The Area Between

ID: 9984

Time required
30 minutes

Activity Overview

Students will use TI-Nspire technology to find the area between two curves while determining the required amount of concrete needed for a winding pathway and stepping stones.

Topic: Applications of Integration

- *Calculate the area enclosed by two intersecting curves defined in Cartesian coordinates.*
- *Use the Solve and Integral commands to verify the computation of areas bounded by curves.*

Teacher Preparation and Notes

- *This activity is intended to be student-centered. This activity is not meant to teach the topics covered, but as additional practice on the topics. You may use the following pages to present the material to the class and encourage discussion.*
- *The students should already be familiar with the concept of the integral as well as using an integral to find the area below a curve.*
- *For this activity, both CAS and numeric TI-Nspire handhelds can be used.*
- *Notes for using the TI-Nspire™ Navigator™ System are included throughout the activity. The use of the Navigator System is not necessary for completion of this activity.*
- ***To download the student and solution TI-Nspire documents (.tns files) and student worksheet, go to education.ti.com/exchange and enter "9984" in the keyword search box.***

Associated Materials

- *AreaBetween_Student.doc*
- *AreaBetween.tns*
- *AreaBetween_Soln.tns*

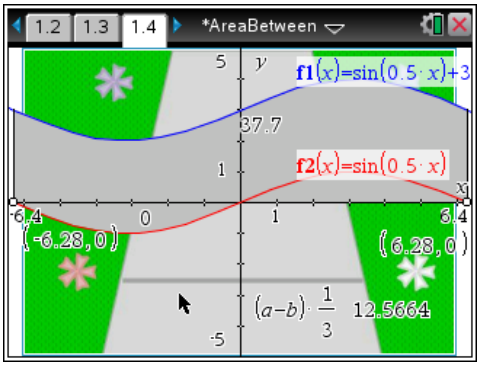
Suggested Related Activities

To download any activity listed, go to education.ti.com/exchange and enter the number in the keyword search box.

- *Solids of Revolution Between Two Curves (TI-Nspire technology) — 17574*
- *Applications of Integrals (TI-89 Titanium) — 4253*

Problem 1 – Making Pathways

The first problem involves a pathway with sine functions as the borders. On page 1.4, students are to graph the functions and then use the **Integral**, **Text**, and **Calculate** tools to find the volume of the pathway. The lower and upper bound points have already been placed on the graph.



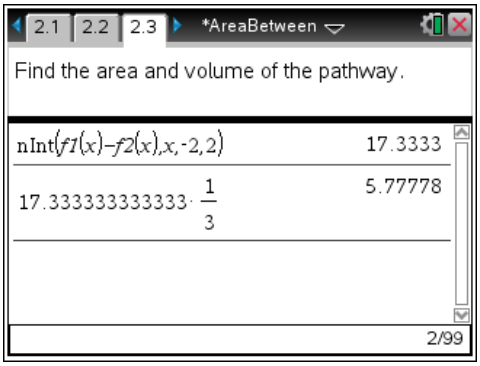
On page 1.6, students are to confirm their result using the **nInt** command (**Calculus > Numerical Calculations > Numerical Integral**). It can also be found in the catalog.

TI-Nspire Navigator Opportunity: *Quick Poll*

See Note 1 at the end of this lesson.

Problem 2 – Finding New Pathways

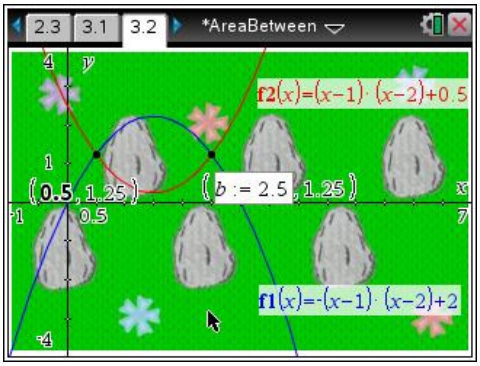
Students are to find the volume of a new pathway using the graph on page 2.2 and then again on the calculator on page 2.3. They should use the same method as in the previous problem.



Remind students that when finding the area of the region, they must always take the integral of the top function minus the bottom function (this is where many mistakes occur).

Problem 3 – Stepping Stones

In this problem, students will find the volume of one stepping stone. On page 3.2, students are to graph the functions and then find the intersection points using the **Intersection Point(s)** tool.

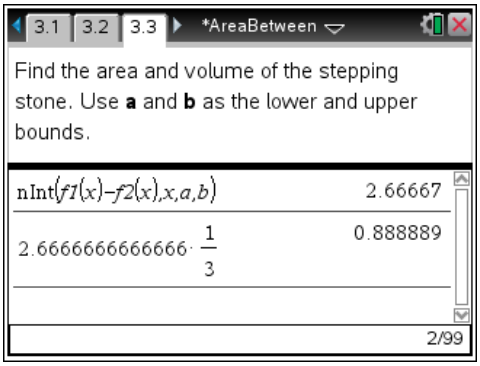


They then need to store the *x*-values of the intersections points as **a** and **b**. To do this, students are to click on the *x*-value, press ctrl + var, type the letter, and then press enter.

Then, students can find the volume of the stepping stone. They may think that **f2** is the top function, but **f1** is the top function in the interval.

On page 3.3, students will confirm their results. They will need to use **a** as the lower bound and **b** as the upper bound.

To avoid rounding the value of the area, students can type **ans** to use the previous result.



TI-Nspire™ Navigator™ Opportunities

Note 1
Problems 1–3: *Quick Poll*
Use Quick Poll to verify students understanding of integral and to make sure that students are inputting the functions in the correct order when using the **nInt** function. The questions provided on the student worksheet may be used for additional Quick Polls.