

Calculate Work in Scratch

Grade 8 and Structures and Mechanisms

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.

Sprite Sprite1	↔ x -168 ‡ y -67
Show Ø	Size 100 Direction 90
Sprite1	

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

Q Button	× 4	Animais Peop	le Fantasy D	ance Music Sp	Food Fas	hion Letters
			✓	X		
Button1	Button2	Button3	Button4	Button5	Home Button	

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"



SUDBURY, ONTARIO, CANADA



(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.





Bath	🔃 🌐 🕶 File Ei	dit 🔆 Tuto	rials			Join Scratch Sign in
	ode 🦪 Costumes	() Sounds			N 0	
Motion	Events				Colculate Work	
Looks	when 🎮 clicked					
Sound	when space + key pre	ssed				
Events						Calculate Work
Control	when this sprite clicked			when this sprite clicked		Work
Sensing	when backdrop switches to	o backdrop1 =				
	when loudness + >	10				
Operators						
Variables	when I receive message1	•			Sprite Button2	37 ‡ y 2 Stage
My Blocks	broadcast message1 -				Sprite Button2 \leftrightarrow x Show () (Ø) Size 100	Direction 90
	broadcast message1 -	and wait				Beckdrops
	Control				Button2	1
	walt 1 seconds					
	repeat 10					
=	,					

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:

New	Variable ×
New variable nam	ne:
W	
For all sprites	\bigcirc For this sprite only
	Cancel



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.

Variables			
Make	a Va	riable	
w			

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:

	this sp		click	be			
ask	What	is th	e for	ce ir	1 N?	and	d wait
set	F -	to	0		1		

Then go back to "sensing" (blue circle) and drag the 'answer' block into the set variable block.

ask What is the force in N? and wait	when th	is sprite c	licked		
	~~~				
set F <del>v</del> to answer					

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:



1	-							
when	this spri		cked					
ask	What is	s the f	force i	n N?	and	d wait		
set	<b>F</b> •	to a	inswer					
ask	What is	s the o	distan	ce in	mete	rs?	and v	vait
set	d 🕶 1	to a	inswer					

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:

when this sprite clicked	when this sprite clicked
ask What is the force in N? and wait	ask What is the force in N? and wait
set F - to answer	set F - to answer
ask What is the distance in meters? and wait	ask What is the distance in meters? and wait
set d - to answer	set d 🕶 to answer
set W - to 0 and a set of the set	set W - to F d

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:

	this sprite clicked
ask	What is the force in N? and wait
set	F - to answer
ask	What is the distance in meters? and wait
set	d - to answer
set	W 🕶 to 🕞 🕶 d
say	The work done in joules is: for 2 seconds
say	• · · · · · · · ·

To run the program, click the green flag.