

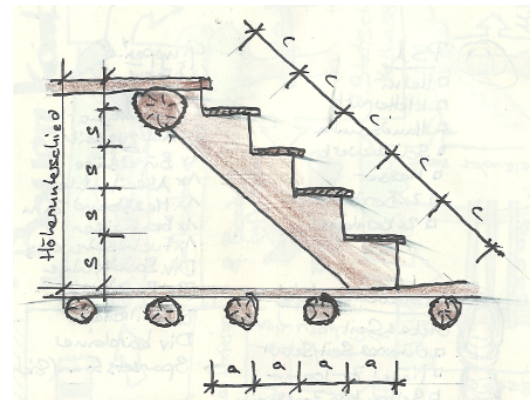
BUILDING STAIRS

Preliminary note: Gradient ratio

In order for a staircase to be comfortable, it is important to choose a gradient ratio that corresponds to the step ratio of an adult person. In concrete terms this means:

step ratio formula: $63 \text{ cm} \leq 2s + a \leq 65 \text{ cm}$

Because it is not always possible to keep the 63cm in practice, values between 60 and 66cm are also possible



Calculate a stair

1. Determine the difference in height that needs to be overcome and determine the number of gradients. The best way to do this is to try to achieve a gradient of 18cm in the first assumption.

e.g.: height difference 285 cm: $18 \text{ cm} = 15,83 \text{ cm}$

This value can then be used to determine the number of slopes: 15.83 is rounded up to 16 slopes.

2. Calculate the exact gradient height (s) from the number of gradients

e.g.: $285 \text{ cm} : 16 \text{ gradients} = 17,81 \text{ cm}$

The exact gradient height(s) of this staircase is 17,81cm.

3. Apply step measure formula:

e.g.: $63 \text{ cm} - 2 \times 17,81 \text{ cm} = 27,38 \text{ cm}$

So the entrance (a) will be 27,38cm deep.

4. Step (a) x number of pitches = stair length

e.g.: $27,38 \text{ cm} \times 16 \text{ pitches} = 438,08 \text{ cm}$

5. Calculate C mass

$$\sqrt{s^2 + a^2} = c \quad \text{z.b.} \quad \sqrt{17,81^2 + 27,38^2} = 32,66 \text{ cm}$$

Stair stringer

The stair stringer is the part of the stairs that supports the steps. The stringboard is the part of the staircase that has to be worked with absolute precision so that the staircase is really "walkable" later on.

Determine dimension

As a load-bearing component, it is important that the stringboard is by no means undersized. It is particularly important that the cheek support (Wt) is correctly dimensioned.

		Staircase width		
Basic dimension in m	Höhenunterschied in m	0,8 m	1,0 m	1,2 m
1,50	$\leq 1,50$	10.5	10.5	11
2,00	$\leq 2,00$	13,5	14	14.5
2,50	$\leq 2,50$	17	17.5	18.5

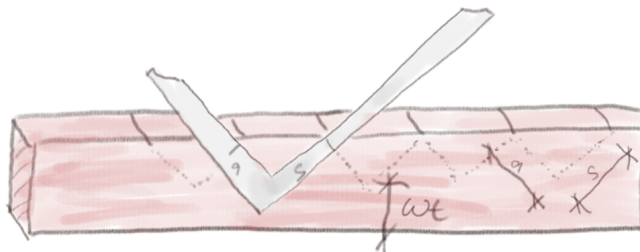
Stair string thickness = 5,5cm

Stair string height:

$$\text{Stair string height} = \text{Wangentragmass (Wt)} + \frac{\text{appearance (a) x Slope(s)}}{c}$$

Stair string Scribing

Once all the dimensions of the staircase are known, all dimensions must be transferred to the stair stringboards. In a first step, the c measure is transferred to the narrow side of the stair stringboard. Step measurement (a) and slope (s) are applied on a large carpenter's angle. This allows the cut lines to be drawn at the correct angle on the staircase stringboard.



Mark the cutting lines around the entire stair stringboard, this will help you later on with the exact sawing.

Place both staircase stringboards next to each other so that they become exactly the same!

Tip: Before you cut the two staircase cheek boards: Hold them at the place in the tree house where they will be mounted later - this way you can see relatively quickly whether you have not miscalculated or drawn incorrectly!

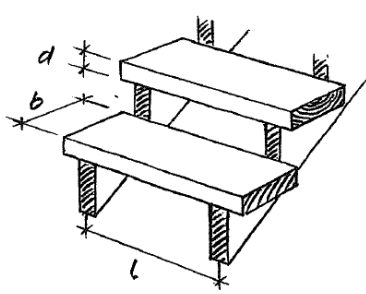
Steps

step width

Clearly more beautiful than stair treads which are flush with the stair stringers are tread projections of about 3-4cm. These are added to the tread measurement. Also laterally a projection per side of approx. 4cm is recommended for saddle stairs.

Board thicknesses for steps

Board thicknesses b [mm]	Sapn l					
	0.3	0.4	0.5	0.6	0.7	0.8
100 - 120	40	50	60	60		
140 - 160	36	40	50	50	60	60
180 - 200	30	36	40	50	50	50
220 - 240	30	36	36	40	50	50
260 - 280	30	30	36	36	40	40



The handrail

Don't forget the handrail on your stairs. It should be 100cm high and have a central rung. A handrail has already prevented injuries from falling.