Course: Interactive Mathematics Program (IMP) Year 1

Teacher: Jim Powell
Room: 25, Hall D
Email: jim.powell@district6.org
Office Hours: 8:00 am – 8:30 am
Lunch – Must prearrange

Materials: Students should bring the following to class each day:
3-Ring Binder, college ruled notebook paper, pencils, ruler, and a protractor. Students must have a calculator (TI-30XA or TI-30XIIIS or Casio fx-300MS or some equivalent) A TI-84 plus Graphing Calculator is (optional)

Course Description:
The Interactive Mathematics Program Year 1 (IMP 1) class will be using a curriculum that meets college entrance requirements and prepares students to use problem-solving skills in further education and in the work place. The goal is to provide the mathematics needed to succeed in this changing world. IMP presents mathematics in a manner that reflects how mathematics is used and the different ways people work and learn together.

The IMP curriculum is:
• Problem centered
• Integrated
• More rigorous than the traditional scope of high school mathematics
• Focused on developing understanding
• Rooted in long-term open-ended investigations
• Accessible to students from various mathematical backgrounds in heterogeneous classrooms

The IMP 1 instructional goal is to lead students toward becoming more accomplished critical thinkers. Critical thinking can be defined as the well-reasoned problem-solving process where one examines evidence and decides what is fact or opinion, communicates well organized ideas supported by evidence and reason, and develops a clear process on what to do.

The following units will be covered during the IMP 1 Course.

Patterns
The primary purpose of this unit is to introduce students to ways of working on and thinking about mathematics that may be new to them. In a sense, the unit is an overall introduction to the Interactive Mathematics Program, which for many students involves changes in how they learn mathematics and what they think of as mathematics. In this unit, major emphasis is placed on developing the ability to think about and explore mathematical problems. Some important mathematical ideas and concepts are introduced and worked with in this unit, especially function tables, the use of variables, positive and negative numbers, and some basic geometrical concepts. Another major theme is the idea of proof. This is not developed as a formal process but rather as part of the larger theme of reasoning and explaining. Students’ ability to create and understand proofs will develop over the course of the four-year IMP curriculum, and their work in this unit is just a beginning.

The Overland Trail
This unit looks at the mid-nineteenth century western migration across the United States in terms of the many linear relationships involved. These relationships grow out of the study of planning what to take on the 2,400-mile trek, estimating the cost of the move, and studying rates of consumption and of travel. Students construct mathematical models and draw graphs by hand and with a computer. They interpret graphs in terms of the "stories" the graphs tell, and create graphs from "stories." They
write algebraic expressions that represent situations, use manipulatives to represent variables, and solve systems of equations using graphs. In the process of graphing equations, they see the need to solve equations for one variable in terms of another, and learn techniques for doing so.

**The Pit and the Pendulum**

This unit opens with an excerpt from *The Pit and the Pendulum*, by Edgar Allan Poe. In the story, a prisoner is tied down while a pendulum with a sharp blade slowly descends. If the prisoner does not act, he will be killed by the pendulum. When the pendulum has about 12 swings left, the prisoner creates a plan for escape and executes it. Students are presented with the problem of whether the prisoner would have enough time to escape. To resolve this question, students construct pendulums and conduct experiments to find out what variables determine the period of a pendulum and what the relationship is between the period and these variables. In the process, students are introduced to the normal distribution and the standard deviation as tools for determining whether a change in one variable really does affect another. They make and refine conjectures, analyze data collected from experiments, and learn about quadratic equations and explore curve fitting. Finally, after deriving a theoretical answer to the problem, students actually build a 30-foot pendulum to test their theory.

**Course Objectives:**

The following list gives a general idea of the topics that will be covered throughout the year. Mastery of these topics will prepare students to continue in additional mathematics courses at BIS. These topics will be covered through a variety of instructional methods and taught with the goal of engaging all students in high-level mathematical thinking. Because IMP 1 is an integrated curriculum, topics beyond just those in a traditional Algebra course will be covered. The topics and skills that will be addressed are described below.

**From Algebra**

- Analyzing and creating In-Out tables
- Using variables in a variety of ways, including to express generalizations
- Finding, analyzing, and generalizing geometric and numeric patterns
- Developing and using general principles for working with variables, including the distributive property
- Working with order-of-operations rules for arithmetic
- Using a concrete model to understand and do arithmetic with positive and negative integers
- Using tables of information and lines of best fit to make predictions and estimates
- Developing meaningful algebraic expressions
- Interpreting graphs intuitively and using graphs intuitively to represent situations
- Making graphs from tabular information
- Quantifying graphs with appropriate scales
- Using graphs to represent two-variable equations and data sets
- Using multiple representations – graphs, tables, and algebraic relationships – to describe situations
- Using rates and starting values, or other data points, to create equations for straight lines
- Laying the groundwork for the concept of slope
- Using the point of intersection of two graphs to find values that satisfy two conditions
- Solving linear equations for one variable in terms of another
- Solving problems involving two linear conditions
- Solving linear equations in one variable
- Using function notation
- Defining the operation for all real exponential values
- Developing exponential laws
- Describing the graphs of exponential
- Comparing the graphs of exponential
- Converting numbers from ordinary notation to scientific notation, and vice versa
- Developing principles for doing computations using scientific notation

**From Geometry**

- Applying algebraic ideas, including In-Out, tables in geometric settings
- Developing proofs concerning consecutive sums and other topics
From Statistics
- Working with mean and median
- Planning and performing controlled scientific experiments
- Recognizing and accommodating for the phenomenon of measurement variation
- Collecting and analyzing data
- Expressing experimental results and other data using frequency bar graphs
- Recognizing the normal distribution as a model for certain kinds of data
- Making area estimates to understand the normal distribution
- Developing concepts of data spread, especially standard deviation
- Working with symmetry and concavity in connection with the normal distribution and standard deviation
- Applying standard deviation and the normal distribution in problem contexts
- Distinguishing between population standard deviation and sample standard deviation
- Calculating the mean and standard deviation of data sets, both by hand and with calculators
- Using standard deviation to decide whether a variation in experimental results is significant

Course Expectations:
All expectations outlined in the Crater High School Student-Parent Handbook will be in place in our classroom to create a positive and respectful learning environment. In addition to these expectations, are a few policies for math class that students and parents should be aware of. Please read them below.

Homework:
Homework will be assigned and will be checked at the beginning of the next class unless otherwise noted. If a student cannot arrive at a solution to the homework problems, the student should provide a written explanation detailing their trials, thoughts, and areas of confusion in order to facilitate learning. If a student fails to complete assignments, they will be asked to meet with Mr. Powell before school or at lunch the next day. The purpose of this meeting is to support the student in a structured learning environment outside of the class period.

In-Class and Cooperative Performance:
Your involvement in class is essential to your success and the success of your peers. We all have strengths to share and it is important that everyone can work together in positive, cooperative groups. In-depth understanding of the problem occurs as students question each other and then work through an explanation. Please be open to sharing ideas, questioning yourself and others, and making mistakes. This is what real mathematicians do!

Problem of the Week (P.O.W):
There will be various problems of the week throughout the year where students present written work and have opportunity to present their work to the class. The purpose of the Problem of the Week is to encourage students to explain their mathematical thinking. This extends their education beyond the math classroom and into other subject areas. Communication of one’s thoughts is a vital tool in the real world.

Quizzes and End of Unit Assessments:
There will be tests and quizzes in IMP 1. Any missed tests and quizzes will be dealt with on a case-by-case basis. It is important that students speak with their teacher on the day that they return to school to set up a time to make up the test or quiz. Students can make up tests and quizzes before school, after school, or during a lunch period.

Portfolios:
Portfolios will be collected at the completion of designated units. Portfolios will include homework assignments that the students have received feedback on throughout the unit and additional challenging problems. Students will also complete a cover letter where they will reflect on what they learned in the unit. It is essential that you hold onto all assignments and notes in your math binder in order to complete your portfolios.
**Final Exams:**

The final exams will include all material covered during the respective Trimester (i.e. the trimester 2 exam will only contain Trimester 2 material.) They may contain a variety of question styles (short answer, multiple choice, free response, etc.).

**Corrections:**

Students who do not do well on a quiz or a Unit Assessments must set up a plan to improve this grade with Mr. Powell. Corrections on a Portfolio can be made to improve their grade.

**Grading information:**

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<tbody>
<tr>
<td>Assignments: IMP/IXL</td>
<td>20%</td>
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<tr>
<td>Quizzes</td>
<td>25%</td>
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<tr>
<td>End of Unit Assessments</td>
<td>25%</td>
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<tr>
<td>Projects</td>
<td>15%</td>
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<tr>
<td>Final Exam /Portfolios</td>
<td>15%</td>
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Grades will be recorded on the computer. Parents and students can access the grade book through the Parent and Student Portals for the most current information. The percentages above will be used to calculate a final course grade based on the following scale.

<table>
<thead>
<tr>
<th>Percentage Range</th>
<th>Grade</th>
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<tbody>
<tr>
<td>90% - 100%</td>
<td>A</td>
</tr>
<tr>
<td>80% - 89%</td>
<td>B</td>
</tr>
<tr>
<td>70% - 79%</td>
<td>C</td>
</tr>
<tr>
<td>60% - 69%</td>
<td>D</td>
</tr>
<tr>
<td>59% and below</td>
<td>F</td>
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**Additional Information**

**Class Expectations:**
1. Respect all individuals and property.
2. Be on time and prepared.
3. Follow the 15-15 rule: Students will not leave the class room 15 minutes after class begins or 15 minutes before class ends.
4. No nuisance items (i.e. cell phones, iPods, etc.)
5. Please. No food, drink, or gum in room #25.
6. Please. No hats, hoods or bandanas in class.
7. Do your best at all times!

**Make-up Work:**

Make-up class work, homework, quizzes and tests will be accepted from students. It is the student's responsibility to acquire all missed assignments and to make arrangements to make up missed work. Time allotted for the completion of make-up work will depend on individual circumstances.

**TIPS FOR SUCCESS:**

- Take notes every day, and keep them in a neat, orderly fashion.
- Do all assigned work.
- Come see me as soon as you begin having trouble. The material that we are covering will build upon itself as the year goes on, so if you are confused in the beginning and do not clear it up, your confusion will only grow.
- Make friends with other students in the class and form study groups.
Please sign and return this sheet.

I have read the Math 1 classroom procedures and expectations.

Student Name (please print) __________________________________________________________

Student Signature ______________________________________ Date ______________________

Parent/Guardian Name (please print) ________________________________________________

Parent/Guardian Signature ______________________________________ Date __________________

Preferred way to reach Parent/Guardian _____________________________________________