## Aim:

To develop the understanding of the concepts of functions. Also, how functions can be applied on real life problems.

To improve how to use of calculator, and use the inbuilt features such as solving equations by drawing graphs, finding zeros, using tables, etc.

Be more confident on the concept of especially linear and quadratic functions.

## Objective:

### COORDINATE GEOMETRY, *(CHAPTER 13: 13A, 13B)*

☐ The procedure of finding distances between points.
☐ Be aware that the formula for finding distances between points is derived from Pythagoras Theorem.
☐ The procedure of finding midpoints of line segments, by using the formula.
☐ Understand the concept of finding a midpoint of a line by using common sense.
☐ Be able to understand problems involving distances between points and midpoints of line segments.

### BASICS OF LINES IN SET OF AXES, *(CHAPTER 13: 13C-H, 16D)*

#### *GRADIENTS*

☐ Understand the concept of the gradient as a measurement of the steepness of a line.
☐ The procedure of finding the gradient of a line – from a graph.
☐ The procedure of finding the gradient of a line – from two points given, using the formula.
☐ Understand that parallel lines have the same gradient.
☐ Use the knowledge of parallel lines in solving problems.
☐ Know that if lines are perpendicular the product of their gradients equals -1.
☐ The procedure of finding the gradient of a line perpendicular to another, and vice versa.
☐ Interpret applications of the gradient as the change in rate, for example

the speed km/h.

☐ Understand why vertical lines have an undefined gradient, as we cannot divide by 0.

☐ Find equations of vertical lines as x = "something".

☐ Understand why horizontal lines have a gradient equal to 0.

☐ Find equations of horizontal lines as y = "something".

☐ Draw different lines, with different gradients (also horizontal and vertical lines), in set of axes.

### *EQUATION OF LINES*

☐ Understand the form y = mx + c, the gradient- intercept form, as expressing the line as an equation, where m is the gradient and c is the y-intercept.

☐ Understand that every ordered pair (x, y) lying on a line satisfies the equation of a line.

☐ The procedure of finding an equation of a line (in gradient- intercept form) - from a graph.

☐ The procedure of finding an equation of a line (in gradient- intercept form) – from a given gradient and one point.

☐ The procedure of rearranging equations given in any other form into gradient- intercept form, to find gradients and y-intercepts.

☐ The procedure of rearranging an equation written in gradient- intercept form, into general form (including converting numbers written as fractions to integers, by multiplying every including term).

☐ Graphing lines (taking advantages from table of value in calculator).

☐ Graphing lines using calculator.

☐ Solve simultaneous equations by drawing the graphs and find point of intersections, using calculator.

☐ Apply the concept of linear models on real life problems *(16D).*

### GENERAL CONCEPTS OF FUNCTIONS, *(CHAPTER 16: 16A-C)*

☐ Understand when a relation is a function, doing the vertical line test or likewise.

☐ Understand the notation f(x).

☐ The procedure of finding, for example, f(2) for a given function.

☐ The procedure of finding, for example, f(x) = 2 for a given function.

☐ Understand the notation, for example, f(-3) = 5 as the coordinates (-3, 5) lying on the graph of the considered function.

☐ Improving the working on negative numbers.

☐ Understand the concept of domain.

☐ Understand the concept of the range.

☐ Understand that the range depend on the domain.

☐ Understand that there might be restrictions for both domain and range, depending on the type of function but also depending how the question is stated.

☐ Understand that for any function, where x=0 there is a y-intercept and where y=0 there is a x-intercept.

☐ Be able to recognize a function give as an equation as quadratic, compared to a linear or exponential.

☐ Be able to recognize a function given as a graph as quadratic, compared to a linear or exponential.

☐ Understand that a quadratic function can be written in different forms.

☐ Understand when the shape of a quadratic graph is "turned down" and when it is "turned up".

☐ Find x-intercepts, so called zeros, from quadratic functions.

☐ Recognize the relationship between solving quadratic equations and finding zeros of a quadratic function.

☐ Find y-intercepts from (quadratic) functions.

☐ Find equation of axis of symmetry, as x="something".

☐ Be aware of the formula for axis of symmetry when solving problems involving quadratic functions.

☐ The procedure of finding the coordinates of the vertex (turning point).

☐ Improve how to factorize quadratic expressions.

☐ The procedure of finding the quadratic expression from a graph.

☐ Use calculator to find where functions meet. Understand that it might be two intercepts when it involves quadratic functions, but can be one or none.

☐ Apply the knowledge of *zeros, y-intercepts, axis of symmetry, coordinates of vertex* when solving problems including quadratic models.

## TOK links

- Restrictions of the domain in real life situations. For how long does a dough rise?
- Is it crystal clear what functions is going to be modelled from a real life situation?

- Words have a different meaning in the context of mathematics compared to if the words are used in everyday speech, such as for example *function, domain and range.*

## ATL

- Opening problems: Modelling Bamboo growth,
- Discussion the easiest way to graph a line when written in different forms.
- Introduction videos.
- Learning checks and quizzes with individual feedback.

## Assessment

- Formative: Test tests, quizzes and homework examination questions.
- Summative:
  Coordinate geometry and linear functions included in test exam May.
  Quadratic functions included in test exam December.