Park House School - Year 12 June Assessment

Maths Assessment Manifest

- You will have 2 Maths papers, paper 1 is pure only, paper 2 is statistics and mechanics
- Paper 1 is 100 marks and 2 hours
- Paper 2 is 60 marks and 1 hour and 15 mins
- You are expected to spend 1 minute on each mark and then have time to check your answers.

<u>Pure</u>

Topics	Red	Amber	Green
I can understand and use the structure of mathematical proof,			
proceeding from given assumptions through a series of logical			
steps to a conclusion; use methods of proof including:			
Proof by deduction			
Proof by exhaustion			
Disproof by counter example			
I can understand and use the laws of indices for all rational			
exponents			
I can use and manipulate surds including rationalising the			
denominator			
I can work with quadratic functions and their graphs			
I can find the discriminant of a quadratic function, including the			
conditions for real and repeated roots			
I can complete the square			
I can find solutions of quadratic equations			
I can solve quadratic equations in a function of the unknown			
I can solve simultaneous equations in two variables by elimination			
and by substitution, including one linear and one quadratic			
equation			
I can solve linear and quadratic inequalities in a single variable and			
interpret such inequalities graphically, including inequalities with			
brackets and fractions			
I can express solutions through correct us of `and' and `or' or			
through set notation			
I can represent linear and quadratic inequalities graphically			
I can manipulate polynomial algebraically, including expanding			
brackets and collecting like terms, factorisation and simple			
algebraic division; use of the factor theorem			
I can simplify rational expressions, including by factorising and			
cancelling, and algebraic division			
I can understand and use graphs of functions; sketch curves			
defined by simple equations including polynomials			
I can interpret algebraic solutions of equations graphically; use			
intersection points of graphs to solve equations			
I can understand and use proportional relationships and their			
graphs			<u> </u>
I can understand the effect of simple transformations on the graph			
y=r(x), including sketching associated graphs			
I can understand and use the equation of a straight line, including			
the forms $y-y_1=m(x-x_1)$ and $ax + by + c = 0$			

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I can understand the gradient conditions for two straight lines to		
be parallel or perpendicular		
I can use straight line models in a variety of contexts		
I can understand and use the coordinate geometry of the circle		
including using the equation of a circle in the form $(x-a)^2+(y-b)^2=r^2$		
I can complete the square to find the centre and radius of a circle		
and then use the following properties:		
 The angle in a semicircle is a right angle 		
 The perpendicular from the centre to a chord bisects the 		
chord		
The radius of a circle at a given point on its circumference is		
perpendicular to the tangent to the circle at that point		
I can understand and use the binomial expansion of $(a+bx)^n$ for		
positive integer n and extend to any rational n, including its use for		
approximation		
I can understand and use the definitions of sine, cosine and		
tangent for all arguments		
I can understand and use the sine and cosine rules and the area of		
a triangle formula		
I can work with radian measure, including use for arc length and		
area of a sector		
I can understand and use the standard small angle approximations		
of sine, cosine and tangent		
I can understand and use the sine, cosine and tangent functions,		
their graphs, symmetries and periodicity		
I can understand and use trigonometric identities		
I can solve simple trigonometric equations in a given interval,		
including guadratic equations in sin, cos and tan and equations		
involving multiples of the unknown angle		
I can construct proofs involving trigonometric functions and		
identities		
I can use trigonometric functions to solve problems in context,		
including problems involving vectors, kinematics and forces		
I can use the function a ^x and its graph, where a is positive		
I can use the function e ^x and its graph		
I know that the gradient of e^{kx} is equal to ke^{kx} and hence		
understand why the exponential model is suitable in many		
applications		
I know and use the definition of $\log_2 x$ as the inverse of a^x , where a		
is positive and $x>0$		
I know and use the function In x and its graph		
I know and use in x as the inverse function of e^{x}		
I can understand and use the laws of logarithms		
I can solve equations of the form $a^{x}=b$		
I can use logarithmic granhs to estimate parameters in		
relationships of the form $v=av^n$ and $v=kh^x$		
I can understand and use exponential growth and decays use in		
modelling, with consideration of limitations and refinements of		
evponential models		
Exponential models I can understand the derivate of $f(x)$ as the gradient of the tangent		
to the graph of $y = f(x)$ at a general point (x, y) , the gradient of the		
to the graph of $y = i(x)$ at a general point (x,y) , the gradient of the tangent as a limit, interpretation as a rate of change		
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I can sketch the gradient function for a given curve	
I can calculate second derivatives	
I can use differentiation from first principles for small positive	
integer powers of x	
I can understand and use the second derivative as the rate of	
change of a gradient and connect this to convex and concave	
sections of curves along with points of inflection	
I can differentiate x ⁿ , for rational values of n, and related constant	
multiples, sums and differences	
I can differentiate e ^{kx}	
I can apply differentiation to find gradients, tangents and normals	
I can calculate maxima and minima and stationary points	
I can identify where functions are increasing or decreasing	
I can evaluate definite integrals, use a definite integral to find the	
area under a curve and the area between two curves	
I can calculate the magnitude and direction of a vector and convert	
between component form and magnitude/direction form	
I can add vectors diagrammatically and perform the algebraic	
operations of vector addition and multiplication by scalars, and	
understand their geometrical interpretations	
I can understand and use position vectors, calculate the distance	
between two points represented by position vectors	
I can use vectors to solve problems in pure mathematics and in	
context	
Statistics	

Topics	Red	Amber	Green
I can understand and use the terms 'population' and 'sample'			
I can use samples to make informal inferences about the			
population			
I can understand and use sampling techniques, including simple			
random sampling and opportunity sampling			
I can select or critique sampling techniques in the context of			
solving a statistical problem, including understanding that different			
samples can lead to different conclusions about the population			
I can interpret diagrams for single-variable data, including			
understanding that area in a histogram represents frequency and			
can connect this to probability distributions			
I can interpret scatter diagrams and regression lines for bivariate			
data including recognition of scatter diagrams which include			
distinct sections of the population			
I can understand the informal interpretation of correlation			
I can understand that correlation does not imply causation			
I can interpret measures of central tendency and variation,			
extending to standard deviation			
I can calculate standard deviation, including from summary			
statistics			
I can recognise and interpret possible outliers in data sets and			
statistical diagrams			
I can select or critique data presentation techniques in the context			
of a statistical problem			

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I can clean data including dealing with missing data, errors and		
outliers		
I can understand and use mutually exclusive and independent		
events when calculating probabilities		
I can link this to discrete and continuous distributions		
I can understand and use conditional probability, including the use		
of tree diagrams, Venn diagrams and two-way tables		
I can model with probability including critiquing assumptions made		
and the likely effect of more realistic assumptions		
I can understand and use simple, discrete probability distributions		
including binomial distribution, as a model and calculate		
probabilities using the binomial distribution		
I can understand and apply the language of statistical hypothesis		
testing, developed through a binomial model: null hypothesis,		
alternative hypothesis, significance level, 2-tail test, critical value,		
critical region, acceptance region, p-value		
I can appreciate that the significance level is the probability of		
incorrectly rejecting the null hypothesis		

Mechanics

Topics	Red	Amber	Green
I can understand and use fundamental quantities and units in the			
S.I. system: length, time and mass			
I can understand and use derived quantities and units: velocity,			
acceleration, force, weight, moment			
I can understand and use the language of kinematics, position,			
displacement, distance travelled, velocity, speed and acceleration			
I can understand, use and interpret graphs in kinematics for			
motion in a straight line: displacement against time and			
interpretation of gradient, velocity against time and interpretation			
of gradient and area under the graph			
I can understand, use and derive the formulae for constant			
acceleration for the motion in a straight line			
I can understand the concept of a force and can understand and			
use Newton's first law			
I can understand and use Newton's second law for motion in a			
straight line and extend to situations where forces need to be			
resolved			
I can understand and use weight and motion in a straight line			
under gravity; gravitational acceleration, and its value in S.I. units			
to varying degrees of accuracy			
I can understand and use Newton's third law, equilibrium of forces			
on a particle and motion in a straight line			
I can apply this to problems involving smooth pulleys and			
connected particles			
I can understand and use the addition of forces, resultant forces			
and dynamics for motion in a plane			
I can understand and use the model for friction, coefficient of			
friction, motion of a body on a rough surface, limiting friction and			
statics			