

THE AMBASSADORS COLLEGE, OTA

MATHEMATICS DEPARTMENT



SSS 1 MATHEMATICS

- In a class of 50 students, 18 play football, 20 volleyball and 21 handball. If 9 play football and volleyball, 6 play football and handball, 11 volleyball and handball while 15 play none of the three games.
 - Represent the information in a Venn diagram.
 - How many students play:
 - all the three games?
 - only one game?
 - only football?
 - If a student is chosen at random from the class, find the probability that the student played only two games.
- Given that $Y = \{-2 \leq x \leq 5\}$ and $W = \{1 < x < 6\}$, illustrate $Y \cap W$ on the number line.
 - x varies jointly as the square of m and the cube of n . When $x = 9$, $m = \frac{3}{4}$ and $n = \frac{1}{2}$
 - determine the relationship between x , m and n .
 - calculate, correct to 3 significant figures, the value of:
 - x when $m = \frac{2}{3}$ and $n = \frac{1}{5}$
 - m when $x = 5$ and $n = \frac{1}{8}$
- A sector of a circle with radius 20cm has an area of 396cm^2 . Calculate, correct to 1 decimal place, the:
 - Sectoral angle
 - Perimeter of the sector.

SSS 1 FURTHER MATHEMATICS

- Given that $A = \begin{pmatrix} 3 & 2 \\ 4 & -6 \end{pmatrix}$, $B = \begin{pmatrix} 4 & 3 & 6 \\ 1 & 8 & -4 \end{pmatrix}$ and $C = \begin{pmatrix} 3 & 2 & 6 \\ 7 & 3 & 0 \\ 1 & 3 & -1 \end{pmatrix}$, find:
 - AB
 - BC
 - AC
- Obtain the first 4 terms of the expansion of the following:
 - $\left(1 + \frac{1}{2}x\right)^{-2}$
 - $(1 + 2x)^{\frac{1}{2}}$
- A train traveling at 45ms^{-1} is brought to rest after covering a distance of 1500m . Find the: (a) time taken to come to rest; (b) uniform retardation.

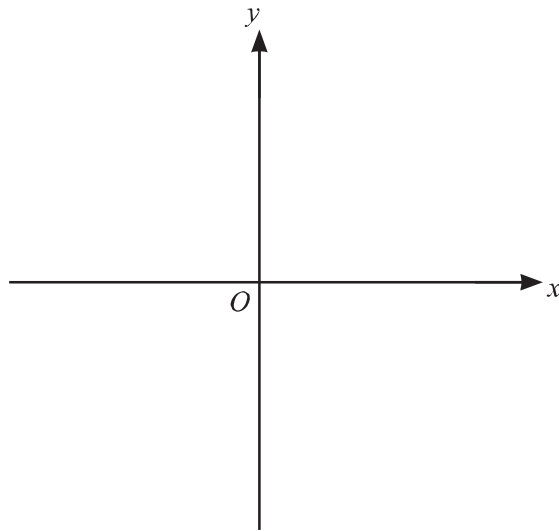
SSS 2 MATHEMATICS

1 A curve has equation $y = x^3 + x^2 - x$

The curve has a stationary point at $\left(\frac{1}{3}, -\frac{5}{27}\right)$.

(a) Find the coordinates of the other stationary point. [5]

(b) By sketching the graph of $y = x^3 + x^2 - x$, determine whether the stationary point $\left(\frac{1}{3}, -\frac{5}{27}\right)$ is a maximum or a minimum.



$\left(\frac{1}{3}, -\frac{5}{27}\right)$ is a [2]

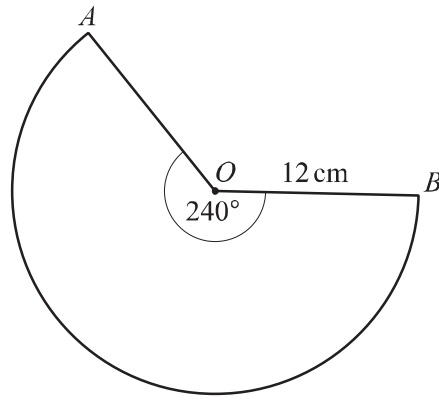
(c) The equation $x^3 + x^2 - x = k$ has fewer than 3 solutions.

Find the range of possible values for k [2]

2 (a) Simplify $\left(\frac{x^2}{4}\right)^{\frac{3}{2}}$ [2]

(b) $16^x \times \left(\frac{1}{2}\right)^x = 4^{x+3}$
 Find the value of x . $x =$ [4]

3



NOT TO SCALE

The diagram shows a major sector, AOB , of a circle. The sector angle is 240° and the radius is 12 cm.

(a) Show that the length of the major arc AB is 16π cm. [1]

(b) OA is joined to OB to form a cone.

Work out the volume of the cone.

Give your answer in the form $\frac{(a\sqrt{b})\pi}{3}$ where a is an integer and b is a prime number
 cm^3 [6]

SSS 2 ADDITIONAL MATHEMATICS

1 Find the coefficient of x^8 in the expansion of $(1-x^2)\left(2x-\frac{1}{x}\right)^{10}$. [5]

2 (a) Write $3 \lg x - 2 \lg y^2 - 3$ as a single logarithm to base 10. [3]

(b) Solve the equation $\log_3 x + \log_x 3 = \frac{5}{2}$. [5]

3 (a) It is given that $2 + \cos \theta = x$ for $1 < x < 3$ and $2 \operatorname{cosec} \theta = y$ for $y > 2$. Find y in terms of x . [4]

(b) Solve the equation $3 \cos \frac{\phi}{2} = \sqrt{3} \sin \frac{\phi}{2}$ for $-4\pi < \phi < 4\pi$. [5]

4 Find the exact values of k such that the straight line $y = 1 - k - x$ is a tangent to the curve $y = kx^2 + x + 2k$. [4]