

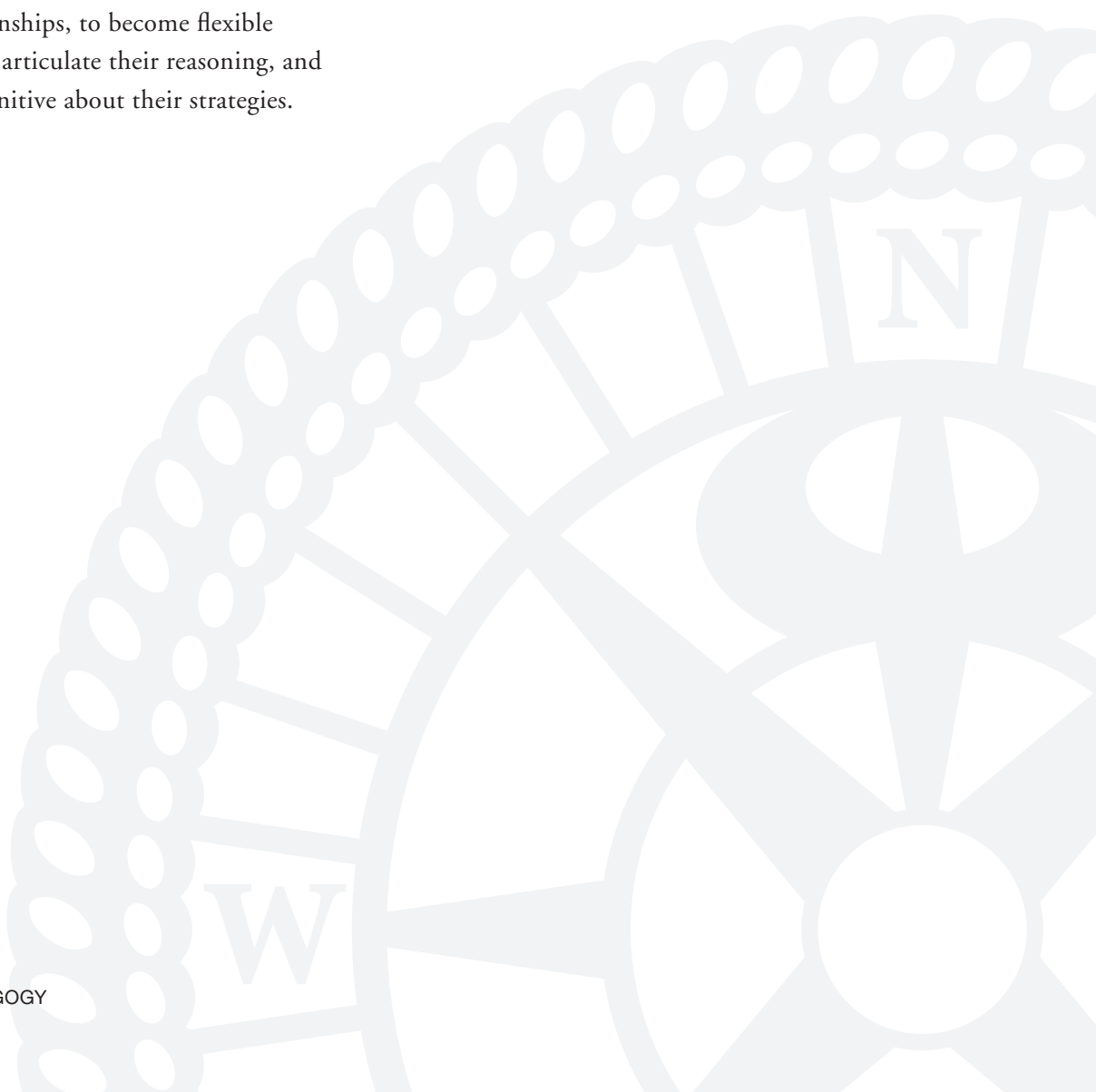
## Active Pedagogy: Teaching Inquiry-Based Math

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### Overview

Learning math involves understanding concepts, grasping procedures, and applying them to real-life contexts. In Expeditionary Learning schools mathematics is taught in an inquiry-based manner as emphasized by the National Council of Teachers of Mathematics standards. The Expeditionary Learning approach focuses on big mathematical ideas, high quality student work, and structures for teaching math within and outside of learning expeditions. Expeditionary Learning math teachers invite students to find patterns and relationships, to become flexible problem-solvers, to articulate their reasoning, and to become metacognitive about their strategies.

Teachers cultivate mathematical habits of mind: curiosity, risk-taking, perseverance, craftsmanship, and tolerance for ambiguity. No matter what math curriculum is used, math class is often conducted as a workshop. It begins with a complex problem, and continues with independent or group work, a mini-lesson based on what students are struggling with or have discovered, sharing/comparing problem-solving strategies, and a synthesis of the day's learning. This sequence ensures that students are doing the thinking.



## BENCHMARK 4:

### TEACHING INQUIRY-BASED MATH

#### A. Structures for Teaching Math

1. Inquiry-based investigations, occurring over one or more class sessions, are a primary way for students to build understanding of mathematical concepts and skills.
2. Sometimes math is the core of the learning expedition.
3. Sometimes math is taught through integrated math projects connected to interdisciplinary learning expeditions.
4. Students apply math concepts and problem solving strategies through independent math projects that incorporate some elements of a learning expedition.

#### B. Math Curriculum

1. Teachers emphasize big mathematical ideas and encourage the generalization and abstraction of big ideas from experience and application.
2. Students study the history of mathematics and the contributions of diverse cultures to that history.
3. Student work focuses on authentic application as much as possible.
4. Students work on open-ended problems, investigations, and projects.
5. Teachers model comprehension strategies to improve understanding and to build a common language for talking about math.
6. Teachers foster mathematical discourse by asking open-ended questions, teaching the vocabulary of the discipline, and using effective instructional practices.
7. Classrooms provide evidence of students' mathematical thinking and learning through anchor charts and displays of student work.

#### C. Teaching Students to Think and Act Like Mathematicians

1. Teachers make sure that students become fluent with number facts and computation: they allot plenty of time for practice and help students see patterns, relationships, and shortcuts.
2. Teachers promote flexibility in mathematical thinking by encouraging different ways to solve problems.
3. Teachers help students develop efficient problem-solving techniques.
4. Teachers stress craftsmanship in mathematics through elegant solutions, accuracy, and neat work.
5. Teachers ask students to analyze and make sense of errors.
6. Students show the thinking behind their answers through numbers, words, graphs, and diagrams.
7. Teachers ask that students pose as well as solve mathematical problems.
8. Students use manipulatives as tools for thinking and representing.
9. Teachers promote critical thinking through rich mathematical discourse.