

Desmos Classroom Activities Play and Learn with Desmos

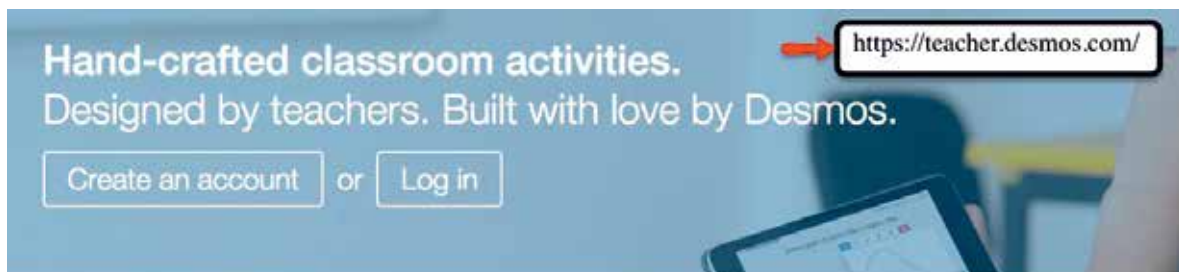
*Desmos (www.desmos.com), the online graphing calculator, is changing classrooms across the world. In my earlier article (Vol. 3, No. 2, July 2014 | *At Right Angles*), I had taken you through the graphing power of Desmos and had described how Desmos helped to bring out the creativity of my students as they explored the concept of 'Domain and Range of a Function'.*

SANGEETA GULATI

This article will highlight another aspect of Desmos, the in-built pre-designed activities, which can be used by the teacher in an interactive manner with students in the mathematics class. These activities, which can be found at <https://teacher.desmos.com/>, are made by the Desmos team (<https://www.desmos.com/team>) along with other teachers. A Desmos Class Activity is essentially a sequence of screens, each with a different task, prompt, or question.

You can get started (Fig. 1) by going to the website <https://teacher.desmos.com/> and creating an account (if you have one which you used to launch the calculator you can use it to login). To use these activities, the teacher will need to have an account, but students do not require it.

Keywords: *Desmos, freeware, activities, math lab, CCE, mensuration, linear functions*



ACTIVITIES BY DESMOS



Figure 1

As the teacher selects ‘Start a New Session’ option for the selected Desmos Activity, a Class Code is generated. Students enter this code on student.desmos.com to get started. As they submit the selected name, the same shows up on the teacher’s dashboard; and the fun begins.

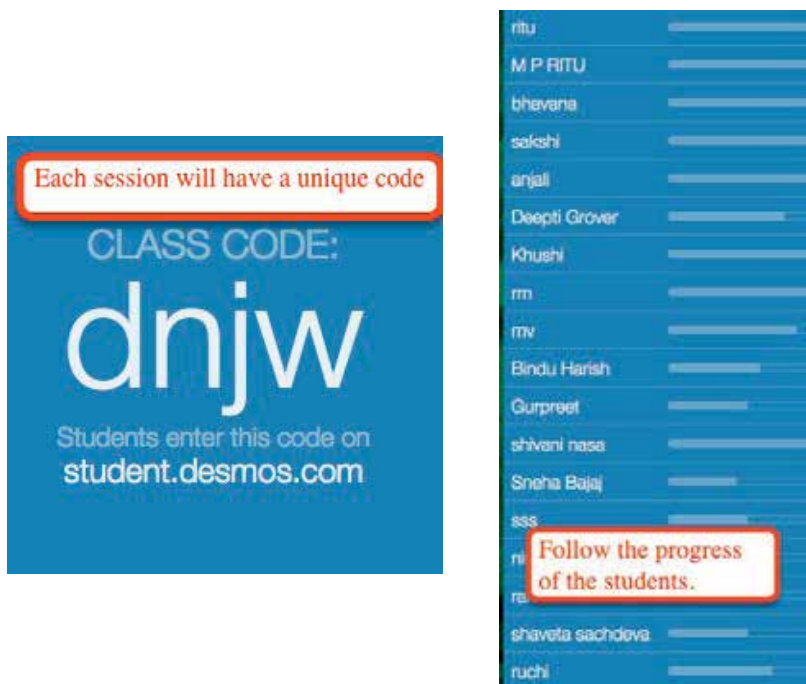


Figure 2

In each activity, there are essentially three screen types: Graph, Question, and Text. The task described in the ‘Graph’ screens requires an action from the student; this could be ‘Plot a line passing through the two given points on the graph’ (Match My Line) or ‘Drag these dividers to create four spaces of equal width’ (Central Park).

The screen with ‘Question’ gives students space to express their thinking. Prompts such as ‘Describe two methods you could use to draw this line’ next to a graph require students to type out their ideas which may or may not be made visible to other students of the class, but which you, as the teacher, will get to

see in real time. The screen for the 'Text' usually concludes the activity with a message for the students, accompanied by a related image.

Each task in the Classroom Activity section helps to engage students in various ways. As the difficulty level changes at each stage, the student is challenged and nudged to think differently and apply his/her learning. Most of the students start the activities by guessing what the solutions could be, but they soon get into the mode of thinking 'mathematically' as the guesses do not work for the questions in the next few screens.

In this article, I am sharing my experience with two of the Desmos Classroom activities: Central Park and Match My Line.

Central Park

The Central Park Desmos Activity is most suitable for Grade 6 students. This activity helps the student to make the transition from arithmetic to algebra.

Central Park puts the power of algebra in the hands of students by asking them to design parking lots. At first, students place the parking lot dividers by estimating and guessing.

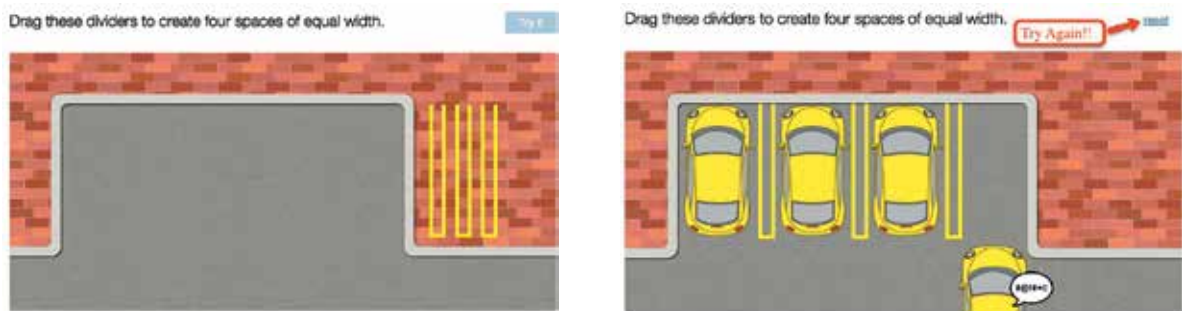


Figure 3

Then they compute the proper placement.

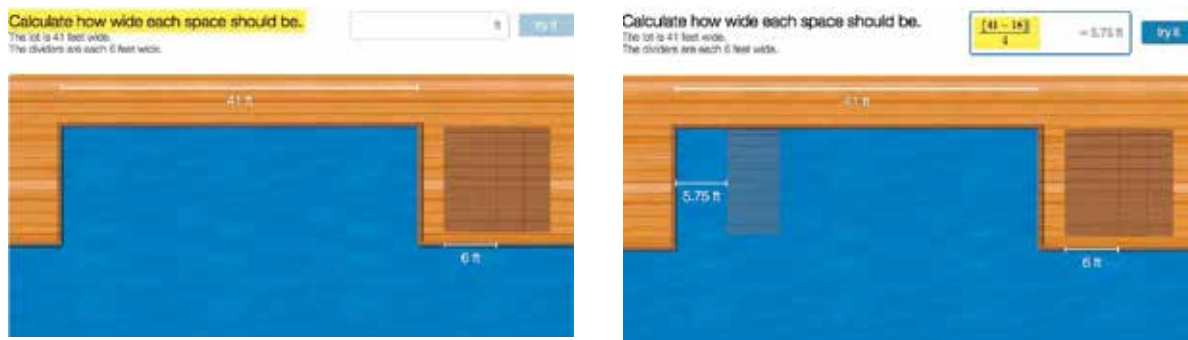


Figure 4

Finally, they write an algebraic expression that places the dividers for many different lots.

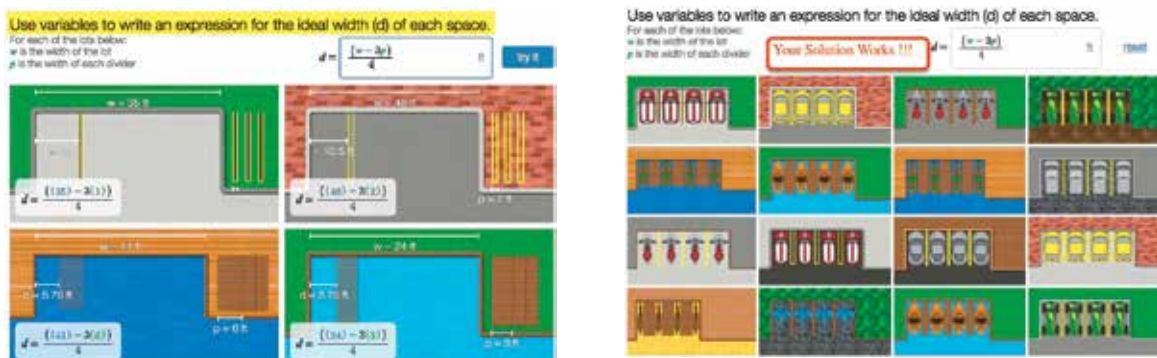


Figure 5

The transition from Estimate to Calculate and then to Algebraic Expression is so smooth that very few students need assistance from the teacher to get the correct expression at the end. The change-over from numbers to variables is also helped by the Question Screen, which asks students to verbalize their thought processes: *Write instructions explaining how to calculate the right width of the parking space for any situation.*

GURPREET

Width of parking space= {total length of wall-n(width of plank)}/n+1

RUCHIKA

(total width-(width of each divider*no of dividers))/no of partitions

SWETA JAIN

subtract the width of the three dividers from the total width and divide the remaining part by 4

ANJALI

From the total length of the space, subtract the total width of the dividers and divide the result by 4.

VIKRAM SINGH

$\frac{1}{4}(\text{total distance}-3*\text{width of bars})$

SNEHA BAJAJ

Subtract the total width of the planks from the width of the space and divide it by 4.

RITU

total width - sum of widths of dividers .then divide the difference by number of parking vehicles

KHUSHI

(total space-number of barriers*width of barrier)/ total parts in which the space has been divided

DEEPTI GROVER

add the width of the dividers, subtract it from the total length to be divided. Divide the result by the no. of spaces to be created.

Also at each stage, the student gets instant feedback and is encouraged to Reset and attempt the task again in case the solution does not meet the expectation.

Students spend 30 to 45 minutes in 'playing' the game, and unknowingly they get introduced to the 'algebra'! Most of my students who attempted this activity found it to be 'great fun' while a few termed it as 'challenging', and all wanted some more of such activities!

Match My Line

Match My Line can be used as an introductory activity to begin the topic on Straight Lines in Grade XI. It is a series of graphing challenges designed to build student understanding of linear functions in various forms.

The tasks are designed to prompt and provoke the student to think about the relationship between the given ordered pairs, and to work out the functional relationship which connects them. The ease of plotting and re-plotting graphs to come up with the required expression makes the activities so much more appealing and meaningful.

It is interesting to note that students who were already aware of the various forms of the equations of straight line opted to use the formulae to get the required equations, whereas students who had not learned these results prior to the activity used their observations and related the x - and y -coordinates of the points to come up with the appropriate expression to graph the lines. It was an ‘Aha!’ moment for the class to listen to the arguments of these students and appreciate the depth of their understanding.

Here are two different approaches in response to the Challenge #2: Plot six lines. Each of the lines should pass through the black point and one of the blue points (Fig. 6).

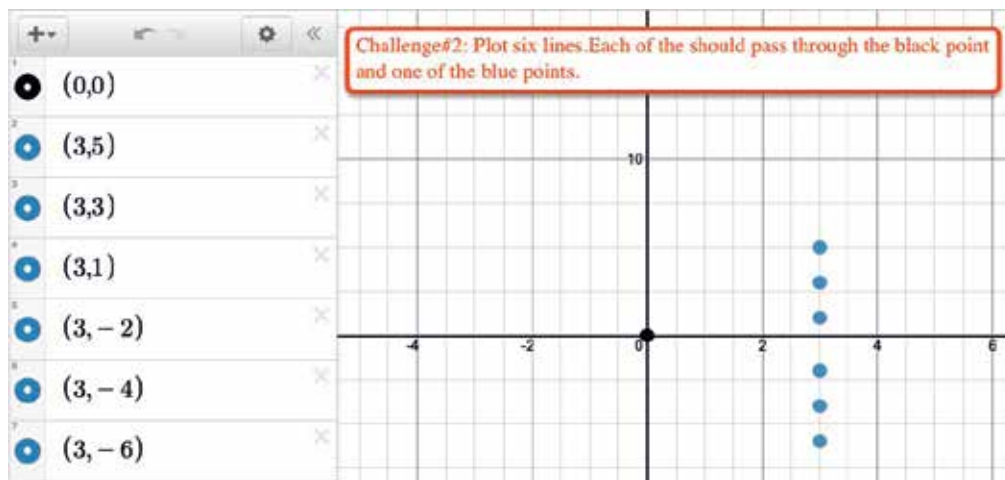


Figure 6

Desmos activities from the Teacher’s Perspective

One of the main concerns of the teachers using technology in classrooms is that it is difficult to monitor individual students’ work from the front of the class. Here, however, the setup is such that the teacher has a bird’s eye view of students’ screens. This feature allows the teacher to follow the progress of the class and identify individual students who need help or a word of caution. One can click on the name of the student to see his/her individual progress, or have an overview of the entire class on the screen.

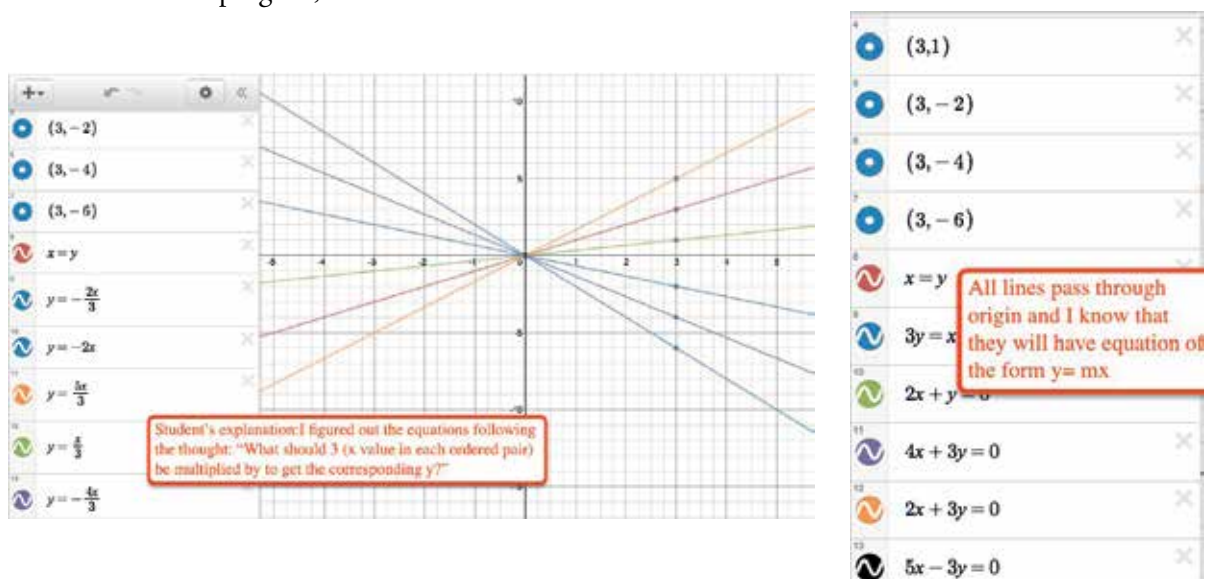


Figure 7

CLASS CODE: WP6M Match My Line 3 of 12

Challenge #2: Plot six lines. Each line should pass through the origin and one of the blue points.

Students shown: renu, Vikram Singh, gp, sudha, ritu, M P RITU, bhavana, sakshi, anjali, Deepali Grover, Khushi, rm, mv, Bindu Harish, Durpreet, shivani nasa, Sneha Bajaj, sas.

CLASS CODE: XSG4 Central Park

ESTIMATES: width of the divider, no. of dividers, width of parking space

NUMBERS: 8, 10.5, 3.75 (length of parking space) (no. of dividers * width of the divider) / (no of dividers + 1)

EQUATIONS: $\frac{(w-3p)}{4}$, there are three slots, $\frac{(w-p)}{n+1}$ designs, coz the width of the divider would also be subtracted

WRAP UP: space it using algebra

Keep an eye out for students who skip certain screens Students need to do all the activities!

Figure 8

In addition to these two activities, there are several well-designed activities suitable for our classrooms; one can check them out at teacher.desmos.com. I am waiting to try out the latest activity from the Desmos Team with my students; it is called Marble Slides. I found this activity to be both challenging and additive, with the potential to facilitate learning through hands-on exploration.



SANGEETA GULATI is Head of Mathematics at Sanskriti School, New Delhi. She has taught Mathematics for 25 years and has contributed to professional development programs aimed at exploring the use of technology in the teaching-learning of mathematics all over India. She conducts workshops on GeoGebra, Geometer's Sketchpad, Google Apps for Education and Online Resources. She has been a regular resource person with NCERT in developing ICT material, and has developed video lessons for classes 11 and 12 with Central Institute of Educational Technology, NCERT. Her wikispace (dynamath.wikispaces.com), which is a product of her action-based research project during Fulbright Distinguish Award in Teaching fellowship in 2011, is a great resource for mathematics teachers. Sangeeta is a Google Certified Innovator and a Certified Edmodo Trainer. She may be contacted at sangeetagulati92@gmail.com.