitting jeans.
  - The loose-fitting culotte has no back or front wedge;
  - Tight-fitting jeans have a significant back wedge, and small front wedge.
    - \* For this draft, your **hipline** position is marked as the point, 6" - 8" below the waist at the sideseam, at which your buttocks protrude the most, when viewed from the side. The hipline is parallel to the floor all around your lower torso at that level.
- ▶ **Vertical ease** in the crotch decreases (the distance between your own crotch and the pant crotch seam). See Pant front for more detail, since the pant's crotch is measured on the front.
  - The loose-fitting culotte's crotch is 1" (or more) below the body crotch;
  - Tight-fitting jeans have no ease in the crotch.
- ▶ The **curve of the crotch seam** becomes less pronounced (approaches bias).
  - The loose fitting culotte's crotch seam is profoundly curved - almost L-shaped - for both F and B crotch seams;
  - Tight fitting jeans crotch seam has only a little curve, and is closer to bias, especially for the back crotch seam.
- ▶ The **waist dart** legs widen (the darts deepen). For slim pants, this change may be significant enough that you may want to move some of that width to an extra dart, or move part of the take-up to CB seam. **do sketch**

The following sketches illustrate these principles for the back of the culotte, trouser & slim pant.

**Back Style Comparison**

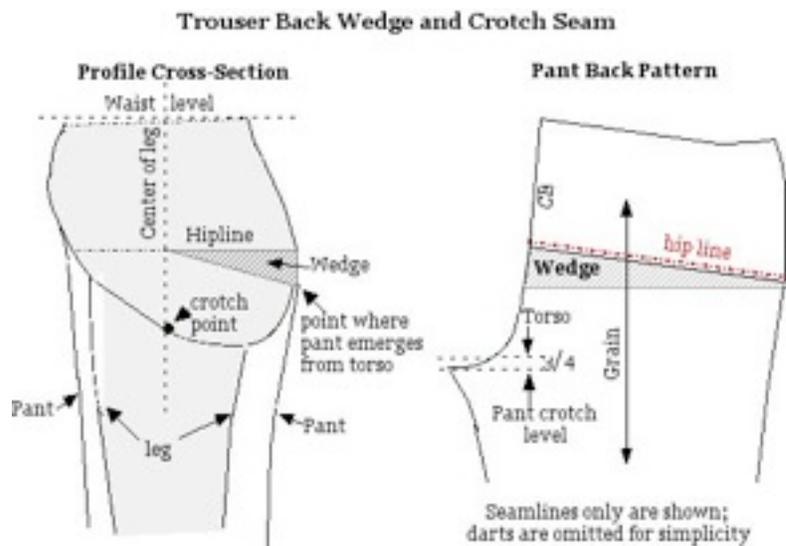
For culottes:

- there is no back wedge;
- both CF & CB are parallel with vertical grain;
- vertical ease in crotch seam is 1" or more; and
- the crotch seam is sharp, nearly L-shaped.



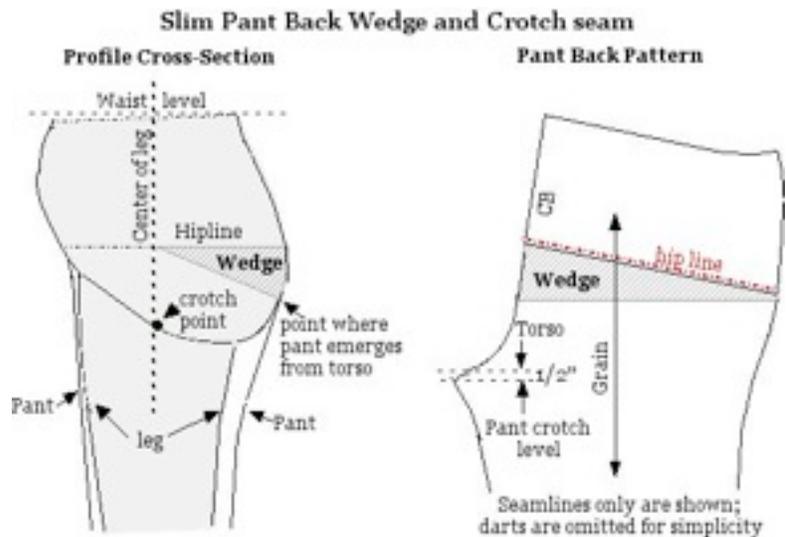
For trousers:

- there is a small back wedge;
- both CF & CB are slightly tilted;
- vertical ease in crotch seam is about 3/4"; and
- the crotch seam is a bit less curvy than culottes.



For a slim pant:

- the back wedge is taller;
- both CF & CB are noticeably tilted;
- vertical ease in crotch seam is about 1/2"; and
- the crotch seam is much less curvy.



## Pant Front torso

As the fit of the pant becomes more slim (tighter):

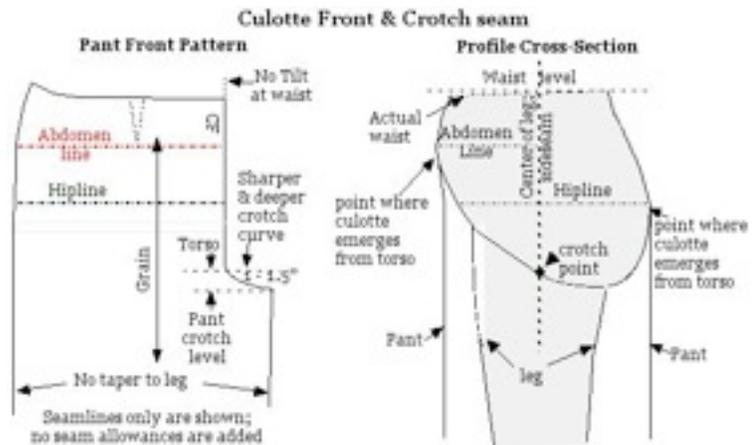
- ▶ For most people, the **slope** of center front (CF) changes very little. However, for those of us blessed with a large protruding, sagging tummy (obese), we may need a **wedge at the top of the crotch curve** (similar to the hipline wedge on the back) for slimmer styles like jeans, because the pant hugs the torso and needs extra length to go over the belly. Some instructions indicate simply to raise the waistline near the CF to accommodate the belly, but this can cause wrinkles or drag lines because it does not fix the problem at the hipline. Remember that the hipline should be equidistant from the floor at all points, but a protruding belly pushes the hipline lower at CF than at the sideseam; this is corrected with a wedge.
  - The loose-fitting culotte, trousers and looser slacks have no back or front wedge because the pant does not follow the torso below the hipline;
  - Tight-fitting slacks and jeans may have a small front wedge.
- ▶ **Vertical ease** in the crotch decreases (the distance between your own crotch and the pant crotch seam), the same as on the back:
  - The very loose-fitting culotte's crotch is 1 " (or more) below the body crotch;
  - Loose-fitting trouser's crotch is  $\frac{3}{4}$ " below the body crotch;
  - Slim-fitting pant's crotch is  $\frac{1}{2}$ " below the body crotch;
  - Tight-fitting jeans have no ease in the crotch.
- ▶ The **curve of the crotch seam** becomes less pronounced (approaches bias), the same as on the back:
  - The loose fitting culotte's crotch seam is profoundly curved - almost L-shaped;
  - Tight fitting jeans crotch seam has only a little curve, and is closer to bias.
- ▶ Slimming the pant leg causes the **waist dart** legs to widen. If they become too wide, they can cause a pucker at the point, so to overcome that, some of the dart take-up can be moved to the CF, or you can replace one or more darts with pleats.
  - The very loose-fitting culotte (really a skirt with legs), has the loosest fit and has no transfer of take-up to CF unless puckers at tip of front dart(s).
  - Loose-fitting trouser with front pleat has none of the take-up transferred to CF; darted trousers may have about  $\frac{1}{8}$ " of take-up transferred to CF.
  - Slim-fitting pant may have up to  $\frac{3}{8}$ " of take-up transferred to CF.
  - Tight-fitting jeans (at least through the torso and upper leg) have up to  $\frac{5}{8}$ " tilt from grain. **do sketch**

The following sketches illustrate these principles for the front of the culotte, trouser & slim pant.

**Front Style Comparison**

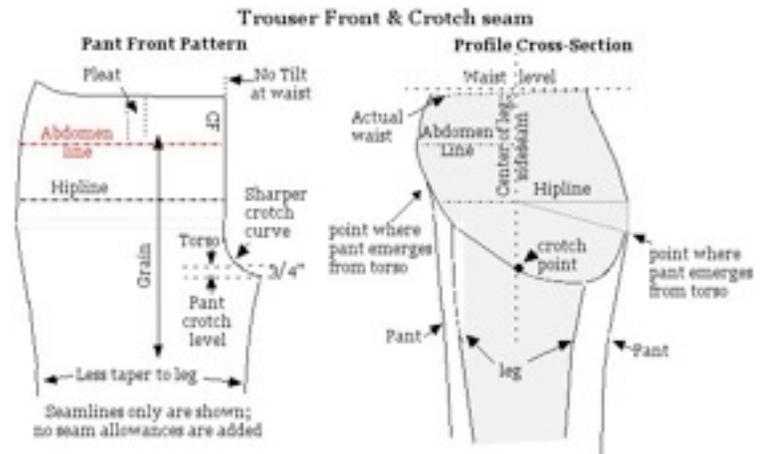
For culottes:

- no wedge;
- CF is parallel with vertical grain;
- vertical ease in crotch seam is 1" or more; and
- the crotch seam is sharp, nearly L-shaped.



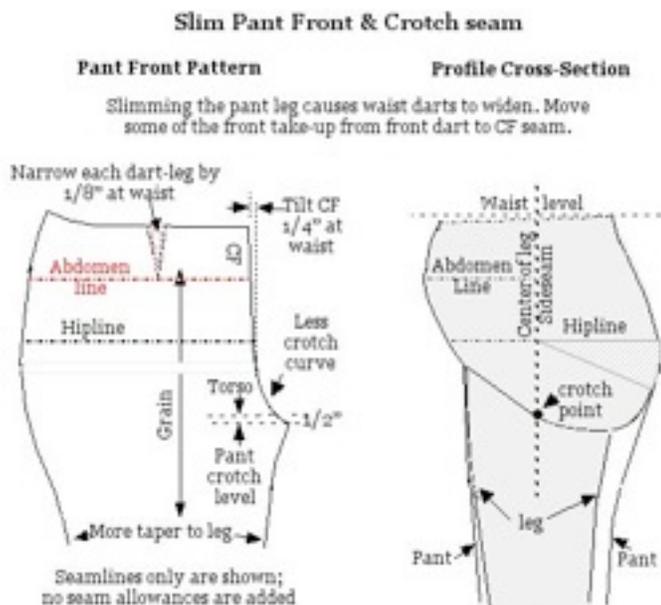
For trousers:

- small wedge if protruding belly
- no additional tilt at CF if pleat at waist; may be  $\frac{1}{8}$ " additional tilt if dart at waist.
- vertical ease in crotch seam is about  $\frac{3}{4}$ "; and
- the crotch seam is a bit less sharp than culottes.



For slim pant: **slash wedge at top of curve then angle up to hipline**

- no wedge;
- CF may be tilted to reduce size of waist dart
- vertical ease in crotch seam is about  $\frac{1}{2}$ "; and
- the crotch seam is much less curvy, approaching bias.

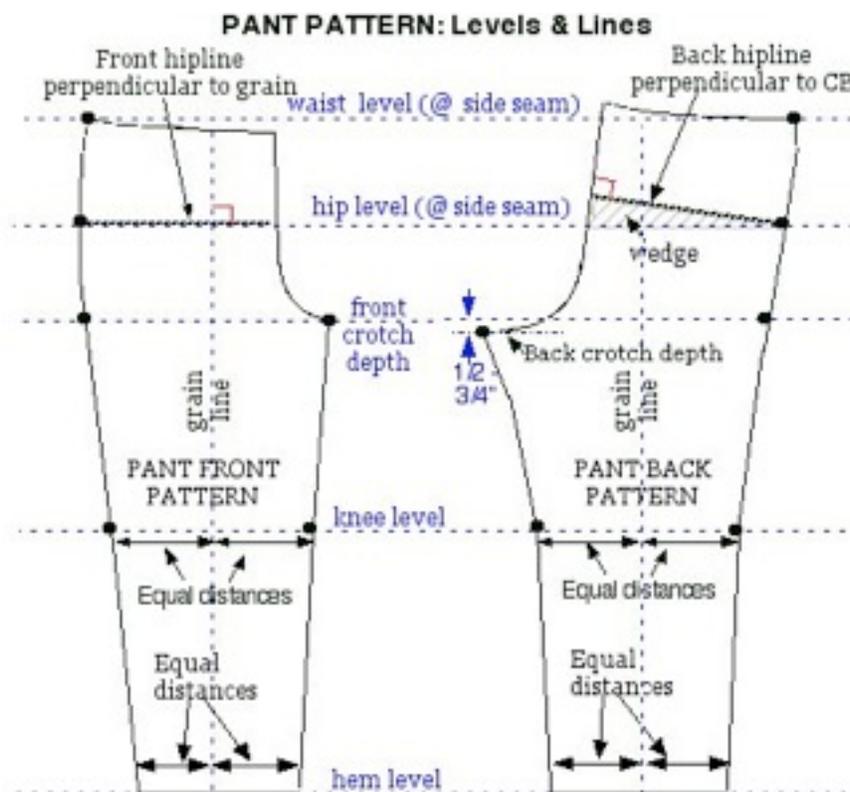


(Pant design principles, continued)

2. **Vertical Grain & Crease Lines:** The **vertical grain line** is a major reference point on the pattern that crosses the center of the knee. A slight mis-positioning of this line can cause the pant not to hang properly. All horizontal reference lines ([principle 3](#)) are positioned perpendicular to the vertical grain line, except the hipline when it is tilted due to the need for a wedge in the torso back and/or front.

The **crease line**, on both front and back, is usually on or near the vertical grain line. Above the knee, it mostly follows the grain line on the front, may angle to the waist dart closest to CF; on the back it angles toward CB at the waist. Below the knee, it follows the grain line (except for those with knock-knees or bow legs, the crease line may tilt off-grain below the knee). For a slim pant it is positioned equidistant from sideseam and inseam, from knee to hem, but this may not be true for wider-leg styles (see [principle 6](#)).

3. **Levels, Lines & Matchpoints:** The following sketch illustrates important vertical and horizontal levels/lines as they relate to the matchpoints used when sewing the sideseam and inseam. It also illustrates the differences between front and back crotch depths. *add sideview to sketch below. update F for wedge?*



Seam allowances not shown.

Dots indicate match points at different levels along sideseam & inseam.

Sideseam and Inseam are equidistant from center grain line between hem and knee.  
Generally, back leg is 1" wider than front leg, from hem to knee.

Always mark the critical **matchpoints** on your pattern's sideseam and inseam, then transfer to the fabric to ensure a well-constructed garment. See sketch above.

- ▶ **Waistline:** The front and back waistlines should meet in a smooth usually curved, line at the top of the sideseam. However, because of the seat and belly wedges, the waistline at CF and CB may be above this level.
- ▶ **Hipline:** Always mark the **hipline** on your pattern (as shown in sketch below) and fabric; it serves as a horizontal balance line for the garment: the hipline of both front and back should be parallel with the floor (equidistant from the floor at all points), when worn, even though may be tilted on pattern. See page 1 for definition of 'hipline'.
- ▶ **Crotch depth:** The crotch depth of the front pattern piece is used as a matchpoint. It is the vertical distance at SS from waist to the level of the front crotch/inseam meet-point. This level is always marked on both front and back pattern at SS. See sketch above.

The **back crotch depth** (the vertical level of the back crotch/inseam meet-point) is not indicated on the pattern, but is used to position the back crotch curve correctly on the pattern. It is  $\frac{1}{2}$  -  $\frac{3}{4}$ " lower than the front crotch depth (as measured on the saddle profile). This difference requires easing the front inseam into the back inseam for the top 7" (or so) of the inseam.

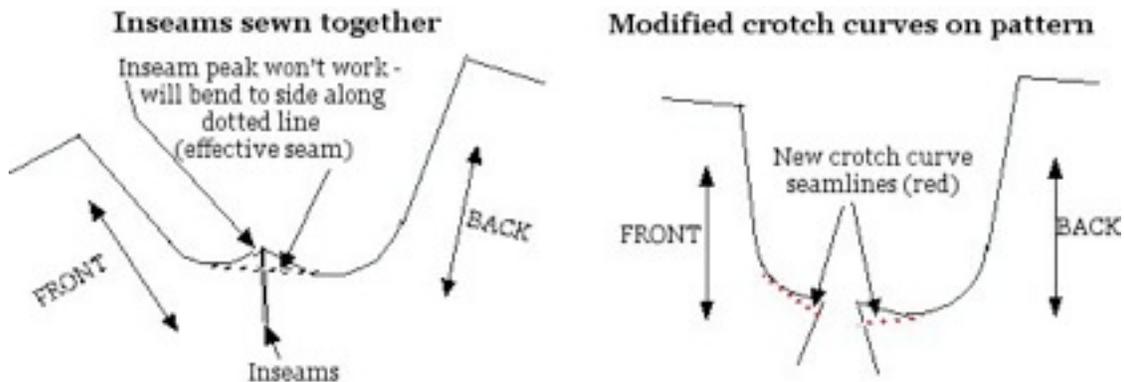
This will be more evident when you draw your own saddle profile (next section).

- ▶ **Knee level** is measured vertically from your body's crotch level to the bend line at the back of the knee.
  - ▶ **Hem line** is measured in the same way, from your body's crotch level to the ankle bone (or wherever you wish to position the hem). I also find the **floor level** to be useful - but you must always wear the same shoes (or be barefoot) when using this reference. Then mark them on the pattern by measuring from your actual crotch level (above the front crotch depth line) along the grain line. Draw a line, perpendicular to the grain line, horizontally across the pattern to mark these levels.
4. **Sideseam & Inseam:** For the most flattering look, the **sideseam** (SS) is positioned in-line with the center of the leg (viewed from the side), from hip to ankle, and is plumb (perpendicular to the floor). Posture and stance may not make this positioning possible, but try to be as close to center as possible, especially at the ankle, and nearly plumb.

The **inseam** is also positioned in-line with the center of the leg (viewed from the side), from crotch to ankle, and is plumb. (Note: as for the sideseam, posture and stance may affect this). The back inseam is slightly shorter than the front inseam because the back crotch point is lower than the front crotch point (see Levels and Lines sketch above).

5. **Crotch Seam:** This seam should be a smooth curve across the inseam; it should not come to a point at the inseam. The best way to ensure this is to have the curve meet the inseam at a right angle (90°) for both front and back crotch curves. If this is not possible, then the sum of the F & B angles should be 180° (a straight line).

The following illustration shows what happens when the F & B angles total less than 180°, which is a common problem, especially when you make modifications to an existing pattern.



Note that this modification lowers the position of the crotch depth, which may provide more vertical ease than you wish; in this case, raise the crotch curve on both front and back by equal amounts, to reduce the vertical ease.

6. **Lower Leg:** For a slim pant or slacks, the **lower pant leg** (knee to ankle) should be symmetrical relative to crease line ([principle 2](#)). That is, the inseam and SS should be equidistant from this line. For looser-fitting styles, the sideseam is typically farther away from the crease line than the inseam. No matter how wide the leg, however, always draw the grain line where it would be for a slim-fitting style, as it is an important reference point that ensures the pant hangs correctly without pull-lines or wrinkles. **do sketch for this and knock knees/bow legs below**

Generally, the lower back leg is 1" wider than the lower front leg (½" wider at sideseam, and ½" wider at inseam, when crease lines are aligned), knee to hem.

Skeletal considerations such as knock knees and bow legs, affect the position of the grain line relative to body center and the crease line:

- **knock knees:** From crotch to knee, the vertical grain line is positioned toward body center (toward CB/CF). Below the knee the crease line may diverge from the vertical grain line, tilting toward sideseam at hem level.
- **bow legs:** From crotch to knee, the vertical grain line is positioned farther away from body center (toward SS). Below the knee, the crease line may diverge from the vertical grain line, moving toward body center at hem level.