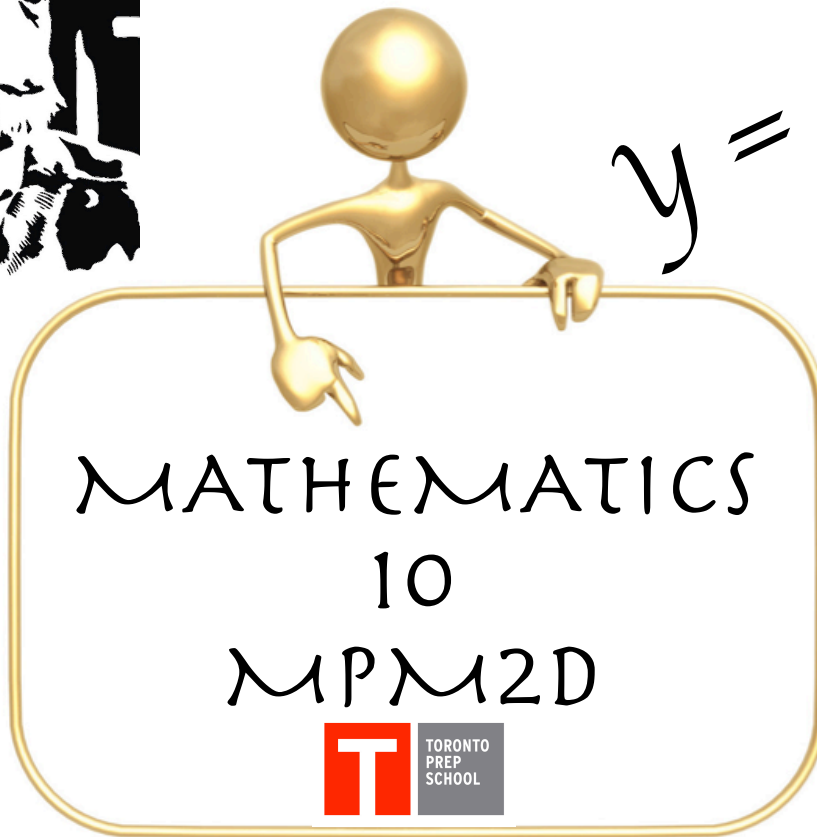
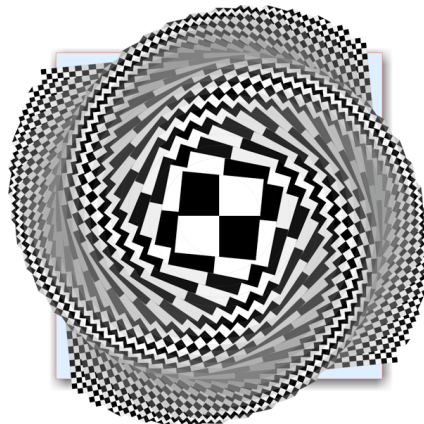


$$y = mx + b$$



π



$$\pm \geq$$
$$\sqrt{\quad} \approx$$

TORONTO PREP SCHOOL

COURSE: PRINCIPLES OF MATHEMATICS (MPM2D)
GRADE: 10
CREDIT VALUE: 1.0
PREREQUISITES: Principles of Mathematics 9 (MPM1D)
TEACHERS: Nathan Oldridge, Andrew Costley, and Steve Tsimikalis
TEXT: Principles of Mathematics 10,
McGraw-Hill Ryerson, 2007
Barbara Canton, et al.
EMAIL: noldridge@torontoprepschool.com, acostley@torontoprepschool.com , or
stsimikalis@torontoprepschool.com
WIKISITE: tpshome.wikispaces.com

ABSTRACT: This course enables students to broaden their understanding of relationships, extend their problem-solving and algebraic skills through investigation, the effective use of technology, and abstract reasoning. Students will explore quadratic relations and their applications; solve and apply linear systems; verify properties of geometric figures using analytic geometry, and investigate the trigonometry of right and acute triangles. Students will reason mathematically and communicate their thinking as they solve multi-step problems

COURSE EXPECTATIONS:

Quadratic Relations of the Form $y = ax^2 + bx + c$

Overall Expectations

By the end of this course, students will:

- determine the basic properties of quadratic relations;
- relate transformations of the graph of $y = x^2$ to the algebraic representation $y = a(x - h)^2 + k$;
- solve quadratic equations and interpret the solutions with respect to the corresponding relations;
- solve problems involving quadratic relations.

Analytic Geometry

Overall Expectations

By the end of this course, students will:

- model and solve problems involving the intersection of two straight lines;
- solve problems using analytic geometry involving properties of lines and line segments;
- verify geometric properties of triangles and quadrilaterals, using analytic geometry.

Trigonometry

Overall Expectations

By the end of this course, students will:

- use their knowledge of ratio and proportion to investigate similar triangles and solve problems related to similarity;
- solve problems involving right triangles, using the primary trigonometric ratios and the Pythagorean theorem;
- solve problems involving acute triangles, using the sine law and the cosine law.

Throughout this course, students will:

- develop, select, apply, and compare a variety of problem-solving strategies as they pose and solve problems and conduct investigations, to help deepen their mathematical understanding;
- develop and apply reasoning skills (e.g., recognition of relationships, generalization through inductive reasoning, use of counter-examples) to make mathematical conjectures, assess conjectures, and justify conclusions, and plan and construct organized mathematical arguments;
- demonstrate that they are reflecting on and monitoring their thinking to help clarify their understanding as they complete an investigation or solve a problem (e.g., by assessing the effectiveness of strategies and processes used, by proposing alternative approaches, by judging the reasonableness of results, by verifying solutions);
- select and use a variety of concrete, visual, and electronic learning tools and appropriate computational strategies to investigate mathematical ideas and to solve problems;
- make connections among mathematical concepts and procedures, and relate mathematical ideas to situations or phenomena drawn from other contexts (e.g., other curriculum areas, daily life, current events, art and culture, sports);
- create a variety of representations of mathematical ideas (e.g., numeric, geometric, algebraic, graphical, pictorial representations; onscreen dynamic representations), connect and compare them, and select and apply the appropriate representations to solve problems;
- communicate mathematical thinking orally, visually, and in writing, using mathematical vocabulary and a variety of appropriate representations, and observing mathematical conventions.

| UNIT | LENGTH |
|---------------------|--------|
| Linear Systems | 17 |
| Analytical Geometry | 17 |
| Quadratic Functions | 42 |
| Trigonometry | 34 |
| Total | 110 |

Unit 1 – Linear Systems

This unit will focus on the use of two linear equations to model a problem. In some cases, both lines are graphical models where the point of intersection of the lines has meaning in the context of the problem. Points of intersection will be found through numerical, graphical, and algebraic analysis. In other cases, only parts of two lines are needed to model a single situation. These result in consideration of a range of values for solution to an optimization problem through linear programming analysis. This unit also contains multi-step problems in analytic geometry which require solution of a linear system.

Unit 2 – Analytic Geometry

This unit provides contexts for developing formulas for midpoint, distance between points, and circles centred at the origin. The geometric relationships investigated in Grade 9 mathematics are confirmed through the use of the Cartesian system and formulas. Properties of triangles and quadrilaterals are investigated analytically.

Unit 3 – Quadratic Functions

This unit enables students to broaden their understanding of relations, extend their skills in multi-step problem solving, and continue to develop their abilities in abstract reasoning. Students will gather, organize, manipulate, and analyze data from primary and secondary sources to model and communicate results about quadratic situations. A variety of problems will be studied to ensure that students will gain depth of understanding of quadratics through meeting the same specific expectations in different contexts. Students will conduct investigations to verify or refute their own conjectures about relationships, using lines or curves of best fit, tables, and pattern descriptions. They will communicate their findings and describe trends. A rich foundation for quadratics, built on experiences from a variety of real world contexts, will be built before subsequent algebraic studies are undertaken.

Unit 4 – Trigonometry

Students are introduced to applications of similar triangles and trigonometry through a variety of activities that use concrete materials and allow students to move about inside and outside the classroom. Primary trigonometric ratios, Sine and Cosine Laws are used to solve problems that are modelled by right-angled or acute triangles. They will investigate how the tangent ratio for the angle of inclination is connected to slope of a line.

Course-Culminating Task

The course-culminating task is a final written examination worth 20% of each student's final grade and an in class assignment based on a take home task valued at 10% of the final grade. The examination and the assignment cover the overall expectations of the entire course.

Textbook:

| | |
|---------|----------------------|
| Unit 1: | Chapter 1 |
| Unit 2: | Chapters 2 and 3 |
| Unit 3: | Chapters 4, 5, and 6 |
| Unit 4: | Chapters 7 and 8 |

TOPICS OF STUDY:

- Chapter 1:
 - linear systems
 - solving linear systems graphically
 - solving linear systems algebraically - substitution, elimination
 - solving problems using linear systems
- Chapter 2:
 - analytical geometry
 - length and midpoint of a line
 - distance from a point to a line
 - equation of a circle
- Chapter 3:
 - properties of triangles
 - properties of quadrilaterals
 - properties of circles
 - verifying geometric shapes using slope and length of a line
- Chapter 4:
 - quadratic functions
 - graphing parabolas
 - transformations
 - negative and zero exponents
- Chapter 5:
 - polynomials
 - multiplying binomials
 - factoring polynomials and quadratics
- Chapter 6:
 - quadratic equations
 - solving quadratic equations
 - graphing quadratics using the x-intercepts
 - the quadratic formula
- Chapter 7:
 - trigonometry
 - similar triangles
 - tan, sine, cosine
 - solving right triangles
- Chapter 8:
 - Sine Law
 - Cosine Law
 - solving non-right angle triangles using trigonometry

REQUIRED
MATERIAL:

- Textbook
- Binder (preferably D-ring) with lined paper, graph paper and dividers
- Ruler, pencils, eraser
- you may purchase a TI-83 Plus calculator as it will help immensely with the graphing components of the course, although a Sharp EL-500 series would be recommended for most of your calculations

EXPECTATIONS AND RULES:

1. Mathematics will be done in a separate 3-ring binder.
2. The student will do his/her homework preferably in PENCIL.
3. The student will ALWAYS include the question on the paper; then work out the answer.
4. Each page will have the text book exercise # and page # in the upper right hand corner, plus the date.
5. Each question will be numbered (lettered) appropriately.
6. The student is responsible for taking lecture notes and all examples off the board.
7. Homework will be checked daily, at the beginning of each class, so have your books open. If homework is not completed, the student will be in after school with me, plus there will be a call home. Marks will be deducted for incomplete homework.
8. If a term test, quiz or assignment is missed, the student must bring a note from the parent stating the reason for the absence, otherwise the student will receive a zero.

If you do not understand a concept, get it straightened out immediately that day after school. We are here to help you.

EXTRA HELP:

Extra help will be available Monday to Friday 9:00 - 9:55 AM and after school by appointment.
Help will also be available at the After School Homework Club and on most Saturday Club dates.

YOU CANNOT FALL BEHIND IN THIS COURSE SO STAY ON TOP OF YOUR WORK!

COURSE EVALUATION:

Evaluation is based on the four Ministry of Education achievement categories consisting of Knowledge and Understanding, Application, Thinking/Inquiry, and Communication. A single evaluation may include one or more of the aforementioned categories. Evaluation in this course is continuous throughout the semester and will include a variety of assessment methods (e.g. assignments, quizzes, practical exercises, tests, and exam).

The distribution of marks into your final grade will reflect your most consistent level of achievement as well as your more recent level of achievement. Term work will be 70% of the overall grade for the course; the final summative evaluation will be 30% of the overall grade.

The 70% term work will reflect the achievement categories as follows:

| | |
|-----------------------------|-----|
| Knowledge and Understanding | 35% |
| Application | 40% |
| Thinking/Inquiry | 15% |
| Communication | 10% |

The 30% summative evaluation will be in the form of a final examination assessing all of the achievement categories and incorporating all overall expectations of the course.

TEST

| | |
|---|------------------------------|
| 1 | Monday, September 27, 2010 |
| 2 | Wednesday, October 13, 2010 |
| 3 | Monday, October 25, 2010 |
| 4 | Friday, November 5, 2010 |
| 5 | Tuesday, November 23, 2010 |
| 6 | Wednesday, December 15, 2010 |
| 7 | Tuesday, January 18, 2011 |

FINAL EXAM Chapters 1 - 8, Review package will be provided