Notre Dame Mathematics

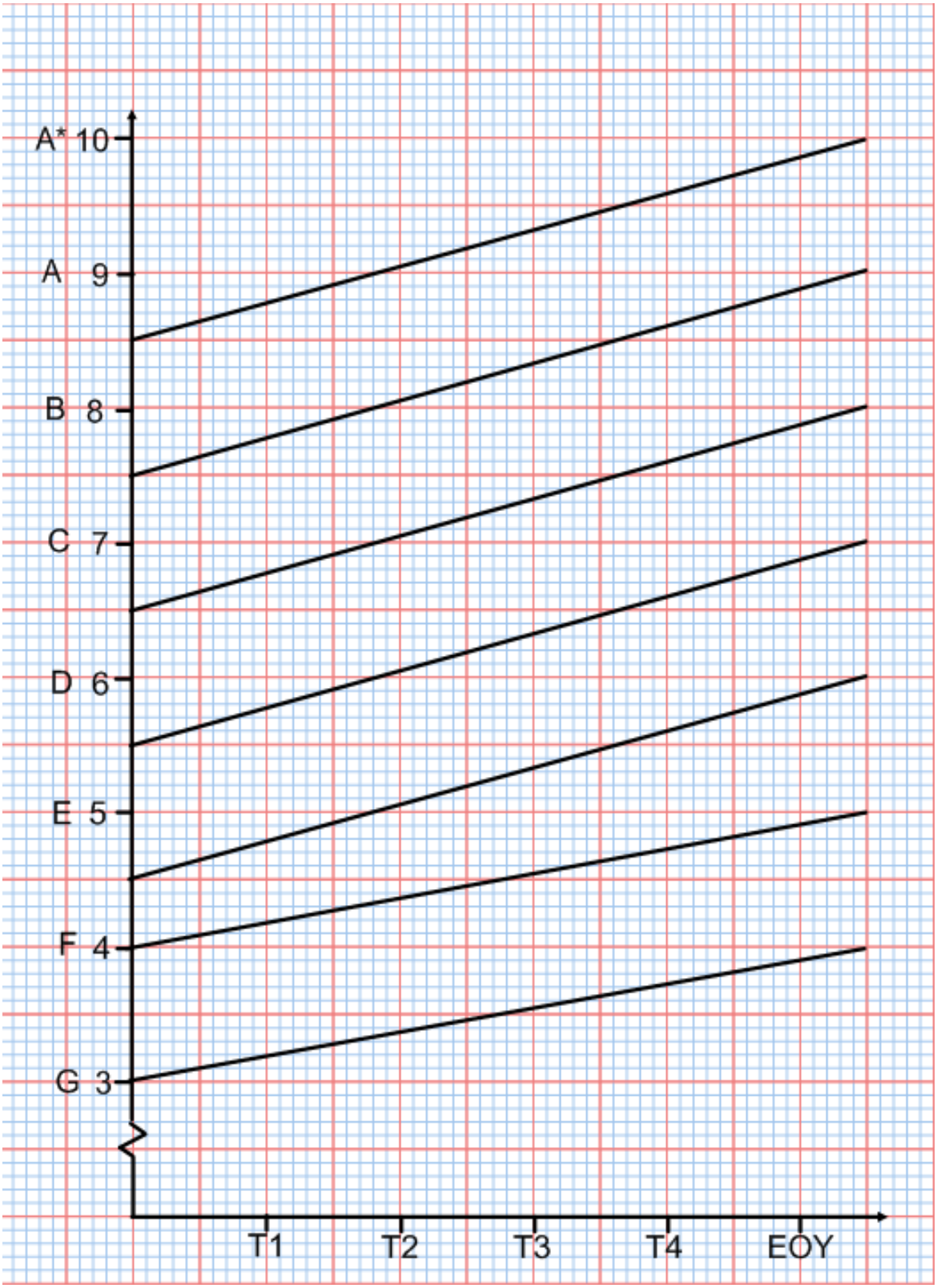
Mathematics GCSE

Higher

Student Booklet Year 10

Name..... Form.....

Year 10 Progress chart



After each test you must plot your level on the graph and then set your targets.

TEST	TARGETS
1	
2	
3	
4	
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Term 1 Objectives

Module 1: Integers	Notes	☺	😐	☹
Use brackets and the hierarchy of operations (BIDMAS)				
Add, subtract, multiply and divide integers, negative numbers and decimals				
Round decimals to appropriate numbers of decimal places or significant figures				
Multiply and divide by any number between 0 and 1				
Check their calculations by rounding, eg 29 × 31 ≈ 30 × 30				
Multiply and divide decimal numbers by whole numbers and decimal numbers (up to 2 d.p.), eg 266.22 ÷ 0.34				
Equivalent Calculations: Know that, eg 13.5 ÷ 0.5 = 135 ÷ 5				

Module 2: Coordinates	Notes	☺	😐	☹
Use axes and coordinates to specify points in all four quadrants in 2-D and 3-D				
Identify points with given coordinates				
Identify coordinates of given points				
Find the coordinates of points identified by geometrical information in 2-D and 3-D				
Find the coordinates of the midpoint of a line segment, AB, given the coordinates of A and B				

Module 3: Fractions	Notes	☺	😐	☹
Find equivalent fractions				
Find fractions of an amount				
Add, subtract, multiply and divide fractions				
Multiply and divide fractions including mixed numbers				

Module 4: Algebra	Notes	☺	😐	☹
Use notation and symbols correctly				
Write an expression				
Select an expression/identity/equation/formula from a list				
Manipulate algebraic expressions by collecting like terms				
Multiply a single term over a bracket				
Factorise algebraic expressions by taking out common factors				
Expand the product of two linear expressions				
Factorise quadratic expressions including using the difference of two squares				
Simplify rational expressions by cancelling, adding, subtracting, and multiplying				

END OF HALF TERM: Test 1

Module 5: Shapes & Angles	Notes	☺	😐	☹
Understand and use the angle properties of parallel lines				
Understand, draw and measure bearings				
Calculate bearings and solve bearings problems				
Mark parallel lines on a diagram				
Use the properties of corresponding and alternate angles				
Recognise and classify quadrilaterals				
Understand and use the angle properties of quadrilaterals				
Explain why the angle sum of a quadrilateral is 360º				
Understand the proof that the angle sum of a triangle is 180º				
Understand a proof that the exterior angle of a triangle is equal to the sum of the interior angles of the other two vertices				
Use the size/angle properties of isosceles and equilateral triangles				
Recall and use these properties of angles in more complex problems				
Calculate and use the sums of the interior angles of polygons				
Use geometric language appropriately and recognise and name pentagons, hexagons, heptagons, octagons and decagons				
Use the angle sums of irregular polygons				

Calculate and use the angles of regular polygons				
Use the sum of the interior angles of an n sided polygon				
Use the sum of the exterior angles of any polygon is 360º				
Use the sum of the interior angle and the exterior angle is 180º				
Find the size of each interior angle or the size of each exterior angle or the number of sides of a regular polygon				
Understand tessellations of regular and irregular polygons and combinations of polygons				
Explain why some shapes tessellate when other shapes do not				

Module 6: Collecting Data	Notes	☺	😐	☹
Understand The Data Cycle; Specify the problem and plan Decide what data to collect and what statistical analysis is needed Collect data from a variety of suitable primary and secondary sources Use suitable data collection techniques Process and represent the data Interpret and discuss the data				
Discuss how data relates to a problem, identify possible sources of bias and plan to minimise it				
Understand how different sample sizes may affect the reliability of conclusions drawn				
Identify which primary data they need to collect and in what format, including grouped data				
Consider fairness				
Understand sample and population				
Design a question for a questionnaire				
Criticise questions for a questionnaire				
Design an experiment or survey				
Select and justify a sampling scheme and a method to investigate a population, including random and stratified sampling				
Use stratified sampling				

Design and use data-collection sheets for grouped, discrete and continuous data				
Collect data using various methods				
Sort, classify and tabulate data and discrete or continuous quantitative data				
Group discrete and continuous data into class intervals of equal width				
Extract data from lists and tables				
Design and use two-way tables for discrete and grouped data				
Use information provided to complete a two way table				

Module 7: Displaying Data	Notes	☺	😐	☹
Produce: composite bar charts, comparative and dual bar charts, pie charts, histograms with equal or unequal class intervals and frequency diagrams for grouped discrete data, scatter graphs, line graphs, frequency polygons for grouped data, grouped frequency tables for continuous data				
Interpret: composite bar charts, comparative and dual bar charts, pie charts, scatter graphs, frequency polygons and histograms				
Recognise simple patterns, characteristics and relationships in line graphs and frequency polygons				
Find the median from a histogram or any other information from a histogram, such as the number of people in a given interval				

From line graphs, frequency polygons and frequency diagrams: read off frequency values, calculate total population, find greatest and least values				
From pie charts: find the total frequency and find the frequency represented by each sector				
From histograms: complete a grouped frequency table and understand and define frequency density				
Present findings from databases, tables and charts				
Look at data to find patterns and exceptions, explain an isolated point on a scatter graph				
Draw lines of best fit by eye, understanding what these represent				
Use a line of best fit, or otherwise, to predict values of one variable given values of the other variable				
Distinguish between positive, negative and zero correlation using lines of best fit				
Understand that correlation does not imply causality				
Appreciate that correlation is a measure of the strength of the association between two variables and that zero correlation does not necessarily imply 'no relationship'				

END OF TERM: Test 2

Term 2 Objectives

Module 8: Construction & Loci	Notes	☺	😐	☹
Use straight edge and a pair of compasses to do standard constructions				
Construct triangles including an equilateral triangle				
Understand, from the experience of constructing them, that triangles satisfying SSS, SAS, ASA and RHS are unique, but SSA triangles are not				
Construct the perpendicular bisector of a given line				
Construct the perpendicular from a point to a line				
Construct the bisector of a given angle				
Construct angles of 60º, 90º , 30º, 45º				
Construct a regular hexagon inside a circle				
Construct diagrams of everyday 2-D situations involving rectangles, triangles, perpendicular and parallel lines				
Draw and construct diagrams from given information				
Construct: a region bounded by a circle and an intersecting line – a given distance from a point and a given distance from a line – equal distances from 2 points or 2 line segments – regions which may be defined by 'nearer to' or 'greater than'				
Find and describe regions satisfying a combination of loci				

Module 9: Types of Number	Notes	☺	😐	☹
Identify factors, multiples and prime numbers				
Find the prime factor decomposition of positive integers				
Find the common factors and common multiples of two numbers				
Find the Highest Common Factor (HCF) and the Lowest Common Multiple (LCM) of two numbers				
Recall integer squares from 2 × 2 to 15 × 15 and the corresponding square roots				
Recall the cubes of 2, 3, 4, 5 and 10 and cube roots				
Use index notation for squares and cubes				
Use index notation for integer powers of 10				
Use standard form, expressed in conventional notation				
Be able to write very large and very small numbers presented in a context in standard form				
Convert between ordinary and standard form representations				
Interpret a calculator display using standard form				
Calculate with standard form				
Use index laws to simplify and calculate the value of numerical expressions involving multiplication and division of integer negative and fractional powers, and powers of a power				

Module 10: Patterns & Sequences	Notes	☺	😐	☹
Recognise sequences of odd and even numbers				
Generate simple sequences of numbers, squared integers and sequences derived from diagrams				
Describe the term-to-term definition of a sequence in words				
Identify which terms cannot be in a sequence				
Generate specific terms in a sequence using the position-to-term and term-to-term rules				
Find the nth term of an arithmetic sequence				
Use the nth term of an arithmetic sequence				

Module 11: 2D & 3D Shapes	Notes	☺	😐	☹
Use 2-D representations of 3-D shapes				
Use isometric grids				
Draw nets and show how they fold to make a 3-D solid				
Understand and draw front and side elevations and plans of shapes made from simple solids				
Given the front and side elevations and the plan of a solid, draw a sketch of the 3-D solid				

END OF HALF TERM: Test 3

Module 12: Perimeter & Area	Notes	☺	😐	☹
Recall and use the formulae for the area of a triangle, rectangle and a parallelogram				
Find the area of a trapezium				
Calculate perimeter and area of compound shapes made from triangles, rectangles and other shapes				
Find the surface area of simple shapes (prisms) using the formulae for triangles and rectangles, and other shapes				
Find circumferences of circles and areas enclosed by circles				
Recall and use the formulae for the circumference of a circle and the area enclosed by a circle				
Use π ≈ 3.142 or use the π button on a calculator				
Give an exact answer to a question involving the area or a circumference of a circle				
Find the perimeters and areas of semicircles and quarter circles				
Calculate the lengths of arcs and the areas of sectors of circles				
Find the surface area of a cylinder				
Find the area of a segment of a circle given the radius and length of the chord				
Convert between metric units of area				

Module 13: Fractions, Decimals & Percentages	Notes	☺	😐	☹
Understand that a percentage is a fraction in hundredths				
Convert between fractions, decimals and percentages				
Convert between recurring decimals and exact fractions and use proof				
Write one number as a percentage of another number				
Calculate the percentage of a given amount				
Find a percentage increase/decrease of an amount				
Reverse percentage, eg find the original cost of an item given the cost after a 10% deduction				
Use a multiplier to increase by a given percentage over a given time , eg 1.18 × 64 increases 64 by 10% over 8 years				
Calculate simple and compound interest				

END OF TERM: Test 4

Term 3 Objectives

Module 14: Formulae & Linear Equations	Notes	☺	😐	☹
Derive a formula				
Use formulae from mathematics and other subjects				
Substitute numbers into a formula				
Substitute positive and negative numbers into expressions such as $3x^2 + 4$ and $2x^3$				
Set up linear equations from word problems				
Solve simple linear equations				
Solve linear equations, with integer coefficients, in which the unknown appears on either side or on both sides of the equation				
Solve linear equations that include brackets, those that have negative signs occurring anywhere in the equation, and those with a negative solution				
Solve linear equations in one unknown, with integer or fractional coefficients				
Solve simple linear inequalities in one variable, and represent the solution set on a number line				
Use the correct notation to show inclusive and exclusive inequalities				
Change the subject of a formula including cases where the subject is on both sides of the original formula, or where a power of the subject appears				

Module 15: Linear Graphs	Notes	☺	😐	☹
Recognise that equations of the form y = mx + c correspond to straight-line graphs in the coordinate plane				
Draw and interpret straight line graphs for real-life situations – ready reckoner graphs – conversion graphs – fuel bills, eg gas and electric – fixed charge (standing charge) and cost per unit				
Plot and draw graphs of straight lines with equations of the form y = mx + c				
Find the gradient of a straight line from a graph				
Analyse problems and use gradients to interpret how one variable changes in relation to another				
Interpret and analyse a straight-line graph				
Understand that the form y = mx + c represents a straight line				
Find the gradient of a straight line from its equation				
Explore the gradients of parallel lines and lines perpendicular to each other				
Write down the equation of a line parallel or perpendicular to a given line				
Use the fact that when y = mx + c is the equation of a straight line then the gradient of a line parallel to it will have a gradient of m and a line perpendicular to this line will have a gradient of -1/m				
Interpret and analyse a straight line graph and generate equations of lines parallel and perpendicular to the given line				
Show the solution set of several inequalities in two variables on a graph				

Module 16: Simultaneous Equations	Notes	☺	😐	☹
Find the exact solutions of two simultaneous equations in two unknowns				
Use elimination or substitution to solve simultaneous equations				
Interpret a pair of simultaneous equations as a pair of straight lines and their solution as the point of intersection				
Set up and solve a pair of simultaneous equations in two variables				

Module 17: Probability	Notes	☺	😐	☹
Write probabilities using fractions, percentages or decimals				
Understand and use estimates or measures of probability, including relative frequency				
Use theoretical models to include outcomes using dice, spinners, coins etc				
Find the probability of successive events, such as several throws of a single dice				
Estimate the number of times an event will occur, given the probability and the number of trials				
List all outcomes for single events, and for two successive events, systematically				
Use and draw sample space diagrams				
Add simple probabilities, eg from sample space diagrams				
Identify different mutually exclusive outcomes and know that the sum of the probabilities of all these outcomes is 1				
Use 1 − p as the probability of an event not occurring where p is the probability of the event occurring				

Find a missing probability from a list or table				
Understand conditional probabilities				
Understand selection with or without replacement				
Draw a probability tree diagram based on given information				
Use a tree diagram to calculate conditional probability				
Compare experimental data and theoretical probabilities				
Compare relative frequencies from samples of different sizes				

END OF YEAR: Test 5

Module 18: Ratio & Scale	Notes	☺	😐	☹
Use ratios				
Write ratios in their simplest form				
Divide a quantity in a given ratio				
Solve a ratio problem in a context				
Use and interpret maps and scale drawings				
Read and construct scale drawings drawing lines and shapes to scale				
Estimate lengths using a scale diagram				
Solve word problems about ratio and proportion				
Calculate an unknown quantity from quantities that vary in direct or inverse proportion				
Set up and use equations to solve word and other problems involving direct proportion or inverse proportion and relate algebraic solutions to graphical representation of the equations				

Module 19: Averages & Range	Notes	☺	😐	☹
Calculate mean, mode, median and range for small data sets				
Recognise the advantages and disadvantages between measures of average				
Produce ordered stem and leaf diagrams and use them to find the range and averages				
Calculate averages and range from frequency tables (Use Σx and Σfx)				
Estimate the mean for large data sets with grouped data (and understand that it is an estimate)				
Draw and interpret cumulative frequency tables and graphs				
Use cumulative frequency graphs to find median, quartiles and interquartile range				
Draw box plots from a cumulative frequency graph				
Compare the measures of spread between a pair of box plots/cumulative frequency graphs				
Interpret box plots to find median, quartiles, range and interquartile range				
Find the median from a histogram				
Compare distributions and make inferences, using the shapes of distributions and measures of average and spread, including median and quartiles				
Find quartile and interquartile range from data				
Find modal class and interval containing the median				

END OF YEAR 10 WORK