**Extra credit:**

Information provided:

23 inches on the waist (circumference measurement around the waist)

17 inch length from the waist to the toes.

Instruction:

Model the section of the dress from the waist to the toes (the skirt section) to determine how much fabric is needed, and what the cut looks like.

Work:

We can’t assume the fabric cut for the design is rectangular, measuring 23x17, because when folded to create the dress there would be no leg room for walking and assume the shape of a perfect cylinder, not exactly fitting the human form well. The dress has to open towards the bottom to allow for a standard stride. The standard stride for an adult will be greater than the standard stride for a 4 year old. Due to my days as a land surveyor and having to pace distances on foot, I know an adult male has an average stride of ~3ft (rear heel to front toe). I can make an educated guess (I also have a 4 year old at home) that ~1.5ft is a good stride distance for a 4 year old, because I typically walk half as fast when I’m in tow mode (holding the hand of and “towing” a 4 year old).

So the bottom of the skirt should have enough space for a 1.5ft (18 inches) stride, and whatever additional play is required in the fabric to make it Disney princess worthy (seems to be wider than average dresses). Let’s say the base is 36 inches around, double the space required for the stride.

So in general we have a couple trapezoids making up the front and back of this skirt (\*Not to scale):

A

23”

Back

Front

B

17”

C

36”

We also know the human body is not made of straight lines, we have curves in the hip, legs, knees, etc. So fabric measured 17” from waist to floor/toes may not “fall” a true 17” due to not taking a straight line to the floor. For this reason, we will add 5% to each measurement. In addition to human curves, we also have to account for fabric to sow the two trapezoids together without reducing measurements of the final product. For this reason, we will add another 5%.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Side | Measurement | Curve Adjustment (5%) | Sowing space (5%) | Total Fabric Cut for each side (rounding to nearest half inch) |
| A | 23 | 1.15 | 1.15 | 25.5” |
| B | 17 | .85 | .85 | 18.5” |
| C | 36 | 1.8 | 1.8 | 39.5” |

Now we need to figure the amount of total fabric needed. Each side (front and back) will require:

(25.5x18.5)+(39.5-25.5)(18.5) =

(471.75)+(14)(18.5) =

(471.75)+(259) = 730.75 in^2

730.75 x 2 (front and back) = 1461.5 in^2

Assuming there is a standard 42” fabric bolt of blue fabric, the two trapezoid pieces could be cut from a length of (25.5x2) = 51”. So a 42x51= 2142 in^2 section of fabric would be required in order to sow the skirt. This would also leave you with (2142-1461.5) = 680.5 in^2 of additional fabric, represented in red below (not to scale):

42”

51”

Front

Back