SEKOLAH BUKIT SION (HIGH SCHOOL)

CENTRE NUMBER: ID 138

CANDIDATE NUMBER: | | | | |

CANDIDATE NAME:

ADDITIONAL MATHEMATICS **0606/12**
PAPER 1 **May/June 2022**

E-PORTFOLIO (SPECIMEN 2) **29 MARCH 2022**
80 minutes

INSTRUCTIONS:

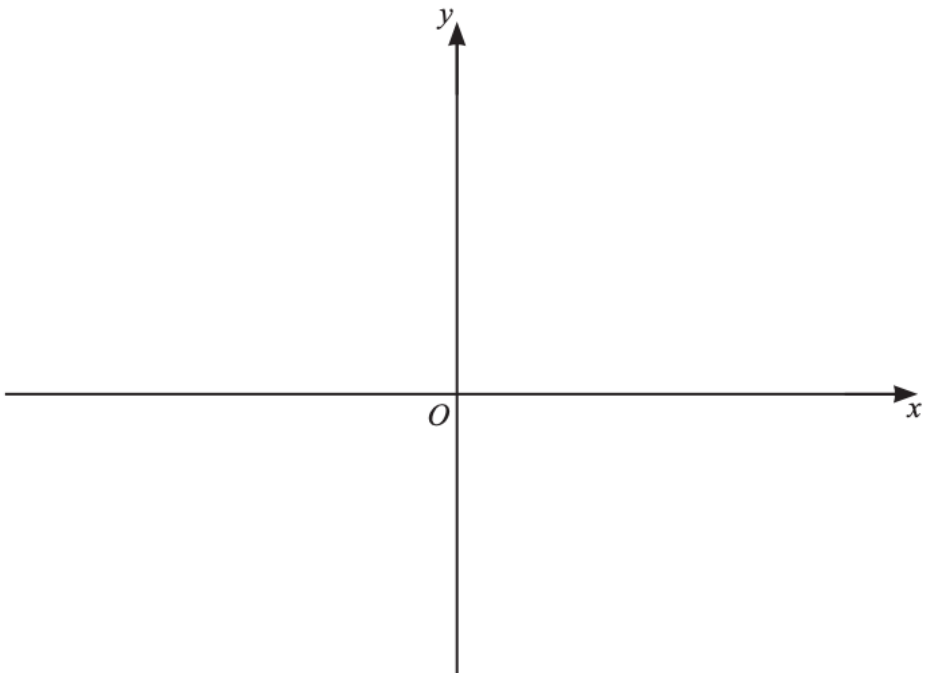
- Answer all questions.
- Use a black or dark blue pen.
- Use HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes provided in each page.
- Write your answer to each question in the space provided.
- Do not use an erasable pen or correction fluid or tape.
- You may use a scientific calculator where appropriate.
- You must show all necessary working clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- Use the calculator value of π or 3.142.

INFORMATION:

- The total number of marks in this paper is 60.
- The number of marks for each question or part question is shown in brackets [].

Question 01

(a) On the axes, sketch the graph of $y = |(x - 3)(x - 1)|$ stating the intercepts with the coordinate axes. [3]



(b) Write down the range of values of k such that $|(x - 3)(x - 1)| = k$ has 4 solutions. [1]

Question 02

Do not use a calculator in this question.

Simplify. [3]

$$\frac{5+6\sqrt{5}}{6+\sqrt{5}}$$

Question 03

(a) Write the expression $x^2 - 5x + 1$ in the form $(x + a)^2 + b$, where a and b are constants. [2]

(b) Hence write down the coordinates of the minimum point on the curve $y = x^2 - 5x + 1$. [1]

Question 04

Solve the following equations.

(a) $2x - 11\sqrt{x} + 12 = 0$ [3]

(b) $5(2^{2p+1}) - 17(2^{p}) + 3 = 0$ [4]

Question 05

Find, in simplest forms, the $\frac{\mathrm{d}}{\mathrm{d}x}$ of $(x + 2)^3 \sqrt{2x - 1}$.

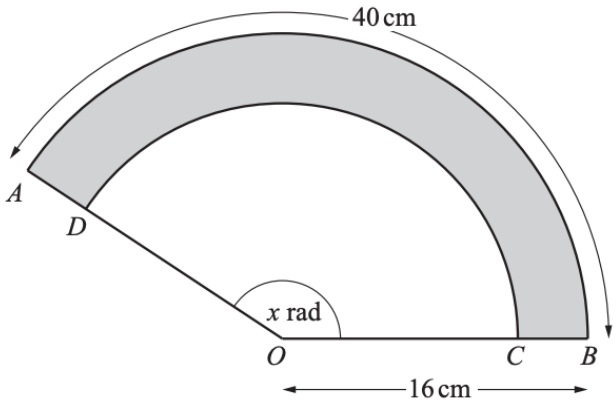
Hence, find the equation of the tangent and of the normal to $y = (x + 2)^3 \sqrt{2x - 1}$ at $x = 1$. [9]

Question 06

In the diagram *AOB* and *DOC* are sectors of a circle centre *O*.
The angle *AOB* is *x* radians. The length of the arc *AB* is 40 cm and the radius *OB* is 16 cm.

If the ratio of the areas sector *AOB* : sector *DOC* is 49 : 64,

find the area of the shaded region. [4]



Question 07

(a) Find the unit vector of $\begin{pmatrix}12\\-5\end{pmatrix}$. [2]

(b) Find the vector which has magnitude 39 and is the same direction as $\begin{pmatrix}12\\-5\end{pmatrix}$. [2]

(c) Given that $\mathbf{a} = \begin{pmatrix}2\\-1\end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix}-4\\5\end{pmatrix}$, find the constants λ and μ such that $5\mathbf{a} + \lambda\begin{pmatrix}4\\6\end{pmatrix} = \mu\mathbf{b}$. [4]

Question 08

(a) (i) Show that $\cos\theta \cot\theta + \sin\theta = \operatorname{cosec}\theta$. [3]

(ii) Hence, solve $\cos\theta \cot\theta + \sin\theta = 4$ for $0° \leq \theta \leq 90°$. [2]

(b) Solve $\sin 2x = \sqrt{3}\cos 2x$ for $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$ radians. [4]

Question 9

(a) Four parts in a play to be given to four of the girls chosen from the seven girls in a drama class. Find the number of different ways in which this can be done. [2]

(b) Three singers are chosen at random from a group of 5 Chinese, 4 Indian and 2 British singers. Find the number of different ways in which this can be done if

(i) no Chinese singer is chosen, [1]

(ii) one singer of each nationality is chosen, [2]

(iii) the three signers chosen are all of the same nationality. [2]

Question 10

The population, P, of a certain bacterium t days after the start of an experiment is modelled by $P = 800e^{kt}$, where k is a constant.

(a) State what the figure 800 represents in this experiment. [1]

(b) Given that the population is 20 000 two days after the start of the experiment, Calculate the value of k. [3]

(c) Calculate the population three hours after the start of the experiment. [2]

**** E N D O F EXAM ****