KILLARA HIGH SCHOOL

YEAR 11 - YEARLY EXAMINATION - 1989

2 UNIT - MATHEMATICS

TIME ALLOWED: 3 hours

QUESTION 1

i) Express 487.8954:

a) correct to 3 decimal places;

b) correct to 3 significant figures.

ii) Find the exact value for:

a) $64^{\frac{3}{2}}$

b) sin 225°

c) tan 330°

iii) Solve the equations:

a) $T^3 = 6859$

b) $|2x - 3| = x + 2$

c) $5 \leq (x + 1)^2 \leq 10$

QUESTION 2

i) a) Solve $5(3 - x) > 20$

b) Simplify $6 - 2(x - 1).(x - 3)$

ii) Differentiate each of the following:

a) $(2x + 5).(x^2 - 5)$

b) $\frac{x^3}{3} + \frac{4}{\sqrt{x}}$

iii) If $x = 3 \times 10^7$ and $y = 5 \times 10^{-3}$, find in standard form x^2y^3.

QUESTION 3

i) Sketch the region defined by $9 < x^2 + y^2 \leq 25$.

ii) If $x = \sqrt{2} + 1$, find $x - \frac{1}{x}$ in its simplest form.

iii) State the domain and range of $y = \sqrt{4 - x^2}$

iv) Solve:

$$\frac{3x - 1}{5x + 1} = \frac{3x - 2}{5x + 2}$$

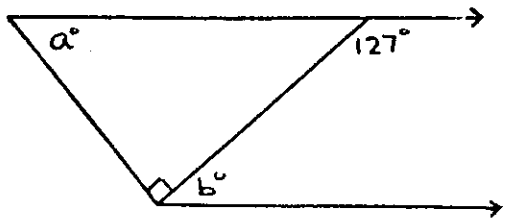
QUESTION 4

i) *Factorise and simplify fully:*

a) $\dfrac{x^2 - 5x + 6}{x - 2}$

b) $16a^2c - 9b^2c$

ii) *Find the value of a and b and give reasons:*



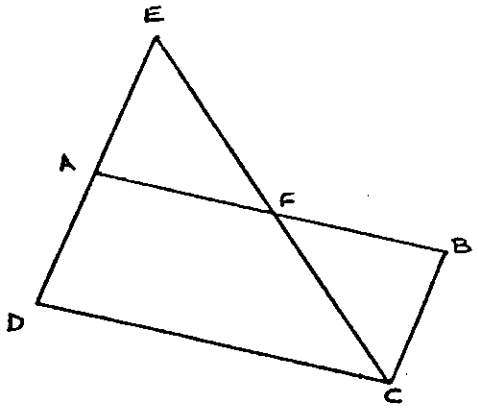
iii) *a)* *Simplify:* $\dfrac{1 - \cos^2\theta}{1 - \sin^2\theta}$ *b)* *Solve* $\cos\theta = -\dfrac{\sqrt{3}}{2}$ *for* $0° \leq \theta \leq 360°$

QUESTION 5

i) *For the curve* $y = x(x^2 - 3)^4$, *find its gradient at the point (2, -1).*

ii) *The first term of an arithmetic series is 10, and the eighth term is 8. What is the sum of the first 21 terms of this series?*

iii)



ABCD is a parallelogram
DA is produced to E
so that AD = AE
Prove that AF = FB

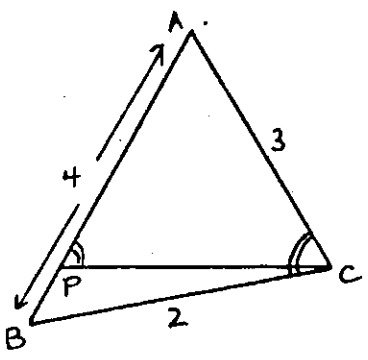
QUESTION 6

i) *SPQR is a quadrilateral in which SQ and PR intersect at T. If ST = TQ and TR = TP, draw a diagram and prove SR || PQ.*

ii) *If* $\hat{APC} = \hat{ACB}$

a) *Prove* $\triangle PAC \;|||\; \triangle ACB$

b) *Find* *i)* *PC*
ii) *AP*



QUESTION 7

i) *A vertical pole of height 15m stands on level ground and a straight wire 30m long joins the top of the pole to a point on the ground. Find:*

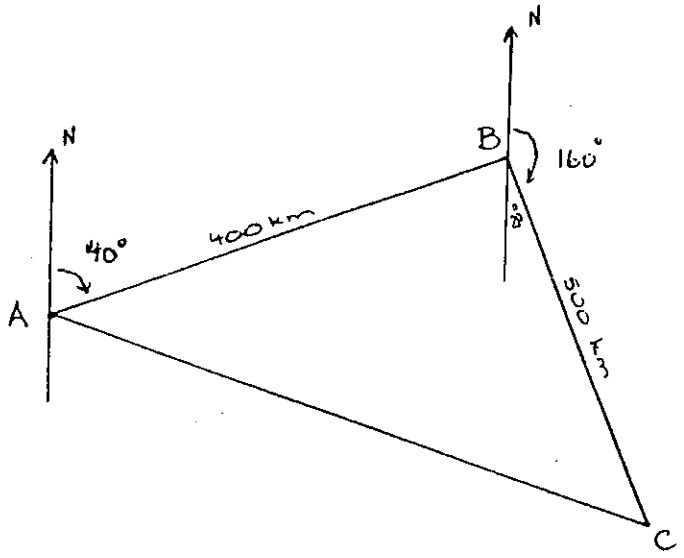
a) *the distance of this point from the foot of the pole.*

b) *the angle the wire makes with the ground.*

ii) *An aircraft flies from point A to point B 400 km on a course 040°. It then flies 500 km on a course 160° from B to a point C. Calculate:-*

a) *the distance AC;*

b) *the bearing of C from A.*



QUESTION 8

i) *A man is to receive a regular payment of $1,500 at the end of each year for 20 years. Instead, the payments are invested immediately at 12% p.a. Find the total amount of the investment at the end of 20 years. (Answer to the nearest $.)*

ii) *If* $F(x) = \frac{3x + 6}{5x - 1}$, *find* $F(1)$ *and* $F(\frac{1}{2})$. *Can* $F(x)$ *have a value for all x? Give reasons.*

iii) *G(x) is defined as:*

$G(x) = 3x$ for $x \geq 1$

$G(x) = 3$ for $-1 < x < 1$.

$G(x) = -x$ for $x \leq -1$.

Find i) $G(-4)$ *and*

ii) $G(\frac{1}{2})$

Sketch the function $G(x)$ *for* $-4 \leq x \leq 4$, *showing important features.*

QUESTION 9

a) The line $5x - ky + h = 0$ passes through $(2, -1)$ and has a gradient of 1. Find k and h.

b) Show that the line $4x - 3y + 5 = 0$ is a tangent to the circle $(x - 1)^2 + (y + 2)^2 = 9$.

c) Find the equation of the straight line which passes through the intersection of the lines:

$5y = x - 3$ and $x = 3y - 2$

and is perpendicular to the line $5x + 3y + 7 = 0$.

QUESTION 10

i) Solve the equations:

a) $\sin x = \cos x \quad (0 \leq x \leq 360°)$

b) $2\sin^2 x - 3 \sin x - 2 = 0 \quad (0 \leq x \leq 180°)$

ii) Evaluate $\lim_{x \to 2} \dfrac{x^2 - 5x + 6}{x - 2}$

iii) a) Show that the curve $y = 2x^3 - 6x + 4$ has a local minimum at $x = 1$.

b) What is the equation of the tangent to the curve at this point?