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

- Illustrative Mathematics. "Computations with Complex Numbers."

  http://www.walch.com/ca/10004

  Students will practice operations on complex numbers using the fact that $i^2 = -1$. Encourage students to examine the structure of each expression and look for shortcuts (SMP 7), as this task allows for the shortening of some tedious calculations. This task is also an excellent candidate for comparison of different approaches to the same problem.

Unit 2

- Desmos. "Card Sort: Parabolas."

  http://www.walch.com/ca/01022

  Find the shape of a parabola by using its form to reveal its characteristics. The activity begins with a review of both the characteristics and forms of a parabola, then moves on to determine characteristics of the graph of a parabola given in standard form, vertex form, or intercept form.

- Desmos. "Domain and Range Introduction."

  http://www.walch.com/ca/01049

  In this activity, students practice finding the domain and range of piecewise functions. Students begin with an informal exploration of domain and range using a graph, and build up to representing the domain and range of piecewise functions using inequalities.

- Desmos. "Free-Range Functions."

  http://www.walch.com/ca/01028

  This activity challenges students to strengthen their ideas about the range of quadratic functions.

- Desmos. "Polygraph: Absolute Value."

  http://www.walch.com/ca/01050

  This activity is designed to spark vocabulary-rich conversations about transformations of the absolute value parent function. Key vocabulary terms that may appear in student questions include *translation*, *shift*, *slide*, *dilation*, *stretch*, *horizontal*, *vertical*, and *reflect*.

- Desmos. "Polygraph: Piecewise Functions."

  http://www.walch.com/ca/01052

  This activity is designed to spark vocabulary-rich conversations about piecewise functions. Key vocabulary terms that may appear in student questions include *piecewise*, *continuous*, and *interval*.

- Desmos. "Polygraph: Square Root Functions."

  http://www.walch.com/ca/01032

  This activity is designed to spark vocabulary-rich conversations about transforming square root functions. Key vocabulary terms that may appear in student questions include *translation*, *reflection*, *intercept*, and *quadrant*.

Unit 3

- Desmos. "Build a Bigger Field."

  http://www.walch.com/ca/01021

  Use quadratic models to optimize the area of a field for a given perimeter.

- Desmos. "Match My Parabola."

  http://www.walch.com/ca/01017

  A series of graphing challenges builds understanding of quadratic functions in various forms and graphing transformations of quadratic functions.

- Desmos. "Penny Circle."

  http://www.walch.com/ca/01023

  Gather data, build a model, and use that model to answer the question, "How many pennies fit in a large circle?"

Unit 4

- Illustrative Mathematics. "The Titanic 3."

  http://www.walch.com/ca/10005

  This task poses an open-ended question that forces students to think about how they can answer it. Students will analyze data given in the two-way table to find meaningful probabilities and increase their understanding of conditional probability and independence.

- Mathematics Assessment Resource Service, University of Nottingham. "Representing Conditional Probabilities 1."

  http://www.walch.com/ca/10007

  In this resource, students will use tables and tree diagrams to represent events as a subset of a sample space and answer questions involving conditional probabilities. This resource includes a diagnostic assessment, a learning task, and sample solutions that students will analyze and evaluate. Some extra materials are required.

Unit 5

- Desmos. "Lines, Transversals, and Angles."

  http://www.walch.com/ca/01033

  In this activity, students explore the relationship of angles formed by a transversal and a system of two lines. In particular, students consider what happens when the two lines are parallel versus when they are not.

- Desmos. "Polygraph: Angle Relationships."

  http://www.walch.com/ca/01034

  This activity is designed to spark vocabulary-rich conversations about angle relationships. Key vocabulary terms that may appear in student questions include *parallel*, *transversal*, *adjacent*, *opposite*, *alternate interior*, *corresponding*, *alternate exterior*, *vertical*, and *right*.

- Desmos. "Polygraph: Figure It Out."

  http://www.walch.com/ca/01035

  This activity is intended as an introduction to geometric notation and vocabulary. Depending on prior knowledge, students could use the following to distinguish figures: points, lines, rays, segments, parallel, perpendicular, angles, congruence, midpoints, bisectors, betweenness, collinearity, and more.

Unit 6

- Desmos. "Card Sort: Parabolas."

  http://www.walch.com/ca/01022

  Find the shape of a parabola by using its form to reveal its characteristics. The activity begins with a review of both the characteristics and forms of a parabola, then moves on to determine characteristics of the graph of a parabola given in standard form, vertex form, or intercept form.

- Desmos. "Equations of Circles."

  http://www.walch.com/ca/01040

  In this activity, students write equations of circles with different given information. The activity involves writing equations in both standard and general form.

- Desmos. "Marbleslides: Parabolas."

  http://www.walch.com/ca/01029

  In this activity, students will rapidly become fluent in transforming, translating, and restricting the domains of parabolas by manipulating their symbolic form to cause marbles to slide down the parabola through stars.

- Desmos. "Polygraph: Parabolas."

  http://www.walch.com/ca/01030

  In this paired game, one student picks a single parabola from a collection and the other student asks yes/no questions in an attempt to guess which parabola was chosen. The game provides students with a reason for noticing important features of parabolas, which in turn provides a need for words to name the features. "Does your graph cross the x-axis twice?" is a common question during play that leads to the naming roots, for example.

- Desmos. "Sector Area."

  http://www.walch.com/ca/01041

  In this proportional reasoning activity, students explore the relationship between circle area, sector area, and sector angle.

- Desmos. "Will It Hit the Hoop?"

  http://www.walch.com/ca/01031

  In this activity, students predict whether various basketball shots will go through the hoop, and then model these shots with parabolas to check their predictions.