Conceptual Activities

Use these interactive open education and/or Desmos resources to build conceptual understanding of mathematical ideas. (*Note*: Activity links will be monitored and repaired or replaced as necessary.)

Unit 1

- Desmos. "Function Carnival."

  http://www.walch.com/ca/01006

  This activity focuses attention on graphs as expressing relationships between variables. It lays the informal groundwork for the more formal definitions and properties of functions.

- Desmos. "Marbleslides: Lines."

  http://www.walch.com/ca/01008

  Restrict, reposition, and rotate lines at will using slope-intercept form, and describe transformations using words and/or symbols.

- Desmos. "Put the Point on the Line."

  http://www.walch.com/ca/01009

  The focus of this activity is slope. Participants are asked to estimate, calculate, and notice proportionality as they place points on an imaginary line.

- Desmos, Inc. "Polygraph: Linear Inequalities."

  http://www.walch.com/ca/10000

  In this activity, students will engage in vocabulary-rich conversations about linear inequalities. Key vocabulary terms that may appear in student questions include *shading*, *above*, *below*, *boundary*, *solid*, *dotted*, *horizontal*, *vertical*, *slanted*, *axis*, and *quadrant*.

Unit 2

- Desmos. "Avi and Benita's Repair Shop."

  http://www.walch.com/ca/01014

  Compare linear and exponential growth in the context of daily payments. One plan increases by $100 each day, while another grows by doubling the previous day's payment. This activity is appropriate for students who have studied linear functions but may not have an experience with exponential growth.

- Desmos. "Card Sort: Functions."

  http://www.walch.com/ca/01005

  Sort graphs, equations, and contexts according to whether each one represents a function.

- Desmos. "Card Sort: Linear Functions."

  http://www.walch.com/ca/01010

  Notice and use properties of linear functions to make groups of three. Different properties will lead to different groupings by different participants.

- Desmos. "Function Carnival, Part 2."

  http://www.walch.com/ca/01007

  This activity follows up on "Function Carnival" by using the contexts in that activity to develop an understanding of function notation.

- Desmos. "Game, Set, Flat."

  http://www.walch.com/ca/01015

  Develop understanding of the exponential relationship that describes a bouncing tennis ball. Learn to examine successive terms in a sequence to determine if it represents an exponential relationship or not, and how to construct the exponential equation itself.

- Desmos. "Marbleslides: Exponentials."

  http://www.walch.com/ca/01016

  Restrict, reposition, and otherwise transform exponential curves at will by modifying the basic form $y = b^x$, and use precision in describing these transformations using words and/or symbols.

- Desmos. "Match My Line."

  http://www.walch.com/ca/01013

  Work through a series of scaffolded linear graphing challenges to develop proficiency with direct variation, slope-intercept, point-slope, and other linear function forms.

- Desmos. "Polygraph: Exponentials."

  http://www.walch.com/ca/01019

  This Custom Polygraph is designed to spark vocabulary-rich conversations about exponentials, including how they differ from linear functions. Key vocabulary terms that may appear in student questions include *increasing*, *decreasing*, *intercept*, *rate*, *asymptote*, and *curve*.

- Desmos. "What Comes Next?"

  http://www.walch.com/ca/01020

  Predict "what comes next" for linear and exponential functions based first on graphs and then on tables of values, then explore connections between graphs, tables, and equations of linear and exponential functions.

Unit 3

- Desmos. "Card Sort: Linear Systems."

  http://www.walch.com/ca/01000

  In this activity, students practice what they've learned about solving systems of linear equations. The activity begins with a review of the graphical meaning of a solution to a system. Later, students consider which algebraic method is most efficient for solving a given system. Finally, students practice solving equations using substitution and elimination. Prior to beginning this activity, students should have experience solving systems of linear equations graphically and algebraically.

- Desmos. "The Intersection."

  http://www.walch.com/ca/01011

  Predict the point of intersection for a system of two linear equations: first without a grid, then with one. With the grid in play, participants are able to use the slope of the lines (formally or informally) to improve the accuracy of their predictions.

- Desmos. "Solutions to Systems of Linear Equations."

  http://www.walch.com/ca/01001

  This activity will help students understand what it means for a point to be a solution to a system of equations—both graphically and algebraically.

- Desmos. "Systems of Two Linear Equations."

  http://www.walch.com/ca/01002

  This resource gives a progression of written explanations, equations, and graphs to explain what the algebraic or graphical solution to a system of equations represents.

Unit 4

- Desmos. "LEGO Prices."

  http://www.walch.com/ca/01012

  Use the concept of linear regression to predict the cost of a LEGO set with *x* pieces. (This activity does NOT use the calculator, just the concept. Participants draw the line on the graph, and Desmos calculates the equation.)

- Desmos. "Predicting Movie Ticket Prices."

  http://www.walch.com/ca/01018

  Build a model to describe the relationship between average movie ticket prices and time, then use that model to make predictions about past and future ticket prices. Participants also interpret the parameters of their equation in context.

- Desmos. "Polygraph: Histograms."

  http://www.walch.com/ca/01024

  This activity is designed to spark vocabulary-rich conversations about histograms. Key vocabulary terms that may appear in student questions include *shape*, *center*, *spread*, *roughly symmetric*, *skew right*, *skew left*, *mean*, *median*, *range*, *peak*, *unimodal*, and *bimodal*.

Unit 5

- Desmos. "Polygraph: Transformations."

  http://www.walch.com/ca/01025

  This activity is designed to spark vocabulary-rich conversations about transformations. Key vocabulary terms that may appear in student questions include *translation*, *rotation*, *reflection*, *dilation*, *scale factor*, *preimage*, and *image*.

- Desmos. "Symmetry."

  http://www.walch.com/ca/01026

  In this activity, students develop an informal understanding of symmetry of functions. By the end, students should be able to identify the symmetry of a function (reflectional vs. rotational) by considering its graph.

Unit 6

- Illustrative Mathematics. "A Midpoint Miracle."

  http://www.walch.com/ca/10003

  Students will prove a theorem about quadrilaterals that is somewhat difficult to prove with a straightedge and ruler but relatively easy to prove using coordinates. This task requires that students be comfortable using the formula for the midpoint of a line segment and the parallel line criterion.