



Python + Grade 9 Math

August 2020

We are delighted to share this collective of eight Grade 9 math activities integrating Python coding. Each activity is independent from one another and is designed as a worksheet to be completed individually or with a partner. Most activities require a one-hour basic intro activity to Python programming (for beginners!), added to this collective as well. For each activity, a full worksheet solution and an activity summary are provided to the teacher.

Designing these Activities

These activities were created with the goal of integrating basic computer programming concepts into Grade 9 mathematics activities to be completed individually, or with a partner, as worksheets. Each activity was designed by a group of two or three pre-service teachers from a [Mathematics Integrated with Computers and Applications](#) (MICA) III course at Brock University under the supervision of Dr. Chantal Buteau, with the help and funding of the *Mathematics Knowledge Network* (MKN). We, the pre-service teachers, had been using Visual Basic.Net programming for pure and applied mathematics investigation projects over two math courses (MICA I and II), and had had a very brief introduction to Python and Scratch programming as part of our MICA III course. By creating these Python + Grade 9 Math activities, we learned a lot about using Python programming basics in Jupyter Notebook while we sought to integrate different affordances of coding as part of our math activity. Needless to say, it was not straight forward, and we are now proud to share with you this collective of Python + Grade 9 Math activities.

Activities Overview

First, there is a “Python Basics Worksheet” which allows users (students *and* teachers) to gain a feel for Python, and coding in general, and how to use it. It is recommended that this worksheet be completed before incorporating the other worksheets into your lesson plan. We also added guidelines for starting Jupyter Notebook.

Then there is a total of eight Python + Grade 9 Math worksheets. Each worksheet is independent of the rest, and can be completed in any order, or completely on its own. The only exception to this is “Manipulating Expressions and Solving Equations” which comes in two parts, the second of which builds on the first. For your convenience, we have created these programs independently of all others so that you may choose to use all of the activities in its entirety or, choose the specific worksheets you would like to use.

Below, is a table listing each activity. In the left column, you will find the strand within the current (as of August, 2020) Ontario Grade 9 mathematics curriculum that the activity focuses on. In the right column, the name of the activity is included, along with the 3 documents it comes with: a student worksheet, teacher solutions to the worksheet, and a



teacher resource (and, in some cases, an additional activity that will strengthen students' understanding of the mathematical concept).

To download an individual activity, simply click on the topic title. If you only wish to download certain worksheets or resources, click on the hyperlink for those which you wish to download. For convenience, here is a [hyperlink](#) that allows you to simply download all of the resources and worksheets with one click!

Grade 9 Math Curriculum Strands	Worksheet Topics
	Python Coding Starter <ul style="list-style-type: none"> • How to start Jupyter Notebook with Python coding • Python Worksheets (Student Version & Annotated Teacher Version)
Number Sense and Algebra	Operating with Exponents <ul style="list-style-type: none"> • Python Worksheets (Student Version & Teacher Solution) • Teacher Resource
	Manipulating Expressions and Solving Equations (Part 1: Introduction) <ul style="list-style-type: none"> • Python Worksheets (Student Version & Teacher Solution) • Teacher Resource
	Manipulating Expressions and Solving Equations (Part 2: Problem Solving) <ul style="list-style-type: none"> • Python Worksheets (Student Version & Teacher Solution) • Teacher Resource
Linear Relations	Using Data Management to Investigate Relationships <ul style="list-style-type: none"> • Python Worksheets (Student Version & Teacher Solution) • Teacher Resource
	Understanding Characteristics of Linear Relations <ul style="list-style-type: none"> • Python Worksheets (Student Version & Teacher Solution) • Teacher Resource
Analytic Geometry	Relation Equations and Their Graphs <ul style="list-style-type: none"> • Python Worksheets (Student Version & Teacher Solution) • Teacher Resource
	Analysing Linear Relations <ul style="list-style-type: none"> • Python Worksheets (Student Version & Teacher Solution) • Teacher Resource
Measurement and Geometry	Optimization <ul style="list-style-type: none"> • Python Worksheets (Student Version & Teacher Solution) • Teacher Resource

Created by Lauren McCann and Tyrell Nurdin. August 2020. Coordinated by Dr. Chantal Buteau (Brock University).

The Mathematics Knowledge Network, funded by the Ontario Ministry of Education, is a Knowledge Network for Applied Education Research (KNAER) Project hosted by the Fields Institute for Research in Mathematical Sciences. The views expressed in this document belong to the authors and do not necessarily reflect the opinions of the Ministry of Education nor the Ontario Government.