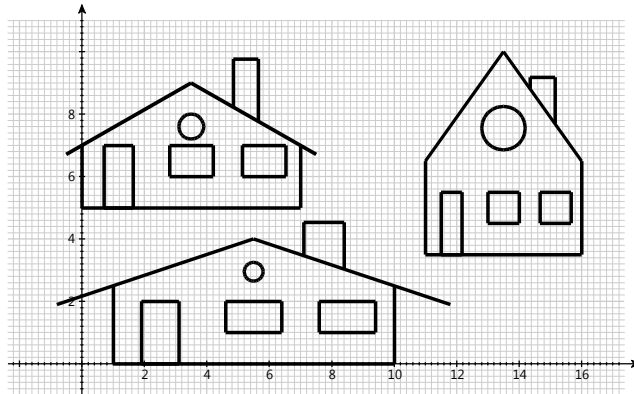


Exercise Sheet 4

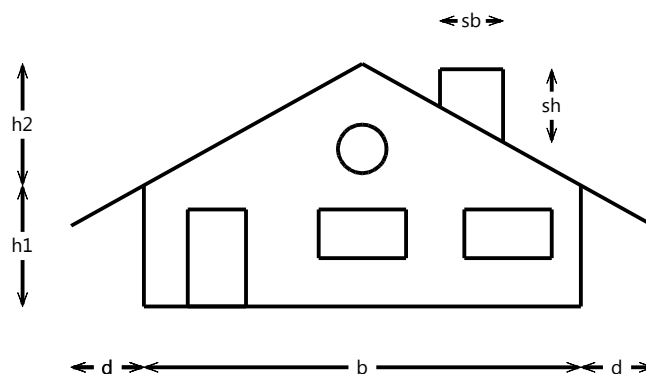
House Configurator



Preparation

Create a graphics component *HouseConfiguratorTVG* and a physical system *HouseConfigurator* analogous to exercise sheet 3. In the class *HouseConfiguratorTVG*, use *setUserArea* to set the drawing area so that the x-values range from -1 to 16 and the y-values range from -1 to 11. Load *HouseConfigurator* into the Physolator.

Exercise 1



In exercise sheet 3, each house has the same shape and dimensions. Now different variants of the house are to be drawn. The six parameters b , $h1$, $h2$, d , sh and sb are used to determine the shape of the house.

With the method *drawHouse(x,y)* from exercise sheet 3 you can draw the house at different positions (x, y) . Now, a new method *drawHouse* is to be programmed, which is similar to the method from exercise sheet 3, but is extended by parameters b , $h1$, $h2$, d , sh and sb .

drawHouse(b, h1, h2, d, sh, sb, x, y)

The invocation of the method *drawHouse(b, h1, h2, d, sh, sb, sb, x, y)* shall cause a house to be drawn at the position (x, y), where the parameters *b, h1, h2, d, sh* and *sb* determine the shape of the house.

Regardless of the parameter values, the door shall always have a height of 2 units. The windows shall have a height of 1 unit and shall be 1 unit above the floor slab of the house. The width of the door and the width of the windows depend on the width of the base plate *b*. The door shall have a width of $\frac{2}{15}b$ and the windows should have a width of $\frac{1}{5}b$. The ground floor area is to be divided into three equally sized sections in a horizontal direction. Each of the three sections thus has a width of $\frac{1}{3}b$. In the left section the door shall be drawn, in the middle and right sections one window each. The door and the windows shall be positioned centrally in their respective sections.

Test the method *drawHouse*. To do this, invoke the method *drawHouse* several times in the paint method and use it to draw different variants of the house at different positions.

Exercise 2

The user shall now be able to configure the house during runtime. First change your program code so that only one house is drawn at the position (0,0).

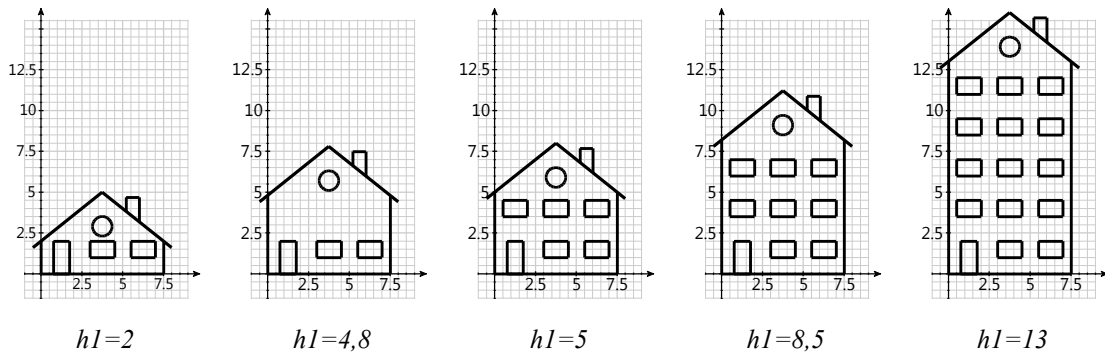
drawHouse(b, h1, h2, d, sh, sb, 0, 0);

The variables *b, h1, h2, d, sh* and *sb* are to be changed by the user during runtime. Proceed as described in exercise 4 from exercise sheet 3: Declare six object attributes and add *@Parameter* and *@Slider* annotations to them. Assign suitable initial values to the object attributes and specify appropriate lower and upper limits and a suitable step size in the *@Slider* annotation.

```

@Parameter
@Slider(min = 1, max = 20, step = 0.1, width = 200)
public double b = 9;
...
    
```

Exercise 3



So far, all houses have only two floors: a ground floor with one door and two windows and an attic with a round window.

If *h1* has a sufficiently large value, then further floors shall now be inserted between the ground floor and the attic floor (see illustration). These upper floors shall each have three windows that are located centrally above the door and the two windows on the ground floor. Each floor shall have a height of 2.5 units. The ground floor shall always be drawn, even if the value of *h2* is less than 2.5. If *h1* has a value greater than or equal to 5, an additional floor shall be drawn, from a value of 7.5 on another floor etc..

Change the program code from the previous task in such a way that several floors are drawn for larger values of hl . Test your program by changing the hl with the slider.