

Excerpts from class handout

# **GARMENTS TO GROW IN: Designing for Kids**

By Margaret Radcliffe

## **1. INTRODUCTION**

As a knitter, designer and mother, I have designed and made beautiful (if I do say so myself) clothes for my own kids and gifts for the children of friends and relatives. The problem with knitting for infants is, of course, that the one-of-a-kind heirloom garment you spent months creating is outgrown so soon, sometimes in less time than it took to knit it!

Since I'm a believer in creating garments that last, this phenomenon really bothered me, so I spent some time trying to come up with ways of extending the life of handknitted clothing for small children. This class is the result of my efforts.

During this class we'll review

- How (and how much) children grow
- What their clothing needs are at different ages and stages
- What kinds of garments adapt themselves to the growing child
- How to plan for growth
- What kinds of fibers to use

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## 2. GROWTH IN INFANTS AND TODDLERS

### Height

Using the numbers from the charts below, we can calculate that from 3 to 12 months, the average growth in height (or length) is .7" per month for girls and .6" per month for boys. From 12 months to 4 years, growth slows, of course, and the average is only 3.5" per year for girls and 3.4" per year for boys. This means that if you want to make sure a baby can wear a full-length garment for at least 9 months as an infant, you need to design it to "grow" at least 6 or 7 inches. For the same garment to fit the same child from age 1 to 4 years, you must allow for 3 years of growth, or about 10". For sweater length, you can look at the "cervical to waist" measurement to see the change with age, and for pants length, you can look at the "waist height measurement" in the Sizing Standards chart below.

CHILDREN'S HEIGHT FROM GROWTH CHARTS (IN INCHES)*							
	3 months	6 months	12 months	18 months	24 months	36 months	4 years
Girls	21-24.4	24.4-27.1	27.5-30.4	30-33	32.2-35.4	35.5-39	37.1-41.7
Boys	22.2-25	25-27.2	28.3-31.2	30.6-33.7	32.6-35.9	36.1-39.6	37.4-42.1

(From Sinclair, Adebonojo, et al.)

\* low figure is 10th percentile, high figure is 90th percentile

The American Society for Testing and Materials has established sizing standards for infants' and children's clothing. Excerpts from these standards are shown in the chart below.

SIZING STANDARDS (IN INCHES)							
	0-3 Mon	3-6 Mon	9-12 Mon	12-18 Mon	2	3	4
Height	up to 23.5	24-26.5	28-30.5	31-32.5	33-35.5	36-38.5	39-41.5
Weight	up to 12	12.5-16	18.5-28	28.5-24	25-28	29-32	33-36
Chest	16.5	17.5	18.5	19.5	20	21	22
Waist	18	18.5	19	19.5	20	20.5	21
Hip	17	18	19	20	21	22	23
Vertical Trunk	25	27	29	31	33	35.5	38
Across Shoulder	6.25	6.5	8.75	9	9.375	9.75	1.0125
Arm Length	6.625	7.875	8.125	10.375	11.625	12.75	13.875
Cervical to Back Waist	6	6.5	7	7.5	8.5	9	9.5
Waist Height	11.25	13.5	15.75	16	20	22.25	24.5

From ASTM, D 4910-95a and D 5826-95, 1996.

Note that these are body measurements without diapers.

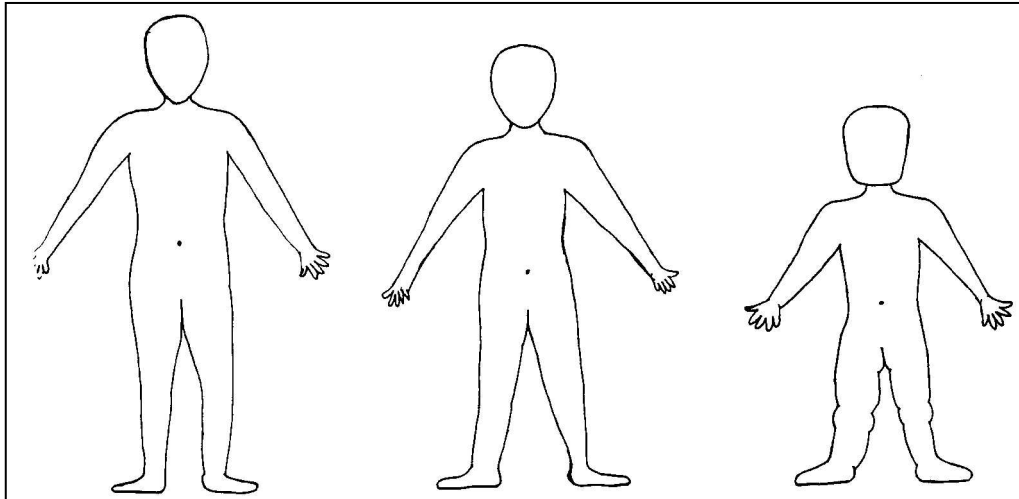
### Width

Looking at the Sizing Standards above, you'll notice that the girth of the child doesn't change as much as height in the first few years. The chest increases from 16.5" to 22". The waist increases from 18" to 21". And the Hip increases from 17" to 23". Note that these measurements are of the body, without diapers.

### Arm Length

As you'd expect, arm length also increases. It more than doubles, from 6.625" to 13.875". Sleeve length, like overall length of the garment, is a major consideration when planning for growth. Note that this is the measurement from the shoulder to the wrist, not including the hand.

## Body Types and Proportions



**Infants** are characterized by very large heads relative to their bodies, and bowed legs with thick thighs tapering down to tiny feet.

**Toddlers** still have large heads, but their bodies are beginning to catch up in size. They have pot bellies and swayed backs, although these straighten out as they get older, so that the posture of the three or four year old is much straighter than that of the one year old who has already started to walk.

Both infants and toddlers wear diapers and need easy on and off both for dressing and diaper changes. Note that boys and girls are shaped the same at these ages, although boys tend on the average to be bigger than girls of the same age. Differences between boys' and girls' clothing at this age is merely superficial.

**Preschoolers** begin to look more like adults in body proportions than younger children, but their heads are still larger in comparison to their bodies.

Clothing fitted in traditional ways for adults just doesn't work on kids; fitted sleeves and shoulders bind and are outgrown quickly. However, it is very easy to use simple shapes to make comfortable kids' clothes. For example, overalls provide a comfortable fit over that pot belly, baggy pants with elastic waists are easy to get on and off over bulky diapers, and large head openings make it easier to get shirts and sweaters over those big heads.

### 3. DEVELOPMENTAL STAGES

At different ages children are, of course, different sizes, but they are also **doing** different things. This should be considered when designing their clothes. Blobs (babies who can't sit up yet) and sitters, creepers and crawlers, cruisers and walkers - each stage has different needs.



be easy to clean and to remove food from.

**Blobs and Sitters:** Babies begin to sit up at about 6 1/2 months, although there are wide variations between individual children. Their main activities before they begin to be mobile are lying down (either on their backs or stomachs), rolling over, kicking their feet, waving their arms, sucking (on their hands, toys or whatever else offers itself), and being held. Diaper changes are very frequent at this stage. Most babies begin eating solids at about 6 months, so clothing must

**Creepers and Crawlers:** Creeping (wiggling across the floor) and crawling can begin as early as 6 months, but 7 1/2 to 9 months is more typical, while some children skip crawling altogether and go straight to walking. Diaper changes are still very frequent.



**Cruisers and Walkers:** Cruising (walking around while holding onto furniture) occurs during the second half of the first year, and most babies begin to walk on their own around their first birthdays. Diaper changes begin to slow down a bit.

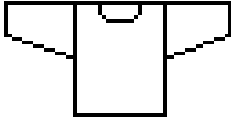
Long gowns, such as christening gowns, are appropriate only for babies who are not yet mobile (i.e. blobs and sitters). Dresses are fine for blobs and sitters, and for cruisers and walkers, but kids who are creeping and crawling across the floor will get tangled up even in short dresses. Garment length is not so important to the blobs and sitters, who just need comfortable clothing that won't restrict their limited movements, but length is very important for a child learning to walk, to prevent falls. Built-in feet are fine for blobs and sitters, and for creepers and crawlers, but children who are learning to walk need to go barefoot as much as possible, so they can grip the floor with their toes. This is especially true if a child lives in a house with bare wood floors, because footed garments tend to slip. However, if the feet are fitted like socks, then they can go right inside of shoes and will be fine for older toddlers. Children of 2 years or more need clothing they can remove and replace easily, because they are learning to undress and dress themselves, as well as beginning to use the bathroom. But keep in mind that many children in the same size range will continue to wear diapers regularly, and clothing must be sized accordingly.

#### 4. GARMENT SHAPES

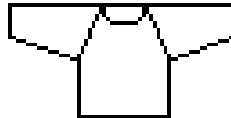
Certain garment shapes lend themselves to planned growth better than others. Basically, shapes that allow for plenty of ease (i.e. bagginess) and that are not fitted to the body work best.

##### Sweaters

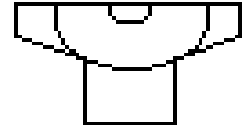
Sweater shapes should have no definite shoulder line, which means that a drop shoulder, raglan sleeve, or circular yoke will work best.



Drop Shoulder



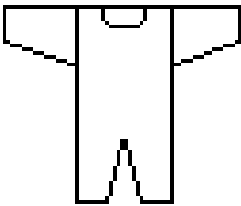
Raglan Sleeve



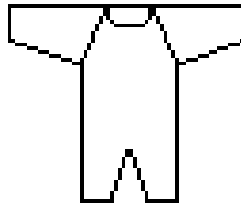
Circular Yoke

##### Jumpsuits and Overalls

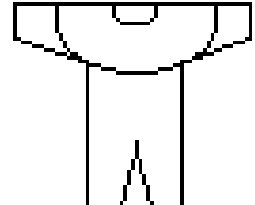
Like sweaters, jumpsuits should have no definite shoulder line, so drop shoulder construction, raglan sleeves, and circular yoke construction also work well. In designing both overalls and jumpsuits, definite waistlines should be avoided.



Drop Sleeve Jumpsuit



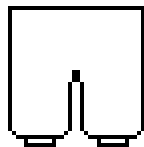
Raglan Sleeve Jumpsuit



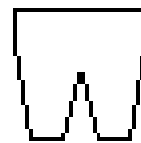
Circular Yoke Jumpsuit

##### Pants

Pants must be full enough to accommodate diapers (if the child is that young), and should be styled with a tight cuff, to prevent extra long legs from slipping down over the feet.



Baggy pants



Tapered Pants

## 5. ALLOWING FOR GROWTH

How long do you want the garment to fit a rapidly growing child? Looking back at Section 2, you can see how fast children grow up and out. Their chest and waist measurement doesn't change much, and you can easily allow enough ease for growth in girth over a long period of time. Allowing for the great growth in length of both body and sleeve, however, requires a bit of planning.

To allow for growth, make the garment to fit the measurement two, or even three sizes larger. In order for the clothes to appear to fit while the child is small, you must plan to accommodate all that extra fabric. But how do you deal with all that extra length while the child is still small? Babies' tiny feet have a way of disappearing up into the bodies of jumpsuits and toddlers' pants always seem to droop under their heels to be walked on. There are several ways of addressing this problem.

- Extra length and width in a soft, thin fabric that drapes nicely, is more easily absorbed than in a thick, stiff fabric.
- A very full body can be made to fit at the shoulders by creating gathers or smocking across the chest with a pattern stitch.
- Extra room in the waist of overalls and jumpsuits can be pulled in with a drawstring until the child grows into the pants. Drawing in the waist will also help control any extra length, by blousing some of it out above the waist.
- Full pants to accommodate a diaper can taper gradually down to narrow cuffs at the ankles, or can be gathered at the ankles.
- Longer sleeves can be dealt with like long pants legs: either taper to narrow cuffs or gathered to preserve their fullness.
- Doubled, tripled or quadrupled length cuffs on both sleeves and legs can be turned down as the child grows.
- Finally, the fact that the garment you are designing is knitted allows you to deal with the extra fullness by using ribbing. Ribbing, either vertical or horizontal, allows the extra length in a garment's sleeves or legs to pleat nicely while the child is small, and to stretch out as the child grows.



A horizontally ribbed sweater, knit from cuff to cuff, allows the sleeves to work like an accordion. While the sweater is still large for the child, the sleeves push up, and the pleating of the ribbed stripes takes care of the extra length. As the child grows, the sleeves will stretch out to accommodate the additional length of the arm. Finally, the double length cuffs can be folded down to allow for even more growth. The sweater shown was knit from cuff to cuff, so the ribbing is vertical on the body, allowing for growth in the child's chest measurement as well. It fits sizes 3 to 5.

## Metamorphosis

Another option, rather than designing a garment that automatically adjusts to fit the child as he or she grows, is to create a garment that will be modified as the needs and size of the child change. If you are planning to enlarge a garment, or change its shape as the child grows, then the structure of the garment can be crucial.

For example, a loose bunting can be easily converted to a sweater by opening up the bottom when it is too short for the child's legs. However, if you construct the bottom of the bunting with a closed cast on edge, it will be difficult to open up the bottom of the bunting. On the other hand, if you work the bunting from the top down, finish it off nicely with the bottom open, then turn it inside out and crochet the bottom seam together with cotton yarn leaving the end free, it will be easy to take it out later. The cotton won't show because it's on the inside; the free end of the yarn will be easy to find and to pull out; the use of cotton yarn will prevent felting so you can simply pull out the crocheted chain stitch that holds the bottom together.

A jumpsuit may be converted to a sweater in the same general way if it is knitted down from the shoulders to the waist, then bound off. The legs may be knit up from the bottom and finished off, then the two pieces may be crocheted together with cotton yarn. This is fairly complicated, so you should consider whether it would not be more sensible just to design a versatile sweater and leggings set, which could be worn separately or together, and which could accommodate the growing height of a child for several years.

If a sweater is knit from the top down, ribbing can easily be lengthened at the bottom and at the sleeve cuffs by picking up stitches and adding to the length. However, a sweater knit in stockinette stitch will allow stitches to be picked up around the bottom regardless of whether it was worked from the bottom or the top. Finishing the bottom with a hemmed edge in the first place, rather than ribbing, will make this easier. If the sweater has not worn much and has not been washed too often, the new section will not be noticeable. To disguise the point where the new knitting begins, a small Fair Isle pattern can be very useful.

Future additions may be planned for in raglan sleeved or circular yoke sweaters by knitting them from the top down. This will make it easy to add on to the bottom later.

## REFERENCES

Adebonojo, Festus, Eleanor Sherman and Linda Carlen Jones, *How Baby Grows: A Parent's Guide to Infant Nutrition*, New York: Arbor House, 1985, 214 pp.

\*American Society for Testing and Materials (ASTM), "Standard Tables of Body Measurements for Children, Sizes 2 to 6x/7," *Annual Book of ASTM Standards*, vol. 7.02, D 5826-95, 1996, pp. 871-873.

\*American Society for Testing and Materials (ASTM), "Standard Tables of Body Measurements for Infants, Sizes 0 to 24 Months," *Annual Book of ASTM Standards*, vol. 7.02, D 4910-95a, 1996, pp. 616-618.

Cooklin, Gerry, *Pattern Grading for Children's Clothes: The Technology of Sizing*, Oxford: BSP Professional Books, 1991, 304 pp.

Gioello, Debbie Ann and Beverly Berke, *Figure Types & Size Ranges*, Language of Fashion Series, New York: Fairchild Publications, 1979, 108 pp.

Jaffe, Hilde and Rosa Rosa, *Childrenswear Design*, 2nd ed., New York: Fairchild Publications, 1990, 303 pp.

National Bureau of Standards, Department of Commerce, *Body Measurements for the Sizing of Apparel for Infants, Babies, Toddlers and Children*, CS151-50, 1953, 18 pp. (withdrawn).

Rodway, Pamela, *Children's Clothes: Easy to Make Clothes for 1-10 Year Olds*, New York: Arco Publishing Co., Inc., 1975, 96 pp.

Sinclair, David C., *Human Growth After Birth*, 4th ed., New York: Oxford University Press, 1985, 251 pp.

Snyder, Richard G., et al., *Anthropometry of Infants, Children, and Youths to Age 18 for Product Safety Design*, Warrendale, Pennsylvania: Society of Automotive Engineers, Inc., 1997, 627 pp.

Solinger, Jacob, *Apparel Manufacturing Handbook*, New York: Van Nostrand Reinhold Company, 1980, 795 pp.

Zimmermann, Elizabeth, *Knitters' Almanac*, New York: Dover Publications, Inc., 1981, 150 pp.

Zimmermann, Elizabeth, *Knitting Without Tears*, New York: Charles Scribner's Sons, 1971, 120 pp.



## DESIGNING FOR GROWTH

These "paper dolls" are drawn to scale to represent the bodies of a 1 year old, a 2 year old and a 3 year old. They are scaled at 0.2":1".

