

What will parents see in an Investigations classroom?

In an Investigations classroom parents will see students working in a variety of groupings whether it be whole group, pairs, small groups or individually. Students will be communicating about the mathematics in a variety of ways. Sometimes the communication will be written, other times it will be oral, it may come in the form of building a model, or drawing a diagram or picture. Parents will see students investigating and exploring problems, comparing their results with others, discussing their strategies for solving the problems, explaining their answers, and considering their reasoning as well as the reasoning of their classmates. Parents will also see students using technology such as the calculator and computer and a variety of other tools to help deepen their understanding of mathematics.

What does an Investigations lesson look like?

Investigations lessons normally last about one hour. During the first part of the lesson called the introduction which lasts between 5-15 minutes, the teacher may pose a problem, explain the rules of a game, or read a story. The teacher is careful during the introduction not to "give away" the mathematics, so that students are given time to discover during the exploration part of the lesson

The second part of the lesson called exploration is where the majority of the lesson is spent. During this time students will be actively engaged in solving problems, discussing strategies with their classmates, and recording their solutions in words, pictures, or numbers. In other sessions students may be playing mathematical games to practice skills or develop mathematical strategies. They may also be building geometric models or collecting data to organize and analyze. The teacher during this part of the lesson will be moving around the room among groups of students recording observations, interacting with students, asking probing questions to help him or her gain insight into how the student is processing mathematics. Questions such as "How did you get your answer?", "Can you describe your method and explain how it works?" "Can you find a second way to prove that?" are all questions that a teacher might use to require critical thinking of the student.

In the final part of the lesson called the summary the teacher will pull the group back together as a whole class. This is the time students have the opportunity to reflect on the mathematics that they learned during the exploration part of the lesson. They may share approaches that they used to solve a problem. They may discuss the strategies they used when playing a game. They may relate the lesson of that day with the mathematics previously taught. Questions such as "Does your answer seem reasonable?" "What have you learned?" "What if you could only use...?" are all questions that a student could hear during the summary of the lesson.

What will homework look like?

Homework is an important means of communicating with parents. It can be a way to share math ideas that were presented that day, give a parent an opportunity to see how his or her child is working mathematically, and give the parent insight into how his or her child is learning and doing mathematics. In Investigations students may bring home only one or two problems and be asked to show how they solved the problem. They may be asked to show how they would solve it in a different way. Homework may also consist of game directions and a score sheet that the student will play with you or might be the collecting and recording of data in a way that makes sense to the student. It may also involve your student in a larger math project, one that overlaps with another subject area.

How can I help my child with his or her homework?

When your child asks you for help try not to jump in with the answer to the problem. Rather ask questions to get your child started toward solving the problem. For example: "How would you describe the problem in your own words?" "What have you come up with so far?" "Does this remind you of other problems that you have done?" "Where might you start this problem?" "Would drawing a picture or diagram help?" "What is the problem asking you to do?" Encourage your child to wrap his or her brain around the problem. Some of our best learning comes in the struggle. If your child becomes frustrated after having worked on a problem for a long time send a note to your child's teacher and communicate with them the difficulty your child had and ask the teacher to help your child or give you further suggestions on what you can do to help him or her.

If your child is working on a game play the game with him or her. Have your child explain the rules to you and have him or her talk about the strategies that he or she chose to complete the game as well as the math. Games are an effective way to practice skills and develop efficient strategies.

Listen carefully to your child whether he or she is solving a problem, playing a game or collecting data. Through your observation you can gain great insight into the sense your child has about mathematics.

Display a positive attitude toward mathematics and the importance that it has in your child's daily life and future. Let him or her know that he or she can succeed.

What about the lack of a student textbook?

Rather than working through a textbook, students are actively engaged in working with materials and their classmates to solve mathematical problems. Students may place their work in a student activity booklet or teachers may choose to have students place their work in 3 ring binders or spirals. The 3 ring binder or spiral may then be tabbed with the title of each unit for that year. Students may then keep their explanations, data, solutions,

and strategies in one place. This can then become material that could be used for a portfolio if the teacher chooses.

What about computation and basic facts?

We want students to know their basic facts and how to compute, but we also want our students to be able to reason, problem solve, and communicate mathematics. American students often rank near the bottom in international testing in the areas of higher order thinking skills such as reasoning, conceptualization, and problem solving. Employers today are looking for employees that can look at a problem think of possible ways to solve it. They are looking for employees that have good number sense, skills in spatial visualization, competence in using and interpreting data, and familiarity with technology.

In Investigations a central objective is for students to learn about numbers, their relationships and operations. A great deal of time is spent on number and number sense with the focus being the development of students' own strategies for solving problems.

How does Investigations meet the needs of all students?

Students in an Investigations classroom have an opportunity to work in heterogeneous groups. Students learn from one another not only through conversation, but through investigations that they complete collaboratively. By sharing their understandings with their classmates they have an opportunity to contribute to the learning of others. They also learn what it is like to work as a team to develop multiple solutions just as many people in the workforce do today.

Students who are learning English get the opportunity to connect the spoken and written language with numbers, symbols, drawings, pictures, demonstrations, and manipulatives. The manipulatives and models help the student make connections with what they are doing to solve a problem with what is being said about solving the problem.

The activities in Investigations are designed to bring out and build on mathematical thinking. Mathematics is communication. Some students when solving problems will come up with one solution. Others will come up with multiple solutions. It is important that all students explain their thinking, make sense of others thinking, and consider the efficiency of various strategies that students offer. By doing problems differently and being able to explain their thinking students have a deeper understanding of the mathematical concepts.

How will I know that my child has a deep understanding of the mathematics?

I will know if my child has a deep understanding of the mathematics if I can answer the following questions:

Can my child use mathematics effectively to help him solve a problem?

Does my child come up with his or her own strategies for solving problems or does he or she expect you to tell him or her exactly what to do?

Can my child choose a strategy that is appropriate and efficient for solving the problem and articulate why he chose that strategy?

Do his explanations, drawings, or representations of his solutions clearly communicate his mathematical thinking?

Does my child choose tools and materials that help him or her with work? Does he or she use them effectively?

Does my child understand that there are different strategies for solving problems not just one?

Is my child able to use "false starts" or mistakes in order to get on the right track?

Does my child understand that how he solves a problem is as important if not more important than the answer itself?

Is my child's work accurate?

Does my child link his knowledge of the real world to his knowledge of math?

Does my child love doing mathematics and see himself as a competent mathematician?