

Subject – Math(Higher Level)
Topic - Vector
Year - Nov 2011 – Nov 2019

Question 1

[Maximum mark: 15]

(a) For non-zero vectors a and b , show that

(i) if $|a - b| = |a + b|$, then a and b are perpendicular;

(ii) $|a \times b|^2 = |a|^2 |b|^2 - (a \cdot b)^2$. [8 marks]

(b) The points A, B and C have position vectors a , b and c .

(i) Show that the area of triangle ABC is $\frac{1}{2} |a \times b + b \times c + c \times a|$.

(ii) Hence, show that the shortest distance from B to AC is

$$\frac{|a \times b + b \times c + c \times a|}{|c - a|}. \quad [7 \text{ marks}]$$

Question 2

[Maximum mark: 5]

Find the values of x for which the vectors $\begin{pmatrix} 1 \\ 2 \cos x \\ 0 \end{pmatrix}$ and $\begin{pmatrix} -1 \\ 2 \sin x \\ 1 \end{pmatrix}$ are perpendicular,
 $0 \leq x \leq \frac{\pi}{2}$.

Question 3

[Maximum mark: 6]

Two boats, A and B, move so that at time t hours, their position vectors, in kilometres, are $r_a = (5t)\mathbf{i} + (3 - 6t)\mathbf{j}$ and $r_b = (7 - 4t)\mathbf{i} + (7t - 6)\mathbf{j}$.

(a) Find the coordinates of the common point of the paths of the two boats. [4 marks]

(b) Show that the boats do not collide. [2 marks]

Ib Mathematics HL Past Paper

RJ Shavelson



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INTERMEDIATE I YEAR MATHS I B (English Medium) TEST PAPERS: Vikram Books, 2014-11-17 Intermediate First Year MATHS I B Test papers Issued by Board of Intermediate Education w e f 2013 2014 **Learning and Understanding** National Research Council, Division of Behavioral and Social Sciences and Education, Center for Education, Committee on Programs for Advanced Study of Mathematics and Science in American High Schools, 2002-08-06 This book takes a fresh look at programs for advanced studies for high school students in the United States with a particular focus on the Advanced Placement and the International Baccalaureate programs and asks how advanced studies can be significantly improved in general It also examines two of the core issues surrounding these programs they can have a profound impact on other components of the education system and participation in the programs has become key to admission at selective institutions of higher education By looking at what could enhance the quality of high school advanced study programs as well as what precedes and comes after these programs this report provides teachers parents curriculum developers administrators college science and mathematics faculty and the educational research community with a detailed assessment that can be used to guide change within advanced study programs **IB World Schools Yearbook 2012** , 2012

Survive the IB! Nathan Taber, 2011 **IB World Schools Yearbook 2011** Wendy Bosberry-Scott, 2011 This yearbook is the official guide to schools offering the International Baccalaureate Diploma Middle Years and Primary Years programmes It tells you where the schools are and what they offer and provides up to date information about the IB programmes and the International Baccalaureate Organization **Introducing the IB Diploma Programme** Marc Abrioux, Jill Rutherford, 2013-02-14 Schools wishing to introduce the IB diploma programme are faced with major investment in terms of time effort and money in order to become authorised This manual is a resource for schools already offering the diploma as well as for prospective diploma schools **High Performance Learning** Deborah Eyre, 2016-01-12 Schools that want to be world class are now paying attention to the findings from neuroscience and psychology that tell us we can build better brains They are changing their mindset expecting success for far more students and no longer being constrained by ideas of genetic potential High Performance Learning provides readers with a ground breaking and approachable model for achieving high levels of academic performance for all students and schools It takes what is known about how people reach advanced cognitive performance and translates it into a practical and user friendly framework which can be used with all students to systematically build the cognitive thinking skills and learner behaviours that will deliver success in school in the workplace and in later life Flexible and adaptable High Performance Learning can be used in any context with any curriculum and at any age It does not require separate lessons but rather becomes the underpinning pedagogy of the school Drawing on the author s 40 years of research into how the most able students think and learn this book provides a framework that has been extensively trialled in schools in eleven countries Themes include Creating world class schools The High Performance

Learning environment The High Performance Learning framework Advanced Cognitive Performance characteristics ACPs Values Attitudes and Attributes VAAs Creating and leading a High Performance Learning school The role of parents universities and employers This invaluable resource will help schools make the move from good to world class and will be essential reading for school leaders teachers and those with an interest in outstanding academic performance **IB** I. Study Publishing Ltd, 2020-09-15 IB IBDP IB IB DSE

The SAGE Handbook of Research in International Education Mary Hayden, Jack Levy, Jeff Thompson, 2015-10-13 The landscape of international education has changed significantly in the last ten years and our understanding of concepts such as international global and multicultural are being re evaluated Fully updated and revised and now including new contributions from research in South East Asia the Middle East China Japan Australasia and North America the new edition of this handbook analyses the origins interpretations and contributions of international education and explores key contemporary developments including internationalism in the context of teaching and learning leadership standards and quality in institutions and systems of education the promotion of internationalism in national systems This important collection of research is an essential resource for anyone involved in the practice and academic study of international education including researchers and teachers in universities governmental and private curriculum development agencies examination authorities administrators and teachers in schools Chemistry for the IB Diploma Geoff Neuss, 2001 This concise guide provides the content needed for the Chemistry IB diploma at both Standard and Higher Level It follows the structure of the IB Programme exactly and includes all the options Each topic is presented on its own page for clarity Higher Level material is clearly indicated and there are plenty of practice questions The text is written with an awareness that English might not be the reader's first language **Mathematics in Population Biology** Horst R. Thieme, 2018-06-05 The formulation analysis and re evaluation of mathematical models in population biology has become a valuable source of insight to mathematicians and biologists alike This book presents an overview and selected sample of these results and ideas organized by biological theme rather than mathematical concept with an emphasis on helping the reader develop appropriate modeling skills through use of well chosen and varied examples Part I starts with unstructured single species population models particularly in the framework of continuous time models then adding the most rudimentary stage structure with variable stage duration The theme of stage structure in an age dependent context is developed in Part II covering demographic concepts such as life expectation and variance of life length and their dynamic consequences In Part III the author considers the dynamic interplay of host and parasite populations i.e. the epidemics and endemics of infectious diseases The theme of stage structure continues here in the analysis of different stages of infection and of age structure that is instrumental in optimizing vaccination strategies Each section concludes with exercises some with solutions and suggestions for further study The level of mathematics is relatively modest a toolbox provides a summary of required results in differential equations integration and integral equations In addition a selection of Maple worksheets is

provided The book provides an authoritative tour through a dazzling ensemble of topics and is both an ideal introduction to the subject and reference for researchers **Veterinary Medical School Admission Requirements (VMSAR)**

Association of American Veterinary Medical Colleges (AAVMC),2020-04-15 Updated annually and packed with useful tips and helpful insights Veterinary Medical School Admission Requirements VMSAR provides a comprehensive overview of the admission process for the national and international veterinary schools that are members of the Association of American Veterinary Medical Colleges AAVMC This book provides concise current and the best comparative information for students interested in preparing for a career in veterinary medicine as well as their advisors and counselors The heart of this publication is a directory of member schools providing the following information for each school a summary of application procedures requirements for application and residency prerequisites for admission deadlines for each component of the application process a description of campus and campus life and the costs of tuition and fees Full page spreads provide a complete profile of the different campuses and clearly lay out all the details you require to select the school that best matches your needs Additional information includes an overview of the Veterinary Medical College Application Service VMCAS information about the accreditation of veterinary schools and professional licensure as a veterinarian a helpful timeline for aspiring vets from high school onward and firsthand accounts from current students and practitioners about what it is like to train as a vet As Executive Director of AAVMC Dr Andrew McCabe writes These are exciting times for veterinary medicine a profession that bridges animal human and ecosystem health We understand that getting started and making sense of all the choices and requirements can be challenging but you ve come to the right place by accessing this publication which provides the essential information you need to begin your journey **How To Choose a Pre-University**

Course in Malaysia ,2022-04-22 How To Choose a Pre University Course in Malaysia Questions you should ask yourself and courses to consider before making your decision Let us help you find the best Pre University course for you The

Manuscripts of the House of Lords: 1708-1710 (H.L. 40) Great Britain. Parliament. House of Lords,Great Britain. Royal Commission on Historical Manuscripts,1923 SSC MTS 2019 Previous Year Solved Paper Dhiraj Kumar,2021-07-19 SSC MTS 2019 Solved Papers With Detailed Explanations 21 Set English Medium 1 MTS 22 August 2019 Shift 3 Quant 2 MTS 22 August 2019 Shift 2 Quant 3 MTS 22 August 2019 Shift 1 Quant 4 MTS 19 August 2019 Shift 3 Quant 5 MTS 19 August 2019 Shift 1 Quant 6 MTS 16 August 2019 Shift 1 Quant 7 MTS 14 August 2019 Shift 3 Quant 8 MTS 14 August 2019 Shift 2 Quant 9 MTS 13 August 2019 Shift 3 Quant 10 MTS 13 August 2019 Shift 2 Quant 11 MTS 09 August 2019 Shift 1 Quant 12 MTS 08 August 2019 Shift 3 Quant 13 MTS 08 August 2019 Shift 1 Quant 14 MTS 07 August 2019 Shift 3 Quant 15 MTS 07 August 2019 Shift 2 Quant 16 MTS 07 August 2019 Shift 1 Quant 17 MTS 06 August 2019 Shift 3 Quant 18 MTS 05 August 2019 Shift 1 Quant 19 MTS 02 August 2019 Shift 3 Quant 20 MTS 02 August 2019 Shift 1 Quant 21 MST 09 August 2019 Shift 2 Quant *Mathematical Reviews* ,2001 The Manuscripts of the House of Lords: 1699-1702 (H.L. 7) Great Britain. Royal

Commission on Historical Manuscripts,1894 The American Mathematical Monthly ,1921 Includes section Recent publications *The Manuscripts of the House of Lords: 1704-1706 (H.L. 142)* Great Britain. Royal Commission on Historical Manuscripts,1912 **Language A for the IB Diploma: Concept-based learning** Kathleen Clare Waller,2019-08-26

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