Maths KS5

COWES ENTERPRISE COLLEGE
AN ORMISTON ACADEMY
Educate for life

KEY C Core M Mechanics S Statistics

YR12

Y12 UNIT 1
C
How do I set out a proof clearly?
Can I solve problems involving proofs?
What are the different kinds of proof?
EXAMPLE: How do I prove 1 is not prime?

Y12 UNIT 2
C
How can I apply the laws of indices to solve problems?
Do I understand the use of the discriminant?
Do I know how to manipulate surds?

Y12 UNIT 3
C
Can I describe the graphs of the transformations of functions?
Do I know how to show inequalities graphically?

Y12 UNIT 4
C
How do I solve simultaneous equations with linear and quadratic powers?
Do I know how to solve inequalities?

Y12 UNIT 5
C
Do I understand the use and application of vectors?
Can I remember how vectors work from GCSE?
How do I extend the use of vectors to real-life situations?

Y12 UNIT 6
C
How can I use and apply my understanding of straight-line graphs?
Can I create an algebraic expression for a circle given certain information?

Y12 UNIT 7
C
What trigonometric identities do I know and when could I use them?
Can I use and apply the cosine and sine rule, and area of any triangle formula?

Y12 UNIT 8
C
Do I know how to show differentiation by first principles?
Can I differentiate to identify turning points?

Y12 UNIT 9
C
How could I differentiate a polynomial?
What are the different kinds of turning points and can I distinguish between them?
Can I find the tangent and normal to a curve at any point?

Y12 UNIT 10
C
Do I know how to expand a binomial in a given problem?
Do I know the rule involved in expanding a binomial function?

Y12 UNIT 11
Do I understand the factor and remainder theorem?
Can I divide a polynomial by a linear factor? Can I factorise a quartic into its linear factors?

Y12 UNIT 12
S
Do I know the difference between discrete and continuous data?
What different sampling methods can I use to answer problems?

Y12 UNIT 13
S
Do I know how to interpret and show information on graphs?
Can I find the mean, variance and standard deviation for a population and sample?
Can I identify an outlier?
Can I show data using:
1. Histograms
2. Box & whisker
3. Cumulative frequency
4. Correlation (including the use of correlation coefficient)

Y12 UNIT 14
M
Do I know the definitions and units associated with kinematics?
Can I sketch graphs involving displacement, velocity and acceleration
How do I use calculus to solve kinematic problems?

Y12 UNIT 15
M
Do I understand Newton's Laws of Motion?
Can I remember the formulae associated with constant acceleration?
Can I apply my understanding of gravity to problem solving?

Y12 UNIT 16
C
Do I know how to integrate functions with and without limits?
Can I work through a function to integrate efficiently and check the answer using the calculator if necessary?

Y12 UNIT 17
S
Do I know what mutually exclusive and independent events are?
How do I calculate the probabilities for a binomial distribution?

Y12 UNIT 18
S
Do I know the steps needed to test any type of hypothesis?
1. Can I formulate a hypothesis?
2. Can I state the null and alternative hypotheses?
3. Do I know how to calculate the test statistic?
4. Can I find the critical region(s) for a 1-tail or 2-tail test, supporting the choice of values in such regions with appropriate binomial probabilities?
5. Do I know when to accept or reject a hypothesis test, with appropriate reasoning?

Y12 UNIT 19
C
Do I know the laws of logarithms?
Can I graph the natural logarithm function and its inverse?
What is e and why is it important?
How is exponential growth and decay modelled?

Y12/13 UNIT 1
C
How do I decompose rational functions into partial fractions?
What are the different methods available to solve a partial fraction?
Can I use the results in the expression of partial fractions?

Y12/13 UNIT 2
S
How do I define and apply the use of conditional probability to problem solving?
When and how would I use set notation, tree diagrams, Venn diagrams and two-way tables?
How do I identify whether an assumption is valid and the likely situations where it becomes invalid?
Can I apply the conditional probability formula?

Y12/13 UNIT 3
C
Can I make logical deductions and prove statements?
Can I divide algebraic expressions?
Do I know how to manipulate and use algebraic fractions in all forms?
I prove a statement directly by exhaustion, or disprove it by counter example or by contradiction?

YR13

Y13 UNIT 1
C
Do I understand functions?
Can I determine the domain and range for any function, including composite functions?
Can I sketch the modulus of a function, give the sketch of the function?
Can I combine transformations?

Y13 UNIT 2
C
Do I know how to use the Binomial expansion formula?
Can I use a binomial expansion to express surds as estimated fractions?
Can I find the limit of a periodic sequence?
Can I identify and determine whether a term appears in either an increasing or decreasing sequence?
Do I know how to find, without using a calculator, the exact value of the sum of a function?

Y13 UNIT 3
C
Do I know what arithmetic and geometric sequences are?
Can I identify the conditions necessary for a geometric series to be convergent?
Can I prove the formulae for the sums of arithmetic and geometric sequences?
What are the conditions for a sum to infinity for a geometric sequence?
Can I model the distance travelled by a dropped ball in terms of a sequence?

Y13 UNIT 4
C
Can I use and apply radians in problems?
Can I show the graphs, range and domain for all trigonometric functions?
Do I know the identities associated with trigonometry?

Y13 UNIT 5
C
Do I know how to use the double angle formulae and their respective geometric proofs?
Can I construct proofs involving trigonometric functions and identities?
Do I know how to find trigonometric derivatives?
Can I determine the convex or concave sections of curves?

Y13 UNIT 6
C
Do I know how to find trigonometric derivatives?
Can I determine the convex or concave sections of curves?
Can I use the product, quotient and chain rules?
Can I find the derivative of natural logs?
Can I apply my knowledge of differentiation to rates of change and inverse functions?

Y13 UNIT 7
M
Can I use vectors and trigonometric functions to solve kinematics problems?
Can I use the formulae for constant acceleration using vectors?
Can I use calculus in kinematics in two dimensional motion?
Can I model motion under gravity using vectors for projectiles?

Y13 UNIT 8
M
Do I know how to use forces to determine dynamics for motion on a plane?
Can I identify the model for friction and apply it to problems?

Y13 UNIT 9
M
Do I understand how to use moments in simple static contexts?
Can I draw a moment and show the relevant forces applicable?

Y13 UNIT 10
C
Can I create a Cartesian equation from a parametric equation?
Do I know what a parametric equation is?

Y13 UNIT 11
C
Can I differentiate simple functions and relations defined parametrically?
Do I know what it means when we use the term parametric?

Y13 UNIT 12
C
Do I know how to solve trigonometric integrals?
Can I use integration to find the area between two curves?
Can I use integration by substitution and integration by parts?
Can I inverse the process of the chain and product rules?

Y13 UNIT 13
C
Can I integrate partial fractions that have a linear denominator?
Can I apply my knowledge of partial fractions to other situations?

Y13 UNIT 14
C
Can I construct simple differential equations?
Can I evaluate differential equations to find their solutions?
Can I apply differential equations?
- I can use differential equations:
- Within problem solving
- To identify limitations

I understand the link to kinematics for differential equations.

Y13 UNIT 15
C
Can I locate the roots of an equation?
What are staircase and cobweb diagrams used to illustrate?
Under what conditions will the Newton-Raphson method fail?
How would I use a calculator to prove iterative operations?
Can I use the trapezium rule to approximate the area under a curve?
Why do we need to be careful with a function that has a discontinuity, when looking for a root?

Y13 UNIT 16
S
Do I know the difference between a discrete and a continuous random variable?
Can I identify and apply my knowledge of a normal distribution?
Do I know how to identify when a binomial distribution can be approximated from a normal distribution?
Do I know how to model distributions and know the characteristics?
Can I find percentage points and calculate values?
Can I find the mean and variance?
Can I identify points of inflection?
What is a z-score and where is it used?
Can I use my calculator to find the values of probabilities?
Do I know the necessary conditions?
Can I calculate the expected number, mean and variance?

Y13 UNIT 17
S
Can I use a hypothesis test to detect the strength of any correlation between two variables?
Do I understand the use of the population correlation coefficient?
Can I use and apply Pearson's Product Moment Correlation Coefficient (PMCC)?

Y13 UNIT 18
S
Can I test a hypothesis for a normal distribution?
Can I carry out a hypothesis test using the mean of a normal distribution?
Given a known or assumed variance, can I use a sample to carry out a hypothesis test to see if it is a suitable estimate for the mean?
Can I apply the test statistic formula (z-values) for a normal distribution?
Can I decide when to accept a null hypothesis, if it has been developed from a binomial model?
Can I use a hypothesis test to determine the critical region?

Y13 UNIT 19
Exam preparation
How can I make sure I am revising effectively for this subject?
How do I memorise and recall knowledge I need for the exam?
How do I maximise marks in this subject's exam?
What are the gaps in my knowledge and how can I address them?
How do I approach exam questions in this subject to ensure I reach the highest grade?
What do I need to do to prepare myself for university courses?
What do I need to do to prepare myself for employment?