

Suitable for AQA, Edexcel and OCR





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PURE MATHEMATICS

A video with the whole of pure maths can be found here: <https://youtu.be/sOE8Slo3Pqw>

Proof:

Knowledge Checklist These are the bits the exam board wants you to know, make sure you can do all of these...	Self-assessment		
	First review 4-7 months before exam	Second review 1-2 months before exam	Final review Week before exam
I can use proof by deduction.	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can use proof by exhaustion.	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can use disproof by counter example.	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can use proof by contradiction.	😊 😐 😞	😊 😐 😞	😊 😐 😞

Algebra & Functions:

Knowledge Checklist These are the bits the exam board wants you to know, make sure you can do all of these...	Self-assessment		
	First review 4-7 months before exam	Second review 1-2 months before exam	Final review Week before exam
I can use the laws of indices for all rational exponents. I understand the equivalence between indices and surds. https://youtu.be/Q7WkzIYFI58	😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞
I can manipulate surds, including rationalising the denominator. https://youtu.be/bBvwOnNow_U	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can solve simultaneous equations by elimination. I can solve simultaneous equations by substitution. https://youtu.be/_bWGbAoxklq	😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞
I can find the discriminant of a quadratic function.	😊 😐 😞	😊 😐 😞	😊 😐 😞



I can solve a quadratic equation by factorisation, completing the square and the quadratic formula. I can solve quadratic equations in a function of the unknown. https://youtu.be/p_gnFs9Sc8	☺ ☹ ☹ ☺ ☹ ☹	☺ ☹ ☹ ☺ ☹ ☹	☺ ☹ ☹ ☺ ☹ ☹
I can represent and solve linear and quadratic inequalities graphically. https://youtu.be/Ltx8FrmGDOc	☺ ☹ ☹ 	☺ ☹ ☹ 	☺ ☹ ☹
I can manipulate polynomials, including expanding and factorising cubic expressions. https://youtu.be/1M4cq3Gif74	☺ ☹ ☹ 	☺ ☹ ☹ 	☺ ☹ ☹
I can simplify rational expressions, including by algebraic division . https://youtu.be/J7NxXZNbMwc	☺ ☹ ☹ 	☺ ☹ ☹ 	☺ ☹ ☹
I can sketch the graphs of functions, including those with asymptotes. I can use graphs to solve equations. https://youtu.be/4tCNS6A2d2o	☺ ☹ ☹ ☺ ☹ ☹	☺ ☹ ☹ ☺ ☹ ☹	☺ ☹ ☹ ☺ ☹ ☹
I can sketch transformations on the graphs of functions, including the modulus and combinations of these . https://youtu.be/NRAtJdjWOXo https://youtu.be/C6ccPVEhxHU	☺ ☹ ☹ 	☺ ☹ ☹ 	☺ ☹ ☹
I understand inverse functions, composite functions and decomposition of rational functions into partial fractions .	☺ ☹ ☹ 	☺ ☹ ☹ 	☺ ☹ ☹
I can use functions in modelling, including limitations of and refinements to models.	☺ ☹ ☹ 	☺ ☹ ☹ 	☺ ☹ ☹

Coordinate Geometry:

Knowledge Checklist These are the bits the exam board wants you to know, make sure you can do all of these...	Self-assessment		
	First review 4-7 months before exam	Second review 1-2 months before exam	Final review Week before exam
I can understand and use the equation of a straight line, in different forms and with parallel or perpendicular gradients. https://youtu.be/5pr5iAmmQqw	☺ ☹ ☹	☺ ☹ ☹	☺ ☹ ☹
I can understand and use the equation of a circle, including tangents.	☺ ☹ ☹	☺ ☹ ☹	☺ ☹ ☹



https://youtu.be/tzpmuYkM93M			
I can understand and use the parametric equations of curves, including converting to and from Cartesian form. https://youtu.be/Lh2NAMFM55U	😊 😐 😞	😊 😐 😞	😊 😐 😞

Sequences & Series:

Knowledge Checklist These are the bits the exam board wants you to know, make sure you can do all of these...	Self-assessment		
	First review 4-7 months before exam	Second review 1-2 months before exam	Final review Week before exam
I can understand and use binomial expansion, including the use of Pascal's triangle. https://youtu.be/IKN7EsaWRcE	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can work with arithmetic progressions, including the formula for the nth term and sum to n terms. https://youtu.be/huYbiAqfbtI	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can work with geometric progressions, including the formula for the nth term, sum of a finite series and sum to infinity of a convergent series. https://youtu.be/rKawwzsP2Ho	😊 😐 😞	😊 😐 😞	😊 😐 😞
I understand the definitions of sequences and series and can use them in modelling, including increasing, decreasing and periodic sequences.	😊 😐 😞	😊 😐 😞	😊 😐 😞



Trigonometry:

Knowledge Checklist These are the bits the exam board wants you to know, make sure you can do all of these...	Self-assessment		
	First review 4-7 months before exam	Second review 1-2 months before exam	Final review Week before exam
I understand and can use the definitions of sine, cosine and tangent. I can use the sine rule, cosine rule and the formula for the area of a triangle. I can find small angle approximations of sine, cosine and tangent.	☺ ☹ ☹ ☺ ☹ ☹ ☺ ☹ ☹	☺ ☹ ☹ ☺ ☹ ☹ ☺ ☹ ☹	☺ ☹ ☹ ☺ ☹ ☹ ☺ ☹ ☹
I can work with radians, including for arc length and sector area. https://youtu.be/ltQGsMEJ_ys	☺ ☹ ☹	☺ ☹ ☹	☺ ☹ ☹
I can understand and use the sine, cosine and tangent graphs, including exact values and their multiples. I can solve trigonometric equations in a given interval. https://youtu.be/rHXL2yAqbwg	☺ ☹ ☹ ☺ ☹ ☹	☺ ☹ ☹ ☺ ☹ ☹	☺ ☹ ☹ ☺ ☹ ☹
I can understand and use the definitions of secant, cosecant, cotangent and of arcsin, arccos and arctan. I can use the double angle formulae and trigonometric identities to solve equations. https://youtu.be/Dhd_XvirQTU	☺ ☹ ☹ ☺ ☹ ☹	☺ ☹ ☹ ☺ ☹ ☹	☺ ☹ ☹ ☺ ☹ ☹



Exponentials & Logarithms:

Knowledge Checklist These are the bits the exam board wants you to know, make sure you can do all of these...	Self-assessment		
	First review 4-7 months before exam	Second review 1-2 months before exam	Final review Week before exam
I know and can use the functions a^x, e^x and their graphs.	☺ ☹ ☹	☺ ☹ ☹	☺ ☹ ☹
I know and can use the functions $\log_a x$, $\ln x$ and their graphs.	☺ ☹ ☹	☺ ☹ ☹	☺ ☹ ☹
I can solve equations in the form $a^x = b$	☺ ☹ ☹	☺ ☹ ☹	☺ ☹ ☹
I can understand and use the laws of logarithms.	☺ ☹ ☹	☺ ☹ ☹	☺ ☹ ☹
I can use logarithmic graphs to estimate parameters in relationships or in modelling.	☺ ☹ ☹	☺ ☹ ☹	☺ ☹ ☹

Differentiation:

2 videos covering the differentiation topic found here:

Part 1: <https://youtu.be/KIbNTcIlct4>

Part 2 (special examples): <https://youtu.be/i4SPcgFjhv8>

Knowledge Checklist These are the bits the exam board wants you to know, make sure you can do all of these...	Self-assessment		
	First review 4-7 months before exam	Second review 1-2 months before exam	Final review Week before exam
I understand and can use the first derivative of as the gradient of the tangent.	☺ ☹ ☹	☺ ☹ ☹	☺ ☹ ☹
I understand and can use the second derivative as the rate of change of gradient	☺ ☹ ☹	☺ ☹ ☹	☺ ☹ ☹
I can apply differentiation to find: gradients, tangents and normals minima and maxima	☺ ☹ ☹	☺ ☹ ☹	☺ ☹ ☹
if a function is increasing/decreasing	☺ ☹ ☹	☺ ☹ ☹	☺ ☹ ☹
points of inflection.	☺ ☹ ☹	☺ ☹ ☹	☺ ☹ ☹
https://youtu.be/T1vVCpbCGvw			
https://youtu.be/47nSzfk-Tik			



I can show differentiation from first principles for small positive integer values of x , $\sin x$ and $\cos x$.	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can differentiate standard functions including: x^n e^{kx} and a^{kx} $\sin kx$, $\cos kx$ and $\tan kx$ $\ln x$	😊 😐 😞 😊 😐 😞 😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞 😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞 😊 😐 😞 😊 😐 😞
I can differentiate using: Product rule https://youtu.be/izFXH_gLO8E Quotient rule https://youtu.be/3TTMaosfw5U Chain rule https://youtu.be/P8q6B9VZ9aI	😊 😐 😞 😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞 😊 😐 😞
I can construct differential equations in pure mathematics or in context. I can interpret the solution of a differential equation in the context of solving a problem, including limitations of the solution.	😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞



Integration:

A video for first principles of integration can be found here:

https://youtu.be/K0KIOh_SEqQ

More difficult examples can be found in a video here: https://youtu.be/xqY_hp-3-Wc

Knowledge Checklist These are the bits the exam board wants you to know, make sure you can do all of these...	Self-assessment		
	First review 4-7 months before exam	Second review 1-2 months before exam	Final review Week before exam
I know that integration is the opposite of differentiation and that indefinite integrals require a constant.	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can integrate standard functions including: x^n e^{kx} and $1/x$ $\sin kx$ and $\cos kx$	😊 😐 😞 😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞 😊 😐 😞
I can evaluate definite integrals and use definite integrals to find the area under a curve or the area between two curves. https://youtu.be/I4_-5Ei3zUI	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can use: Integration by substitution https://youtu.be/iXUYUvui7UQ Integration by parts https://youtu.be/HC524mZKT6o Integration using partial fractions	😊 😐 😞 😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞 😊 😐 😞
I can understand and use integration as the limit of a sum.	😊 😐 😞	😊 😐 😞	😊 😐 😞



Numerical Methods:

Knowledge Checklist These are the bits the exam board wants you to know, make sure you can do all of these...	Self-assessment		
	First review 4-7 months before exam	Second review 1-2 months before exam	Final review Week before exam
I can locate roots by considering changes in sign, understanding how these methods can fail.	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can solve equations using iterative methods, including using staircase and cobweb diagrams.	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can solve equations using the Newton-Raphson method and other recurrence relations, understanding how these methods can fail.	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can understand and use numerical integration of functions, including the use of the trapezium rule and estimating the approximate area under a curve and limits that it must lie between.	😊 😐 😞	😊 😐 😞	😊 😐 😞

Vectors:

Knowledge Checklist These are the bits the exam board wants you to know, make sure you can do all of these...	Self-assessment		
	First review 4-7 months before exam	Second review 1-2 months before exam	Final review Week before exam
I can use vectors in two and three dimensions.	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can calculate the magnitude and direction of a vector and convert between magnitude/direction forms.	😊 😐 😞	😊 😐 😞	😊 😐 😞
	😊 😐 😞	😊 😐 😞	😊 😐 😞



I can add vectors diagrammatically and perform the algebraic operations of vector addition and multiplication by scalars.	😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞
I can understand and use position vectors. I can calculate the distance between two points represented by position vectors.	😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞

Mechanics

Quantities and units in mechanics:

Knowledge Checklist These are the bits the exam board wants you to know, make sure you can do all of these...	Self-assessment		
	First review 4-7 months before exam	Second review 1-2 months before exam	Final review Week before exam
I can understand and use units in the S.I. system: length, time, mass. I can understand and use derived units: velocity, acceleration, force, weight, moment .	😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞



Kinematics:

Knowledge Checklist These are the bits the exam board wants you to know, make sure you can do all of these...	Self-assessment		
	First review 4-7 months before exam	Second review 1-2 months before exam	Final review Week before exam
I can understand and use the language of kinematics, including position, displacement, distance travelled, velocity, speed and acceleration.	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can interpret and use 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 derive and use the formulae for constant acceleration for motion in a straight line, including SUVAT formulae.	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can use calculus in kinematics for motion in a straight line.	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can derive and use the formulae to model motion under gravity in a vertical plane using vectors, such as for projectile motion.	😊 😐 😞	😊 😐 😞	😊 😐 😞



Forces & Newton's Laws:

Video for this topic is here: <https://youtu.be/31j8J5EZtIM>

Knowledge Checklist These are the bits the exam board wants you to know, make sure you can do all of these...	Self-assessment		
	First review 4-7 months before exam	Second review 1-2 months before exam	Final review Week before exam
I can understand the concept of a force, including normal reaction, tension, thrust, compression and resistance.	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can understand and use Newton's first law.	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can understand and use Newton's second law for motion in a straight line and situations where forces need to be resolved.	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can understand and use Newton's third law, including: Equilibrium of forces on a particle and motion in a straight line. Application to problems involving smooth pulleys and connected particles. Resolving forces in two dimensions. Equilibrium of a particle under coplanar forces.	😊 😐 😞 😊 😐 😞 😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞 😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞 😊 😐 😞 😊 😐 😞
I can understand and use weight and motion in a straight line under gravity.	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can understand and use: Addition of forces. Resultant forces. Dynamics for motion in a plane.	😊 😐 😞 😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞 😊 😐 😞
I can understand the concept of a frictional force in vector or component form, when the magnitude and direction of the force are given or using the $F \leq \mu R$ model for friction.	😊 😐 😞	😊 😐 😞	😊 😐 😞



Moments:

Knowledge Checklist These are the bits the exam board wants you to know, make sure you can do all of these...	Self-assessment		
	First review 4-7 months before exam	Second review 1-2 months before exam	Final review Week before exam
I can understand and use moments in simple static contexts.	😊 😐 😞	😊 😐 😞	😊 😐 😞

Statistics

Statistical Sampling:

Knowledge Checklist These are the bits the exam board wants you to know, make sure you can do all of these...	Self-assessment		
	First review 4-7 months before exam	Second review 1-2 months before exam	Final review Week before exam
I can select, use and critique sampling techniques, including: Simple random sampling. Stratified sampling. Systematic sampling. Quota sampling. Opportunity sampling.	😊 😐 😞 😊 😐 😞 😊 😐 😞 😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞 😊 😐 😞 😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞 😊 😐 😞 😊 😐 😞 😊 😐 😞



Data Presentation & Interpretation:

Knowledge Checklist These are the bits the exam board wants you to know, make sure you can do all of these...	Self-assessment		
	First review 4-7 months before exam	Second review 1-2 months before exam	Final review Week before exam
I can interpret and use: Frequency polygons. Histograms. Cumulative frequency diagrams. Box and whisker plots.	😊 😐 😞 😊 😐 😞 😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞 😊 😐 😞 😊 😐 😞	😊 😐 😞 😊 😐 😞 😊 😐 😞 😊 😐 😞
I can interpret scatter diagrams and regression lines.	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can interpret and calculate measures of central tendency, including mean, mode and median.	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can interpret and calculate measures of variation, including variance, standard deviation, range and interpercentile ranges.	😊 😐 😞	😊 😐 😞	😊 😐 😞
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.	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can clean data, including dealing with missing data, errors and outliers.	😊 😐 😞	😊 😐 😞	😊 😐 😞



Probability:

Knowledge Checklist These are the bits the exam board wants you to know, make sure you can do all of these...	Self-assessment		
	First review 4-7 months before exam	Second review 1-2 months before exam	Final review Week before exam
I can use tree diagrams with independent and conditional probability. https://youtu.be/394smmY9oJU	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can use Venn diagrams with independent and conditional probability. https://youtu.be/yUqGuebVQGk	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can use set notation with independent and conditional probability.	😊 😐 😞	😊 😐 😞	😊 😐 😞

Statistical Distributions:

Knowledge Checklist These are the bits the exam board wants you to know, make sure you can do all of these...	Self-assessment		
	First review 4-7 months before exam	Second review 1-2 months before exam	Final review Week before exam
I can understand and use discrete probability distributions, including the binomial distribution.	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can understand and use the Normal distribution, including to find probabilities.	😊 😐 😞	😊 😐 😞	😊 😐 😞



Statistical Hypothesis Testing:

Knowledge Checklist These are the bits the exam board wants you to know, make sure you can do all of these...	Self-assessment		
	First review 4-7 months before exam	Second review 1-2 months before exam	Final review Week before exam
I can understand and apply the language of statistical hypothesis testing and be able to interpret a given correlation coefficient using a given p-value or critical value.	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can conduct a statistical hypothesis test for the proportion in the binomial distribution and interpret the results.	😊 😐 😞	😊 😐 😞	😊 😐 😞
I can conduct a statistical hypothesis test for the mean of a Normal distribution with known, given or assumed variance and interpret the results.	😊 😐 😞	😊 😐 😞	😊 😐 😞