

Calculate Work in Scratch		Grade 8 and Structures and Mechanisms	
Lesson Plan	Coding Tool	Scratch	
	Cross-curricular	Number Sense and Numeration	
Big Ideas <ul style="list-style-type: none"> Systems are designed to accomplish tasks Programming calculations in scratch The formula $W = F \times d$. 	Specific Expectations 3.5 Understand and use the formula work = force \times distance ($W = F \times d$) to establish the relationship between work, force, and distance moved parallel to the force in simple systems		
Description Use scratch to create a simple program to calculate mechanical work, given force and distance.			
Materials <ul style="list-style-type: none"> Any computing device with internet access (tablet, Chromebook, etc) 	Computational Thinking Skills <ul style="list-style-type: none"> Block-coding Variables Input and Output 		
Introduction Scratch code is a form of “block coding” created by MIT for use in schools that you may already be familiar with. (If not, see “What is Scratch” at https://www.youtube.com/watch?v=jXUZaf5D12A) We recommend you create a teacher account at https://scratch.mit.edu/educators#teacher-accounts so you can better manage the use of Scratch in your classroom, though that is beyond the scope of this lesson plan. Though primarily used for creating games and game-like programs, Scratch can also be used to calculate mathematical operations. In this case, we are going to create a simple calculator to solve the equation $W = F \times d$ given a distance and a force parallel to movement. A walkthrough in how to do this in Scratch is provided on the associated handout.			

Action

Assist the students (as much as you deem necessary for your class, given their levels of experience and ability with coding) to produce the app discussed above.

At one extreme, if your students have very little experience, guide them step-by-step as in the handout, or provide them with the handout should you desire.

At the other extreme, if your students are already very familiar with the tool, you can give them the problem (“Calculate work”) and the formula ($W=F*d$) and set them loose as an assignment.

Consolidation/Extension

To extend the activity, have students add additional sprites to the program to calculate Force ($F=W/d$) and Distance ($d=W/F$) without direct guidance.

To consolidate, you can allow them to use this calculator on exercises related to calculating work.

Assessment

If the extension is performed, you can assess students on how well they are able to recreate the app with a different formula.

If the consolidation is performed, evaluate their calculations.

Additional Resources

<https://scratch.mit.edu/>