PURE

FM AS

① Matrices
1) $+, -, \times$, matrices
2) matrix multiplication
3) det & inverse 2×2
4) det & inverse 3×3

② Further vectors
1) Vector eq. (line)
2) Cartesian eq. (line)
3) Intersection (lines)
4) Angles & dot product
5) Vector product

③ Application (Matrices)
1) Linear sim. eq.
2) Matrices Linear transformations
3) Further transformations (2D)
4) Invariant points & lines
5) 3D Transform

④ Complex #s
1) Defin & basic arithmetic (i)
2) Division & Complex conjugates
3) Geometric representation
4) Modulus & argument
5) Loci in complex plane
6) Operations in mod-arg form

⑤ Roots (polynomials)
1) Factoring polynomials
2) Complex solutions to polynomial eq.
3) Roots & coef.
4) Find eq. w/ given roots

⑥ Mathematical induction
1) Principle
2) Matrices
3) Divisibility
4) Ineq.

FM A2

① Series & Induction
1) Induction review
2) Series induction
3) Standard series
4) Method (differences)

② Powers & roots (complex #s)
1) De Moivres theorem
2) Complex components
3) Roots (complex #s)
4) Roots (unity)
5) Further factorising
6) Complex # Geometry

③ Complex #s & trig.
1) Deriving multiple angle formulae
2) Apply to polynomial eq.
3) Powers (trig. functions)
4) Trig. series

④ Lines & planes & space
1) Eq. (plane)
2) Intersection (line & plane)
3) angles between line & plane
4) Distances between points, lines, planes

⑤ Sim. eq. & planes
1) Linear sim. eq.
2) Intersections (planes)

⑥ Hyperbolic functions
1) Defining em
2) Inverse hyperbolics
3) Identities
4) Solving harder eq.s
5) Differentiation
6) Integration

⑦ Further Calculus
1) $\frac{d}{dx}$ inverse trig
2) $\frac{d}{dx}$ inverse hyperbolics
3) Using trig⁻¹, hyper⁻¹ in integration
4) Using partial fractions integration

⑧ Applications (calculus)
1) Maclaurin Series
2) Using standard Maclaurin series
3) Improper integrals
4) Volumes (revolution)
5) Mean value of function

⑨ Polar curves
1) Curves in polar coordinates
2) Some features of polar curves
3) Changing between polar & Cartesian
4) Area enclosed by polar curve
5) Area between 2 curves

⑩ Differential equations
1) Terminology
2) Integrating factor method for 1st order eq.s
3) Homogeneous 2nd order linear differential eq.s w/ const. coef.
4) Homogeneous 2nd order linear differential eq.s w/ const. coef.

⑪ Applications (differential eq.)
1) Forming differential eq.s
2) Simple harmonic motion
3) Damping & damped oscillations
4) Linear sys.

FM MECH (AS & A2) OCR A

① Work, E, P. 1

1) W done by F
2) KE & W-E princip.
3) Potential E, Mechanical E, & conserving mech. E.
4) W done by F at θ to dir.(motion)
5) Power

② Dimensional Analysis

1) Defining & calculating dimensions
2) Units & dimensions (Σs, diff's, Θs)
3) Finding dimensions von units & derivs & predicting units
4) Summary (dimensions & units)

③ Momentum & collisions 1

1) Momentum & impulse
2) Collisions & princip (conservation of momentum)
3) Restitution, KE, impulsive T

④ Circular motion 1

1) Linear vs. Angular speed
2) Accel. in horiz. circular motion
3) Solving problems w/ motion in horizontal circle

⑤ Centres (mass) 1

1) Centre (mass) of sys (point masses)
2) Centres (mass) of standard shapes
3) Centres (mass) of composite bodies

⑥ Work, E, P. 2

1) W done by var F f(x)
2) Hooke's law, W done against elasticity & F_{epe}
3) Problem solving w/ W, E, P
4) Using vectors to calculate W, KE, P

⑦ Linear motion under var F

1) Working w/ accel., $\bar{v}$, s
2) Var (F)

⑧ Momentum & collisions 2

1) Var. F & vector notation
2) Oblique impacts & impulse momentum triangle
3) Oblique collisions (2 spheres) & impulsive T in springs

⑨ Circular motion 2

1) Conservation (mech. E.)
2) Components (accel.)
3) Problem solving scenarios

⑩ Centres (mass) 2

1) Centres (mass) by integration
2) Equilibrium (rigid body)

FM STAT (AS & A2) OCRA

① Counting princip. & probabil.
  1) Product principle & addition princip.
  2) Permutations
  3) Combinations
  4) Exclusion principle
  5) Selections where order matter
  6) Keeping objects together // separated
  7) Permuting objects w/ repetitions
  8) Counting princip. in probabil.

② Discrete Random Variables
  1) $\bar{x}$ & spread (DRV)
  2) Except. & Vari. (transformations) of DRVs
  3) Discrete uniform distrib.
  4) Binomial distrib.
  5) Geometric distrib.

③ Poisson distrib.
  1) Using the Poisson model

④ ! Parametric hypothesis tests
  1) Single-sample sign test
  2) Single-sample Wilcoxon signed-rank test
  3) Matched-pairs tests
  4) Wilcoxon rank-Σ test
  5) Normal approx.

⑤ Correlation & regression
  1) Pearson's product moment correl. coef.
  2) Spearman's rank correl. coef.
  3) Linear regression

⑥ Chi-squared tests
  1) Contingency tables
  2) Yate's correction
  3) Goodness-of-fit tests

⑦ Continuous distrib's
  1) Continuous random variables
  2) $\bar{x}$ & measures (spread) of CRVs
  3) Expec. & Vari. (functions) of random var.
  4) Cumulative distrib. functions
  5) Piecewise-defined probability density functions
  6) Continuous uniform distrib.
  7) Exponential distrib.
  8) Distrib. (functions) of CRV
  9) Goodness-of-fit test w/ continuous distrib.

⑧ Combining random variables
  1) Adding independant random variables
  2) Expec. & Vari. (sample $\bar{x}$)
  3) ! biased estimates ($\bar{x}$ & Var.)
  4) Linear combinations (normal vars)
  5) Distrib. ($\bar{x}_s$) of samples ++

⑨ Further hypothesis tests & confidence intervals
  1) Hypothesis testing for $\bar{x}$ (large sample)
  2) Confidence intervals