Unit 4, Lesson 15

Working Backward

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:

$(10 + 4i) - (_____ + ____ i) = C$?

1. If C is a real number, what real numbers could go in the blanks?

2. If C is an imaginary number, what real numbers could go in the blanks?

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 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. "Can you tell me _____?"
3. Explain to your partner how you are using the information to solve the problem. "I need to know _____ because _____."

   Continue to ask questions until you have enough information to solve the problem.
4. Once 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.

If your teacher gives you the data card:

1. Silently read your card. Wait for your partner to ask for information.
2. Before telling your partner any information, ask, "Why do you need to know _____?"
3. Listen to your partner's reasoning and ask clarifying questions. Only give information that is on your card. Do not figure out anything for your partner!

   These steps may be repeated.
4. Once your partner says they have enough information to solve the problem, read the problem card, and solve the problem independently.
5. Share the data card, and discuss your reasoning.

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 b and d are the imaginary parts, then the result will always have $ac - bd$ as a real part and $ad + bc$ as an imaginary part.