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# Conics and trig and VUW courses.

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By Richard Catterall and Steven Archer

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## Contact us.

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Email us at

[rcatterall@hibs.school.nz](mailto:rcatterall@hibs.school.nz)

and

[steven.archer@vuw.ac.nz](mailto:steven.archer@vuw.ac.nz)

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# Skills vs problems

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Level 3 mathematics courses are about problem solving.

Our VUW courses (at 100 level) are about skill development.

Does this apply to both?

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# Expectations at 100 level

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The only courses with specific required standards are Math 142 and 177.

Math 142 requires differentiation, integration and trigonometry (two at merit or above).

Math 177 requires differentiation and integration.

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# What is trig at Vic?

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In algebra and discrete maths, we normally don't get past ideas about polar coordinates and pythagoras in 3D.

In calculus, we expect students to use trig identities to convert between trig fns.

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# Examples from courses I.

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Math 132 gets them to fill in triangles.

Math 151 did rotational matrices in 2014, so it helped if they knew the addition rules

$$\cos(A+B) = \cos(A)\cos(B) - \sin(A)\sin(B)$$

$$\sin(A+B) = \sin(A)\cos(B) + \cos(A)\sin(B)$$

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## Examples from courses II.

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Math 141. Integrate  $\ln(\sin(x)) \cos(x)$  (by parts?)

Math 142. Integrate  $\sin^2(x)$  or  $\sin^4(x)$   
 $\cos^3(x)$  (trig identities and reduction formulae)

Engr 121. Simplify  $\cos^3(A) + \cos(A)\sin^2(A)$ .

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# 142 and 151 assignment questions

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(142) Differentiate  $\cot(x)$  using the quotient rule, and use implicit differentiation to show the derivative of  $\cot^{-1}(x)$  is  $-1/(1+x^2)$ .

(151) Express  $1-i$  in polar form, without a calculator.

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## 142 conic question

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142. Find the general solution to the DE  $y' = y/2x$  in implicit form. Sketch several solution curves corresponding to different values of the constant of integration. Find an explicit form of the solution  $y = y(x)$  satisfying the initial condition  $y(-1) = 2$ . For what values  $x$  is this solution defined?

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# 161 conic question

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161. Find the domain and range of the relation  
 $\{ (x,y) : (x^2)/25 + (y^2)/9 = 1 \}$

For exams, go to

<http://library.victoria.ac.nz/library-v2/collections/general-collections/exam-papers>

and type in the course code e.g. Math 142

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# Calculators and Formula sheets

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Calculator allowances vary. In 2014,

Engr 121, 122, Math 142, 177 and Stat 193 all allow graphics calculators.

Math 132, 141, 151 and 161 all banned calculators from tests and exams.

Only some courses (121, 141 and 142) have proper formula sheets for tests and exams.

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# Teaching methods

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All courses are lecture based, with supporting tutorials and drop-in help-sessions.

Weekly assignments are the norm, with mid-course test(s) and a final exam worth 60% to 100% of the final grade.

No oversight of teaching methods, so lots of freedom, particularly on the maths side.

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# Where could conics appear?

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121,122 - functions? geometry?

132 - extension work, hyperbolas?

141 - polar-like parameters? Integration?

142 - implicit differentiation? Diff eqns?

151 - more geometry?

161 - more relations?

177 & 193 - not really applicable I feel.

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# Where could trig expand?

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121,122 - I can't see what the extension is here.

132 - Extend what is already done.

141 - Solving general trig equations

142 - Extend, although lots is done now.

151 - Embed rotations?

161 - Complex numbers?

177 & 193 - not really applicable I feel.

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# What is trig at school?

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In the internal trig standard the assessment requires students to solve problems using trig methods (with relational thinking and extended abstract thinking added for Merit and Excellence). eg. They must write equations, solve equations of the form  $A\sin(B(x+C)) + D = K$  and solving may involve use of formulas such as double angle rules.

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# What is trig at school?

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The curriculum also mentions manipulate trig expressions, display and interpret graphs of functions and their reciprocals and inverses, trig identities and general solutions. Students could be required to do proofs, especially of sum and product formulas, from diagrams. Graphics calculators are much used.

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# Conics changed from ext to int

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In 2013, conics changed from being externally assessed to being internally assessed.

[Here is the internal version \(see 91573\)](#)

[Here is the 2012 conics exam](#)

[Here are the conics questions from scholarship exams from 2004-2013.](#)

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# Trig is internal

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Most but not all calculus students are doing this standard. Schools are free to choose courses for their students to opt in to. About 30% to 40% of level 3 maths students do calculus.

[Here is an internal version \(see 91575\)](#)

Trig is embedded in scholarship calculus in a similar way to how Math 141/142 use it.

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# Conics is also internal

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Some schools offer conics as part of the calculus course. Students have to solve problems involving a selection from ellipse, hyperbola and parabola, with tangents to curves. Implicit and/or parametric differentiation are useful; but not necessarily included.

[Here is an internal version \(see 91573\)](#)

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