It's A Parallelogram, You Say?

ID: 11646

Time Required
20 minutes

Activity Overview

In this interactive activity, students represent complex numbers in the complex plane as points or vectors and display the sum and difference of two complex numbers as diagonals of the parallelograms they define using the Cabri Jr. Application.

Topic: Complex Numbers

- *Addition/Subtraction of Complex Numbers*
- *Vector Addition/Subtraction*
- *Parallelogram Method*
- *Resultant*

Teacher Preparation and Notes

- *This activity is designed to be used with the Cabri Jr. app on the TI-84 Plus family of graphing calculators.*
- ***To download the student worksheet and Cabri Jr. file, go to education.ti.com/exchange and enter "11646" in the keyword search box.***

Associated Materials

- *ItsAParallelogramYouSay_Student.doc*
- *COMPLEX (Cabri Jr. file)*

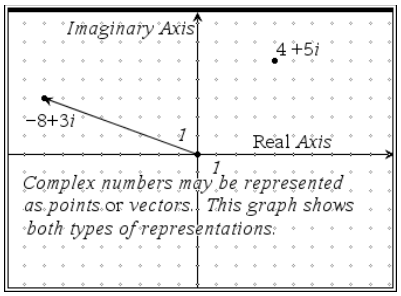
Suggested Related Activity

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

- *Complex Numbers (TI-84 Plus family) — 10887*

Adding and Subtracting Complex Numbers

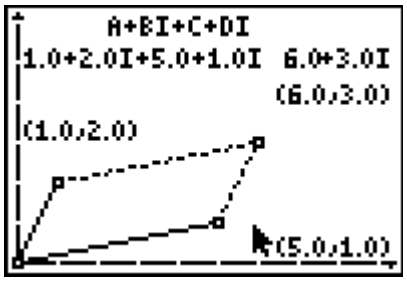
In this activity, students are introduced to representing complex numbers in the complex coordinate plane both as points and as vectors.



Explain to students that the coordinate for both the end of the vector and the point is (real, imaginary). So the coordinate for –8 + 3*i* is (–8, 3) and for 4 + 5*i* is (4, 5).

Students are to move the points **(A, B)** and **(C, D)** to explore the addition of two complex numbers. They should discover that the addition of **(*a* + *bi*)** and **(*c* + *di*)** results in a resultant that is the diagonal of a parallelogram.

The diagonal is not shown on the screen. If students want to see the diagonal, they can use the **Segment** tool to connect the point at the origin and the top right point. They will focus on the 1st quadrant.

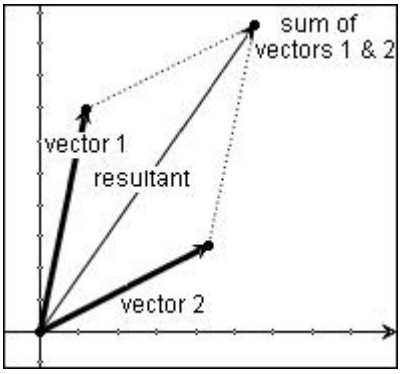


If students want to verify the addition of the numbers, they can change the MODE from REAL to *a*+*bi*. Then perform the calculation on the Home screen.

The worksheet explains how change the subtraction of two complex numbers to addition by changing the signs of the second number.

(*a* + *bi*) – (*c* + *di*) = (*a* + *bi*) + (*–c* – *di*)

Students are to use the graph to sketch the subtraction problem as vectors.



Homework

There are 7 addition and subtraction problems that may be done in class or assigned as homework. Questions may be answered on the associated worksheet.

When students complete the last problem, they should see that when the sum of two complex numbers is zero, there is no resultant vector.

1. –3 + 5*i*
2. 7 + *i*
3. –7 + 3*i*
4. –5 – *i*
5. –4 – 4.3*i*
6. 1.6 – 0.9*i*
7. 0

If using Mathprint OS:

Students can check their answers by pressing 2nd [i]. They can press the up arrow key ▲ to view any previous entries and also press enter when an entry is highlighted to copy and place it on the calculation line.