Lesson 15: Working Backwards

Let's use what we've learned about multiplying complex numbers.

15.1: What's Missing?

Here are some complex numbers with an unknown difference: $(10 + 4i) - (\_\_ + \_\_i) = ?$

1. If the result of this subtraction is a real number, what could the second complex number be?
2. If the result of this subtraction is an imaginary number, what could the second complex number be?

15.2: Info Gap: What Was Multiplied?

Your teacher will give you either a problem card or a data card. Do not show or read your card to your partner.

If your teacher gives you the data card:

1. Silently read the information on your card.
2. Ask your partner "What specific information do you need?" and wait for your partner to ask for information. Only give information that is on your card. (Do not figure out anything for your partner!)
3. Before telling your partner the information, ask "Why do you need to know (that piece of information)?"
4. Read the problem card, and solve the problem independently.
5. Share the data card, and discuss your reasoning.

If your teacher gives you the problem card:

1. Silently read your card and think about what information you need to answer the question.
2. Ask your partner for the specific information that you need.
3. Explain to your partner how you are using the information to solve the problem.
4. When you have enough information, share the problem card with your partner, and solve the problem independently.
5. Read the data card, and discuss your reasoning.

Pause here so your teacher can review your work. Ask your teacher for a new set of cards and repeat the activity, trading roles with your partner.

Lesson 15 Summary

When complex numbers are multiplied, each part of one of the numbers gets distributed to the other one. This means that we'll always see the same pattern:

$$(a + bi)(c + di) = ac + adi + bci + bdi^2$$

We can use the fact that $i^2 = -1$ to rearrange this and make it easier to see the real part and the imaginary part of the result.

$$(a + bi)(c + di) = (ac - bd) + (ad + bc)i$$

Every time we multiply complex numbers, the result is not only a complex number, but it's a specific complex number that comes from combining the parts of the numbers we started with in a specific way. If a and c are the real parts of the numbers we start with and bi and di are the imaginary parts, then the result will always have $ac - bd$ as a real part and $(ad + bc)i$ as an imaginary part.