



SEKOLAH BUKIT SION (HIGH SCHOOL)

CENTRE NUMBER: ID 138

CANDIDATE NUMBER:

CANDIDATE NAME:

**ADDITIONAL MATHEMATICS
PAPER 2**

**0606/22
May/June 2022**

E-PORTFOLIO (SPECIMEN 3)

**31 MARCH 2022
120 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 80.
- The number of marks for each question or part question is shown in brackets [].

Question 01

Find the values of the constant k for which $(2k - 1)x^2 + 6x + k + 1 = 0$ has real roots. [5]

Question 02

Find the value of the constants p and q given that $\frac{6^p \times 8^{p+2} \times 3^q}{9^{2q-3}} = 2^7 \times 3^4$. [3]

Question 03

The polynomial $p(x) = mx^3 - 29x^2 + 39x + n$, where m and n are constants, has a factor $(3x - 1)$ and remainder 6 when divided by $(x - 1)$.

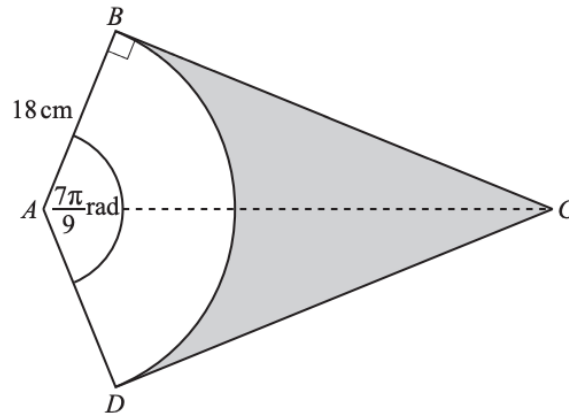
Show that $(x - 2)$ is a factor of $p(x)$. [6]

Question 04

Given that $y = 2(7^{2x}) - 3(7^{x+1}) + 19$, find the value of x when $y = 30$. [4]

Question 05

DAB is a sector of a circle, centre A , radius 18 cm. The lines CB and CD are tangents to the circle. Angle DAB is $\frac{7\pi}{9}$ radians.



(a) Find the perimeter of the shaded region. [3]

(b) Find the area of the shaded region. [3]

Question 06

The functions f and g are defined for real values of x by

$$f(x) = \sqrt{x-1} \text{ for } x > 1 \quad \text{and} \quad g(x) = \frac{x-2}{2x-3} \text{ for } x > 2$$

(a) Find $gf(37)$. [1]

(b) Find an expression for $f^{-1}(x)$, the inverse of $f(x)$. [2]

(c) Find an expression for $g^{-1}(x)$, the inverse of $g(x)$. [2]

Question 07

DO NOT USE A CALCULATOR IN THIS QUESTION.

Simplify $\frac{1}{1+\sqrt{3}} - \frac{\sqrt{3}}{3+2\sqrt{3}}$, giving your answer as a fraction with an integer denominator. [4]

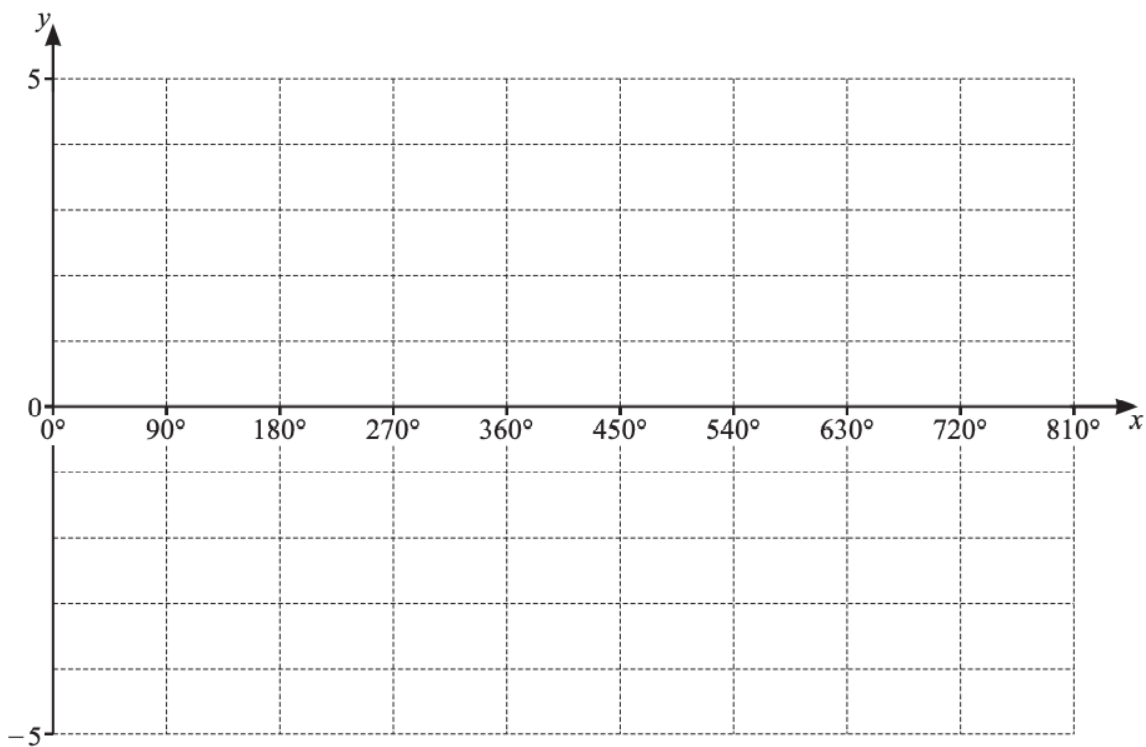
Question 08

The function is defined, for $0^\circ \leq x \leq 810^\circ$, by $f(x) = -2 + \cos \frac{2x}{3}$.

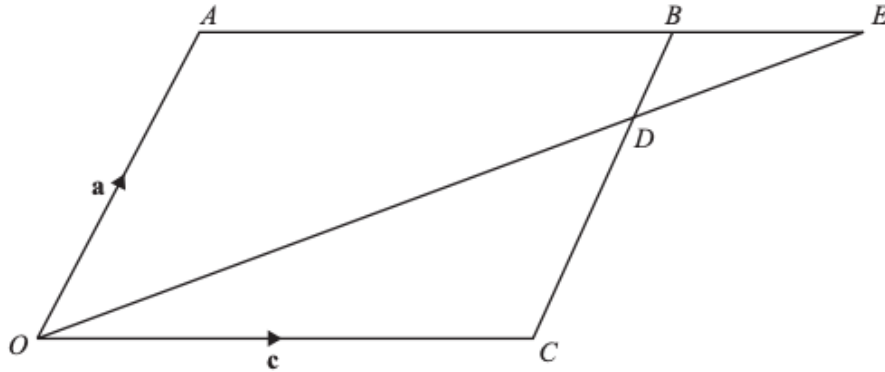
(a) Write down the amplitude of f . [1]

(b) Find the period of f . [2]

(c) On the axes, sketch the graph of $y = f(x)$. [2]



Question 9



The diagram shows the parallelogram $OABC$, such that $\vec{OA} = \mathbf{a}$ and $\vec{OC} = \mathbf{c}$.

The point D lies on CB such that $CD : DB = 3 : 1$.

When extended, the lines AB and OD meet at the point E .

It is given that $\vec{OE} = h\vec{OD}$ and $\vec{BE} = k\vec{AB}$, where h and k are constants.

(a) Find \vec{DE} in terms of \mathbf{a} , \mathbf{c} and h . [4]

(b) Find \vec{DE} in terms of \mathbf{a} , \mathbf{c} and k . [1]

(c) Hence find the value of h and k . [4]

Question 10

(a) Solve the equation $5\tan x - 3\cot x = 2\sec x$, where x is in radians and $0 \leq x \leq 2\pi$. [6]

(b) Find the value of a such that $2\log_a 8 = \frac{3}{2}$. [2]

Question 11

(a) Solve the inequality $2x^2 - 16x + 1 \geq x - 20$. [3]

(b) Find the equation of the normal to the curve $y = x^3 + x^2 - 4x + 6$ at $x = 2$. [5]

Question 12

A curve has equation $y = \frac{(x^2 - 5)^{\frac{1}{3}}}{x + 1}$ for $x > -1$.

(a) Show that $\frac{dy}{dx} = \frac{Ax^2 + Bx + C}{3(x+1)^2(x^2-5)^{\frac{2}{3}}}$ where A , B and C are integers. [6]

(b) Find the x -coordinate of the stationary point on the curve.

[2]

(c) Determine the nature of this stationary point.

[2]

Question 13

Marc chooses 5 people from 4 men, 4 women and 2 children.

Find the number of ways that Marc can do this

(a) if there are no restrictions, [1]

(b) if at least 2 men are chosen [3]

(c) if at least 1 man, at least 1 woman and at least 1 child are chosen. [3]

**** END OF EXAM ****