KILLARA HIGH SCHOOL

YEARLY EXAMINATION 1995

YEAR 11 MATHEMATICS

2 UNIT PAPER

Time allowed: 1 hours 15 mins.
All questions may be attempted.
All necessary working should be shown.
Marks may be deducted for careless or untidy work.
Approved silent calculators may be used.
Start each question on a new page.

QUESTION 1

(a) Find x when t = -3 given $x = 4t - 5$

(b) Express $\sqrt{75} - \sqrt{12}$ in the form $a\sqrt{b}$ (and hence find a,b,)

(c) If $y = 7x^4 - 4x^2$ find $\frac{dy}{dx}$

(d) Find the derivative of $\frac{x}{x-1}$

(e) Find the 5th term of a geometric series with a = 4, r = 3

(f) Solve $\frac{x+1}{3} = \frac{x-2}{2}$

(g) If v =u + at find u when v = 35, a = -10, t = 3.2

(h) Solve $x^2 - 15x < 34$

(i) Solve $5x^2 - 2x - 2 = 0$. Give your answer correct to 3 decimal places.

(j) Factorise fully $3x^3 + 24$

(k)Find the exact value of 2.9781×10^{23} divided by the product of 2.43×10^{11} and 1.35×10^{9}.

(l) For what value of k is $x^2 + kx + 16 = (x - 4)^2$?

QUESTION 2

(a) If $f(x) = 2^{x-1}$ for what value of x is f(x) = 32?

(b) State the domain and range of the function $y = \sqrt{9-x^2}$

(c) Sketch graphs of the following equations each on a separate set of axes. Indicate the main features on each.

(i) $y = \cos x^0 \quad 0^0 < x < 360^0$ (ii) $y = |x+3|$ (iii) $y = 2^{x-1}$

(d) Sketch on separate co-ordinate axes, the regions which satisfy the given conditions:

(ii) $y < \sqrt{9-x^2}$ (iii) $y > (x^2 - 7)$ (iii) Parts (i)and(ii) simultaneously.

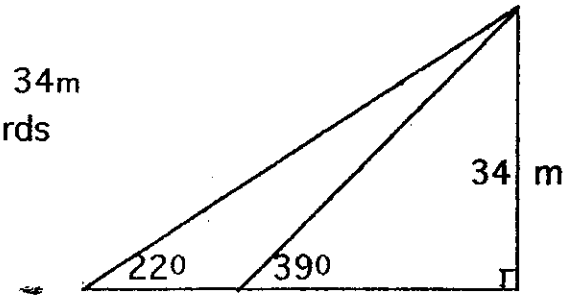
QUESTION 3

(a) If $\tan A = 7$ find A when $0^0 < A < 360^0$

(b) $\sin A = 24/25$ and A is obtuse. Give the exact value of cosA.

(c) Find the exact value of $\tan^2 30^0 - \sin 60^0 \tan 60^0$

(d) From a small boat it is noticed that the angle of elevation of a cliff top 34m high is 22^0. After rowing directly towards the cliff it is found that the angle of elevation is now 39^0. How far has the boat been rowed?



(e) Simplify $(1-\cos^2 A)/(1-\sin^2 A)$

(f) If $\tan^2 D + 2\sec^2 D = 5$ find the value of $\sin^2 D$

QUESTION 4

(a) The fortieth term of an arithmetic series is 353 and the fourteenth term is 119. Find (i) the first term
and (ii) the common difference.

(b)A plant when first observed has a height of 420 mm. In the first week it grows 10 cm and each succeeding week its growth is found to be 70% of that of the previous week. Find the height of the plant to the nearest mm at the end of eight weeks.

(c) Differentiate with respect to x

(i) $(5x-1)^6$ (ii) $4x\sqrt{x+1}$

(d) Use first principles to find the gradient of the tangent to the curve $y=x^2+3x$ at the point where $x=5$.

(e) Solve for x, $4x^4+17x^2-15=0$.

QUESTION 5

(a) The skirt of a dancer's costume is to be decorated with 25 rows of sequins. The top row will contain 16, the next 18, the third 20 and so on. How many sequins will be used?

(b) Show that the curve $y=2x^4 - x-3$ has a turning point where $x = 0.5$

(c) A man wishes to build a chook pen using his existing fence for one side. He has 30 metres of fencing wire to form the other three sides.

(i) Show that the area of this pen is given by $A = 30B - 2B^2$

(ii) Show that for a maximum area $L = 2B$

(iii) Calculate the maximum area of the pen.