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Leaving Higher Maths Paper Two

Question 1 : Circle : In this question parts (a) and (b) tend to quite easy). Note the following **are not on the course** (i) **Orthogonal Circles**

(ii) **Radical Axis .Systems of Circles some of these topics are covered in the text books but will not be examined** . Expect to be asked to find the equation of a circle/circles, remember if asked to find the equation of a circle you will be looking for **three unknowns** ,hence you need **three equations** ,therefore you need **three bits of information!**

Equations of tangents from a point to a circle is often asked .The

$xx_1 + yy_1 = r^2$ proof came up in '97. The part © in 1999 was a bit of a hand full there was a nice way to do it which did not involve half the alphabet , if you would like to see it send us an email .

Question 2 : Vectors

Good use can be made of the formula $\vec{x} = \frac{\vec{a}s + \vec{b}r}{r + s}$ for a point x on the line ab

where x divides [ab] in the ratio r:s. Also expect to make ample use of the Scalar Product .This is usually a very easy question , don't worry about the last part of part © on the 1999 it only **received 5 marks** ,again there is a lovely otherwise way to do it (it's based on the bisector of an angle)

Question 3 : The Line /Transformations .

The co-ordinate geometry of the line did not feature at all in '94, but made a small appearance in part (a) of the 95. In '96 it featured in parts (a) and (b) . It may be possible to get a question on a Co-ordinate Geometry proof here . Transformations appeared in every year except 1998.

So the two proofs that can be asked are (1) the angle between two lines (2) and the perpendicular distance from a point to a line!The

parts (b) and (c) will involve a transformation and the affects of this transformation on a line or lines remember that for the transformation to be an Isometry the determinant of the matrix must be +or- 1. A line segment appeared in '96 and by all accounts was badly done so it may appear again.

Question 4 /5:Trigonometry :

Know how to use the **Sine and Cosine Rules** : They have shown in previous years they have asked questions concerning three points on a horizontal plane with a vertical pole at one corner of the plane .A possible identity which may

be asked to prove is $\cos 2A = \frac{1 - \tan^2 A}{1 + \tan^2 A}$ Know how to use $\sin(A+B)/\cos(A+B)$. **The**

proof of the Cosine Rule was asked in ,97 Be able to solve trig equations, and be able to use the fact that $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$. Lengths of arcs and areas of sectors

may also be important . Q5c 1997 was a bit different could get another outing. In 1999 and 2000 both question 4 and question 5 could have done with the use of page 9 of the tables and very little knowledge of trigonometry!

Question 6/7 Statistics /Probability/Permutations/Combinations

/Difference Equation . It is difficult to be very precise as to what topics will come up in each question . The difference equation and probability look likely in question 7 . Question 6 may contain a Mixture of Permutations/Combinations/probability and Statistics .I think there is plenty of scope to ask questions on the standard Deviation look for a repeat of '96 /'97in this question . .Maybe a Weighted mean could appear again .The properties of the mean and standard Deviation seem to flavour of the month at the moment !

Question 8 Further Calculus : Integration by parts is very likely ,the only certainty is the Max/Min part which will involve some form of figure although 97 was a bit different) Mac Lauren came up in 1995 whereas the Ratio test appeared in 1994 . No integration by parts in 1997 but was asked in 98,99,and 2000,should appear this year
The pattern for the last 4 years has been

1999 (a)Integration by parts,(b) Maclauren © Max/Min

1998 (a)Ratio Test(b)Integration by parts (c) Max /Min

1997(a)Ratio test (b) Maclauren (c) Max and Min

1996(a)Integration by Parts (b)Max/Min (c)Maclauren + ratio test

Which Questions to do ?

Some questions select themselves because most students find them in general OK . Questions 1,2,3 and 8 will be done by most students . So the question is 4or 5 or 6or 7 ? . I do not think it is a good idea to total exclude either topics . Question 4 seems to be the more straightforward trig question while 7 has the least amount of probability . For those students hoping to get a C ,4 and 7 may solve the problem . For those hoping to get an A or B, 4 and 5 may be more straightforward as at least the will know if they are right or not . You will probably have time to do an extra question anyway if you have do . They will mark your best 6.

What about the proofs The history of the Exam so far indicates the following

Proofs Asked On Paper 2

2000 4©.Derive the formula $\cos(A+B)=\cos A\cos B-\sin A\sin B$ 5(b)Show

that
$$\frac{1 - \tan^2 A}{1 + \tan^2 A} = \cos 2A$$

1999 (4c)
$$\tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$

1998(3c) The perpendicular distance from a point to a line is
$$\left| \frac{ax_1 + by_1 + c}{\sqrt{a^2 + b^2}} \right|$$

1997(3b) $Tan\Theta = \pm \frac{m_1 - m_2}{1 + m_1 m_2} \dots (1b) xx_1 + yy_1 = R^2 \dots (1c) g^2 = c$, (5c) Proof of the Cosine

Rule

1996 no proofs!

$$1995 (5c) \tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$$

$$1994 (4a) \sin 2A = \frac{2 \tan A}{1 + \tan^2 A} \text{ proof involving difference equations}$$

You can see from the above list that apart from 1997 , only one proof is asked
!