

# A Model for Setting Up Group Work in High School Math

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## Collaborative Learning

Collaboration is beneficial for student learning, and a strategy designed for distance learning makes it manageable and engaging.

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As math teachers, we find that our students learn best when they can collaborate. In our book, *The Math Teacher's Toolbox*, we note that cooperative learning—in which students learn by working together in small groups to complete a task—has several benefits:

Students can construct a deeper understanding of the material, improve their self-confidence, reduce their math anxiety, and practice social and emotional learning skills. In addition, successful cooperative learning holds students individually accountable while making their success also dependent on others.



The pandemic initially restricted our ability to implement traditional group work. Remote learning has burdened both students and teachers with overwhelming workloads, and in addition, our students spend most of the school day alone, passively watching lessons or silently working on assignments by themselves.

Over the last few months, we've developed a simple cooperative learning strategy for our online teaching. This strategy not only makes our workload more manageable—since we're checking work for each group instead of for each individual—but also encourages students to interact with others and take a more active role in their learning.

## **Group Work Checklist**

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We divide students into groups of three or four to work on a task in our online meetings, and we use breakout rooms so each group has its own space to talk. Using a blank copy of the classwork sheet as a template, each group then creates a shared document so that group members can write their responses and edit each other's work.

To help groups manage their work, we've developed a simple checklist that describes each student's responsibilities.

Each student has a clearly defined role. Student A manages the group's discussion and ensures that the work is fairly divided. Student B shares the screen while the group is in the breakout room so that we can observe their work, and students B and C help A and D as needed. Student D is responsible for submitting the assignment.

Each student is responsible for treating each other respectfully, doing a fair share of the work, and seeking or providing help as necessary—and the checklist contains all those points, to help make sure students keep those goals in mind.

## **Different Types of Group Work**

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We often use online group work to help students discover mathematical ideas. For example, in a lesson on transformations, each group member watches a video explaining a different transformation and teaches it to the rest of the group. To summarize their learning, the group then matches transformations to pictures. (This is similar to a jigsaw, a cooperative learning technique in which individual students complete part of a larger task, which is then reassembled with the rest of the group.)

Another way we commonly use group work is to facilitate practice. Our practice assignments typically have between four and 16 problems, depending on the lesson's complexity—we might give four word problems or 12 equations. We put enough problems on an assignment so that each student can do the same amount of work. Each student is responsible for answering some of the questions, reviewing the work of other group members, and explaining solutions as necessary.

To enable groups to check their work, we create a blank copy of the assignment that all students can edit—for extra credit, students can type in their response or comment on existing responses, so that we have a student-created answer key. We then facilitate a whole-class discussion based on the work contributed by students. We find that using a student-generated answer key instead of a teacher-generated one encourages more students to explain their work, since they wrote it themselves, and to pay attention, since their peers are speaking.

All of our group work has the same structure, with students working together in clearly defined individual roles to answer questions as a group.

### **Advantages of This Strategy**

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Our online group work strategy has several advantages. Our students are generally more likely to complete group work than individual work because they're accountable to their peers. Our method encourages students to communicate mathematically with each other by writing and speaking, which improves their understanding. Most of our students enjoy being able to choose their roles because doing so gives them more autonomy in their work. (If necessary, we step in to help students select tasks.) They also appreciate the opportunity to talk to others, breaking the lonely monotony of solitary independent work.

However, online group work has some limitations. As with any strategy, it doesn't work with every lesson. Online group work also requires more class time than independent work since students need time to create shared documents and divide the work fairly—we find that these discussions are best done in class. We also have to take time in class to train students on interpersonal skills, such as trust, decision making, and conflict resolution. Sometimes we have to mediate disputes between group members who don't communicate clearly with each other. Since determining which students function well together can be tricky, we periodically change the groups.

Despite these limitations, we find that online group work has made our mathematical instruction more engaging and manageable. In our experience, our strategy enables us to achieve the same goals online that we would in person—holding students individually responsible while allowing them to collaborate with others to achieve a common goal.