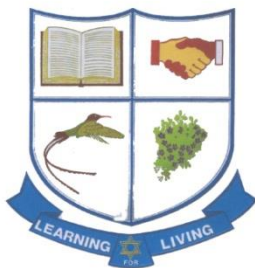


## Hillel Academy High School



**Grade 9**  
**Mathematics**  
**End of Year Study Guide**  
**September 2013- June 2014**

Examination	Duration	Date
The exam consists of <u>2 papers</u> :		
<u>Paper 1</u> : Short Response Calculator	1 ½ hours	June 2014
<u>Paper 2</u> : Structured Response  Calculator	2 hours	

Materials Needed: Pens, Pencils, Erasers, 30cm Ruler, Geometry Sets, and Scientific Calculator

HOW TO STUDY MATH

- ✓ WITH PAPER & PENCIL! Not your eyes and headphones!



- ✓ Use your own notebook(s) to help you revise. Make notes and try the examples to ensure you understand the concepts.

- ✓ Go over your old assignments- homework, classwork & test. Look at the mistakes you made. Do you know how to do all questions correctly now?



- ✓ Practice more questions in your weak areas. Additional questions can be found in your textbook or online. If you are not sure how to do a question, look at the solution. Copy it out carefully, trying to understand the processes involved then try to do it again independently, without the solution in front of you. If you are still having problems ask a friend, parent, tutor, or teacher for help.



- ✓ Plan your study time systematically. Set aside at least 45 minutes every day to revise and practice mathematics.

- ✓ Start now! Do not wait until the week of the exam!

**COURSE CONTENT***Algebra*

- Simplify indices using all laws
- Surds (radicals), simplification of square root expressions, rationalisation of the denominator
- Expansion – binomial, including surds
- Factorization
  - simple factorizing
  - factorizing by grouping
  - factoring difference of squares
- Simplifying Algebraic Fractions – with variables in numerator & denominator
- Solving Linear Equations – including rational, radical
- Simultaneous Equations – by substitution, elimination, graphical
- Solve Absolute value  $|x|$  Equations – one sided
- Solve Equations with Indices and Surds
- Transposition of Equation (changing the subject of an equation) – including powers, radicals, roots
- Variation – direct, indirect

*Number Theory*

- Identify the categories of numbers that exists within the Real Number System
- Give examples of specific numbers within each category within the Real Number System
- Round negative and positive numbers to specified number of decimal places or significant figures
- Round negative and positive numbers to the nearest whole number and other powers of tens up to the nearest million; to nearest multiples of 5 and other values such as nearest 2 , nearest 20, nearest, 50 etc
- Round off answers to reasonable accuracy in the context of a given problem.
- Use rounding to estimate answers to calculations.
- Obtain appropriate upper and lower bounds to solutions of simple calculations and problems given data to a specified accuracy.
- Identify numbers written in standard form.
- Write both large and small numbers in standard form.
- Add, subtract, multiply and divide numbers written in standard form.
- Perform simple, compound, reverse and repeat percentages
- Solve percentage application questions including profit and loss, tax and discount, compound and simple interest

*Trigonometry*

- Use Pythagoras' Theorem to calculate the length of unknown sides in right-angled triangles
- Use Pythagoras' Theorem to calculate the length of unknown sides in composite/compound/complex shapes
- Use Pythagoras' Theorem to prove whether or not a set of measurements are those of a right-angled triangle
- Use trigonometric ratios and their inverses to calculate the length of unknown sides and angles in right-

angled triangles

- Identify angles of elevation and of depression in real-life situations
- Identify the bearing of one object from another
- Solve word problems involving the concept of the angles of elevation and of depression and that of bearings using Pythagoras' Theorem and trigonometric ratios where appropriate

### Sets

- Define the terms/phrases *set*, *element*, *null or empty sets* and *Universal set*
- Describe sets in words, using set notation, u sign set builder notation
- Distinguish between finite and infinite sets
- Distinguish between equal and equivalent sets
- Determine the cardinal number of a set
- Determine the complement of a set
- Determine the number of subsets had by one set using the  $2^n$  formula
- Identify the elements in the intersection of two or more sets
- Identify the elements in the union of two or more sets
- Draw Venn diagrams to represent information given.
- Identify the parts of a Venn diagram which represent a description given
- Solve two and three set *word problems* using Venn diagrams when appropriate

### Coordinate Geometry

- Determine the equation of a straight line from the graph of the straight line
- Determine the equation of a straight line given the coordinates of two points on the line
- Solve equations graphically i.e. using the graph of a straight line
- Determine the gradient and y – intercept of a straight line given its equation
- Draw/sketch the graph of a straight line given its equation - table of values, x – and y – intercepts and y – intercept and gradient
- Determine the equation of a straight line *parallel* to another line given the equation of the original line and the coordinates of a point on the new line
- Determine the equation of a straight line *perpendicular* to another line given the equation of the original line and the coordinates of a point on the new line
- Calculate the length of a line segment given the coordinates of its endpoints
- Calculate the midpoint of a line segment given the coordinates of its endpoints

### Similar Shapes and Transformations

- Review Translation, Reflection
- Rotate points, figures and lines –  $90^\circ$  clockwise, counter clockwise, and  $180^\circ$  about the origin and other points.
- Find the centre of rotation given the object and image.
- Find the object given the image and centre of rotation.

- Distinguish between congruent and similar shapes
- Prove why a pair of shapes are congruent or similar
- Calculate scale factor given two similar shapes
- Use scale factor to calculate unknown lengths
- Use ratio to calculate unknown lengths
- Determine area / volume factor given scale factor
- Determine area / volume factor given the area (or surface area) / volume of similar shapes (or solids)
- Calculate scale factor given area / volume factor
- Calculate area / volume of one shape using the area / volume factor and the area/ volume of a shape similar to it
- Determine the image of a plane shape under enlargement given the centre of enlargement and scale factor. Scale factor could be a positive or negative integer or a positive or negative fraction.
- Determine the scale factor and centre of enlargement given a plane figure and its image after enlargement
- Determine the object shape given its image after enlargement and the scale factor and centre of enlargement which produced the image given

### Mensuration

- Review areas of plane shapes
- Solve Problems involving length of arcs and areas of sectors
- Find areas of triangles – using Heron’s (semi-perimeter) formula.
- Volume and Surface areas of Solids
- Trigonometry and Mensuration

### Graphs

- Recognition and properties of the following function types from the shape of their graphs:
  - linear  $f(x) = ax + b$
  - quadratic  $f(x) = ax^2 + bx + c$
  - cubic  $f(x) = ax^3 + bx^2 + cx + d$
  - reciprocal  $f(x) = \frac{a}{x}$
  - exponential  $f(x) = a^x$  with  $0 < a < 1$  or  $a > 1$
  - absolute value  $f(x) = |ax + b|$

*Mathematics is a continuous subject and requires that you build on your previous knowledge base. So though the exam will focus on the areas indicated above, it will also require that you remember concepts taught in previous years.*