| Calculate Work in Scratch | Grade 8 and Structures and Mechanisms |
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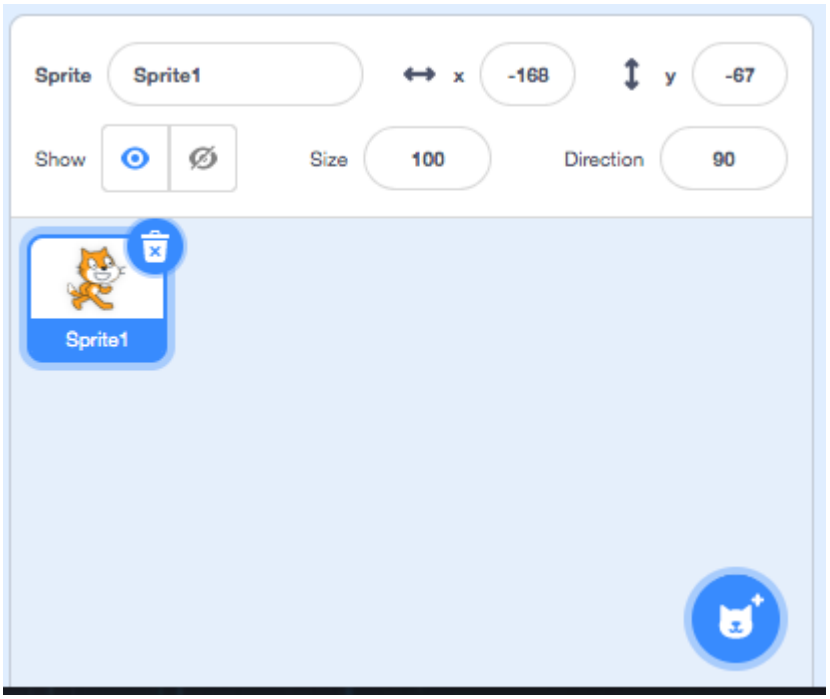
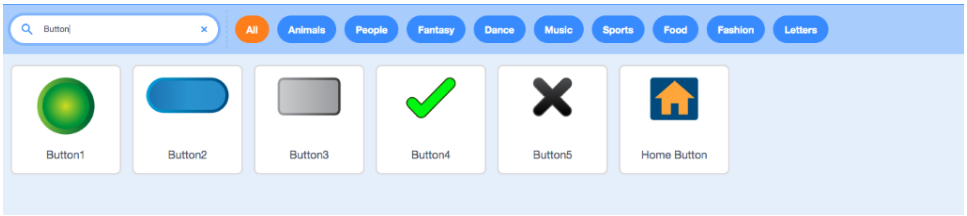
## Handout

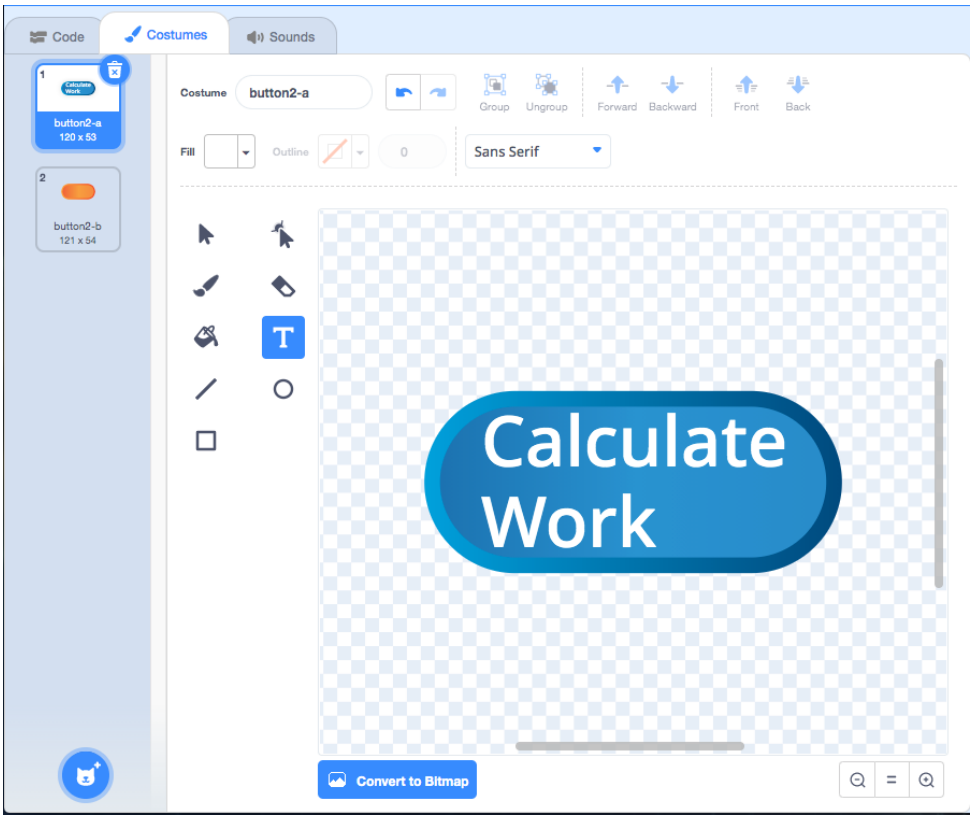
Programs in Scratch are structured by sprites. Clicking on a sprite in editing mode will display the blocks that control its actions. By default, a sprite of a cartoon cat is loaded in a new project, with no blocks. We will delete this sprite by clicking the blue trash can icon in the sprite pane in the lower right corner of the editing window.




To create a new sprite, click the blue circle with the cat face and the plus sign. Select one of the button sprites.



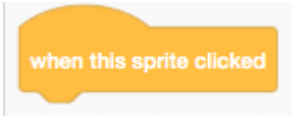

To edit the sprite, click the ‘costume’ tab in the upper left, and use the text button to modify the sprite’s costume with something like “Calculate work”

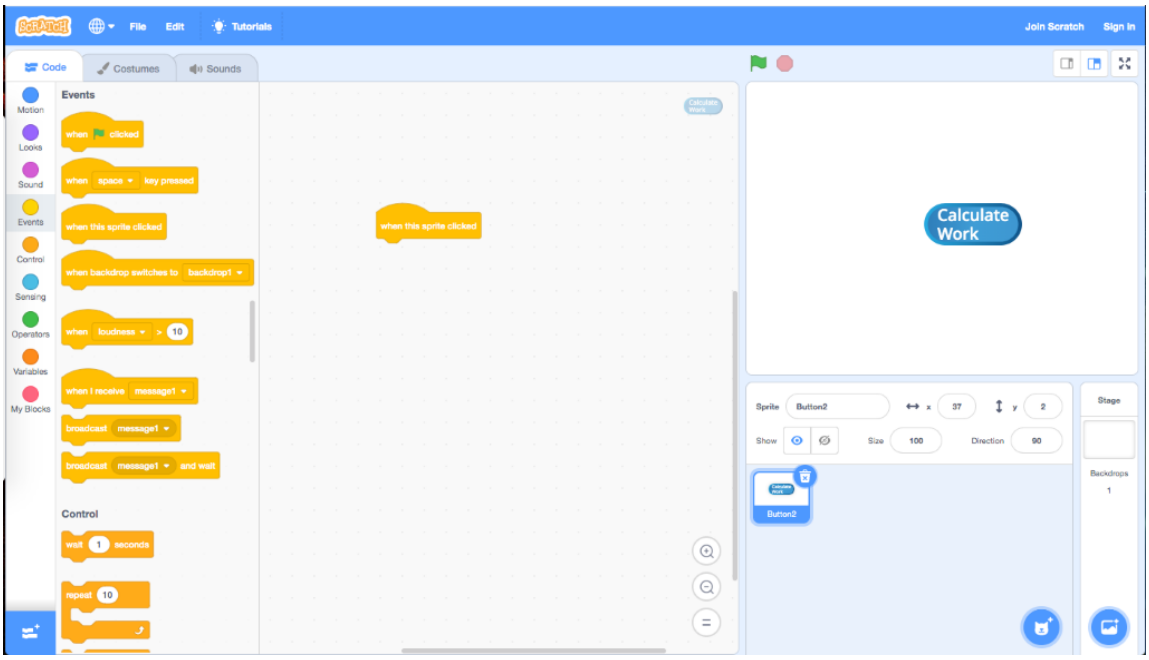



(To change the text colour, use the ‘fill’ dropdown)

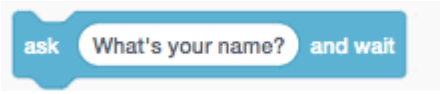
Then return to the ‘code’ tab.

We wish to initiate the calculation when the sprite is clicked, so click the yellow circle marked “events” and find the block ‘when this sprite clicked’. Drag it into the main, empty area. (This is where code controlling your sprite goes. Notice an image of the sprite is in the upper-right corner of the coding pane.) Your window should look like the image below.



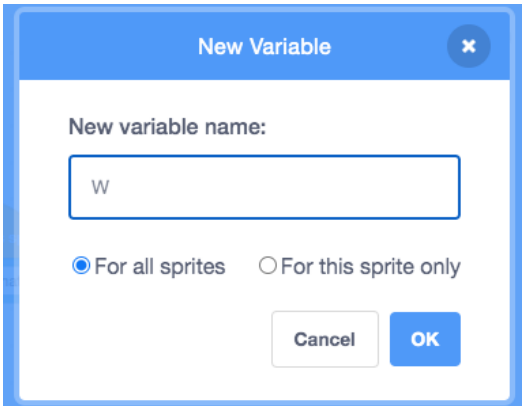



There are multiple ways to request input, but the easiest is to use Scratch's built-in sensing blocks. (Click the blue circle labelled sensing to find them). Find the 'ask and wait' block; drag it under the event block and change the text to something like "What is the force in Newtons?"

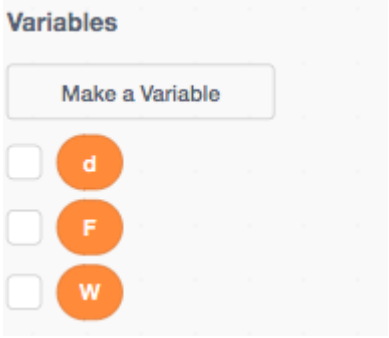




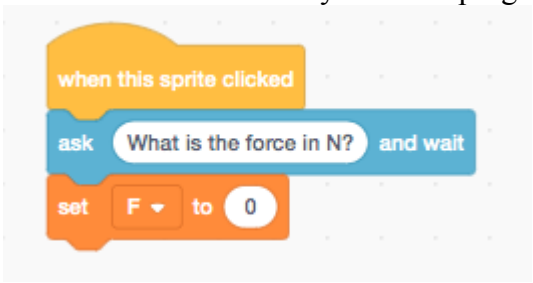
We will store the answer in a variable, but first we need to create one. Click the orange circle labelled 'Variables' and the "Make a variable" button. This will pop up the "new variable" window:



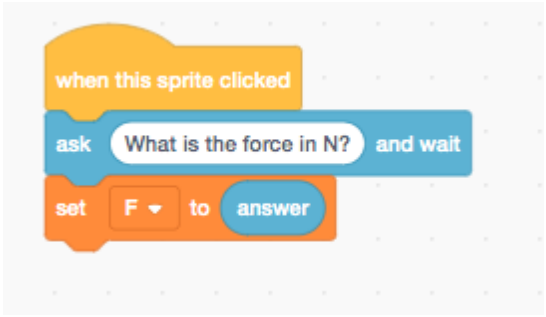
Name the variable and click OK. Repeat the process. We need 3 variables: W, F, and d. (you can right click the default “My variable” to rename it or delete it.) Uncheck the variables so they will not visible on screen when running the program.



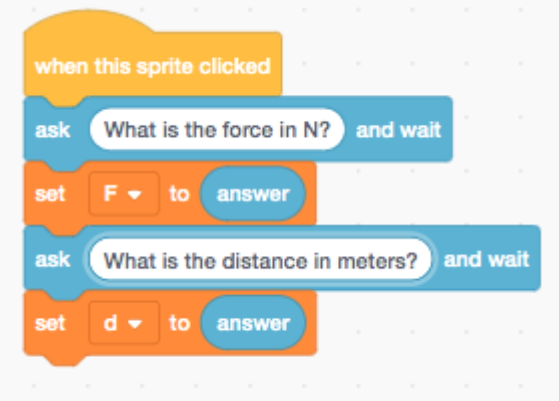

Grab the block ‘ set variable block’ (click the variable to select the one you want) and drag it under the sense block in your main program:




Then go back to “sensing” (blue circle) and drag the ‘answer’ block into the set variable block.

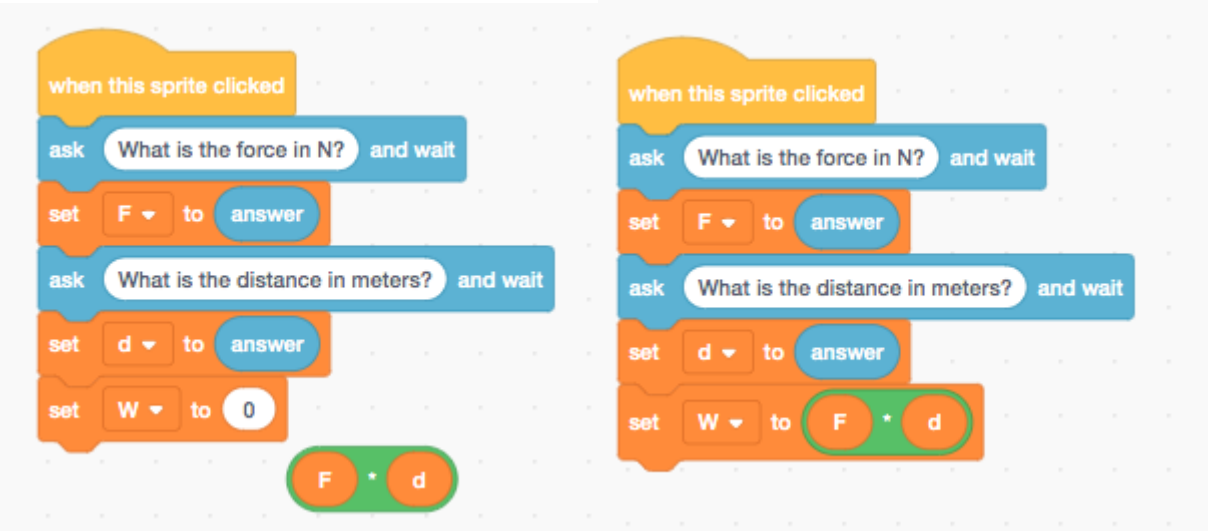



Now, if the program is running, when the button is clicked, a speech bubble will pop up asking for the force, and a text input will allow the user to type it. This answer will be stored in the variable F. We need to ask for and store the distance as well, so repeat the previous steps to produce code that looks like this:

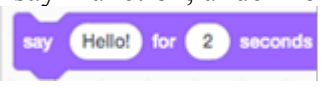



We also wish to set W to equal F*d. To do this we will use the ‘set’ block we have seen before, and an operator block (under the green circle).

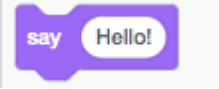
Place the set block next in your code and add the operator block in the white space. Drag the variable blocks (click the orange circle to find them) for d and F into the white circles in the operator block. Note that you may have to add the variable blocks to the operator block before putting it in the set block, as shown here:



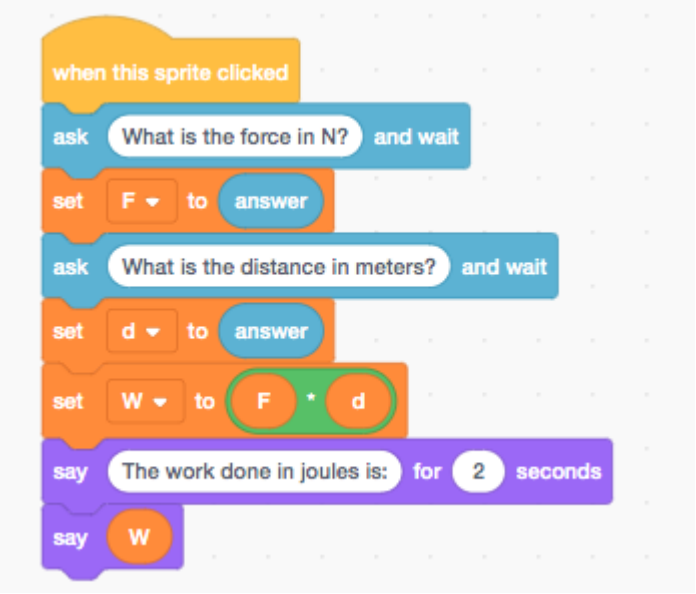

Now all that is left is to display the answer. There are multiple ways to do this, but the easiest is the “say” function, under Looks (the purple circle). Chose a time-limited block:




And change the text to something like “The work done in Joules is:”, and add it to your program. Then add the ‘say’ block, and replace the text with the variable W block.



Your finished program should look like this:




To run the program, click the green flag.