



Master Coaching
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Year 12 2 Unit Advanced

Test #6

Trial HSC

Time allowed - two hours (*Plus 5 minutes reading time*)

Directions to candidates :

- * Attempt ALL questions.
- * ALL questions are of equal value.
- * All necessary working should be shown in every question.
Marks will be deducted for careless or badly arranged work.
- * Board approved calculators may be used.
- * Each question attempted is to be returned on a separate sheet of paper
clearly marked question 1, question 2, etc. at the top of the page.



QUESTION 1 (Start a new page)

- a Evaluate $\frac{4^{12} - 2 \cdot 16}{\sqrt{42 \cdot 71}}$ giving your answer correct to three decimal places.
- b Rewrite with a rational denominator : $\frac{3\sqrt{5}}{2\sqrt{5}-1}$
- c The volume of a cone of height 15 cm. is given by the expression $V = 5\pi r^2$
Find the base radius of the cone if the volume is 40 cubic centimetres.
- d Solve the inequality $\frac{4}{x-1} \leq 2$ and plot the solution on a number line
- e Factorise $3y^2 - 11y + 6$

QUESTION 2 (Start a new page)

- a On the number plane, plot the points A(-4,0) , B(4,6) , C(4,3) and the origin O.
- b Calculate the length of each of the intervals AB and OC.
- c Show that the line AB has equation $3x - 4y + 12 = 0$
- d Show that AB \parallel OC
- e Find the perpendicular distance of C from the line AB.
- f Calculate the area of the trapezium OABC.

QUESTION 3 (Start a new page)

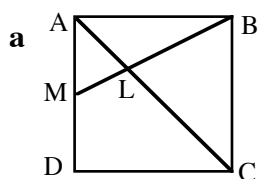
- a Differentiate with respect to x : **i** $3x^5 - \frac{2}{3\sqrt{x}}$ **ii** $4\cos(3x+2)$ **iii** $3x^2 \cdot \ln 4x$
- b Find : **i** $\int (x - e^{-2x}) dx$ **ii** $\int_0^1 \sin\left(\frac{x}{2}\right) \cdot dx$ correct to two decimal places
- c Find the equation of the normal to the curve $y = \sqrt{x}$ at the point where $x = 4$.



QUESTION 4 (Start a new page)

- a** In January 1995 Brigitte joined a superannuation fund into which she has paid \$2000 on the first Monday of each January of each year. Brigitte hopes to close the fund at the end of 2006.
- If Brigitte closes the fund on 31 / 12 / 2006, how many payments would she have made ?
 - What would be the value of Brigitte's first payment of \$2000 on 31 / 12 / 2006 given that the fund has paid 6% p.a. interest, compounded annually ?
 - How much can Brigitte get from her investment if she closes the fund on 31 / 12 / 2006 ?
- b** The third term of an arithmetic series is 2 and the eleventh is 50.
- Find the first term, a , and the common difference, d .
 - Find the sum of the first fifteen terms of the series.
- c** Two cards are drawn successively at random (without replacement) from a pack of playing cards. (52 card pack, 4 suits of 13 cards each - Hearts, Diamonds, Clubs, Spades)
- What is the probability that :
- both cards are Diamonds ?
 - both cards are of the same suit (not necessarily Diamonds) ?

QUESTION 5 (Start a new page)



In this figure , ABCD is a square
and $\angle ALM = 68^\circ$

Find $\angle LBD$, giving reasons.

- b** A point P moves in the xy plane so that it is equidistant from the $S(0,2)$ and the line $y+4=0$
- Show that the locus of point P is a parabola with equation $x^2 = 12(y+1)$
 - Write down the co-ordinates of the vertex, V , of the parabola.
 - What is the focal length of the parabola.
 - What is the length of the latus rectum of the above parabola ?
- c** A ship is travelling due west at 20 knots. At point A a lighthouse is sighted on a bearing of 300° Two hours later, at point B , the lighthouse can be seen on a bearing of 345°
- Draw a neat diagram which illustrates the information given above.
 - How far is the point B from the lighthouse ? Give your answer to the nearest nautical mile.

