INSTRUCTIONS TO CANDIDATES

To be read by the external invigilator to all candidates

1. There are 3 printed pages in the question booklet and 8 printed pages in the answer booklet. There is a one-page formula sheet included as an insert.

2. The answer booklet is enclosed in the centre of this booklet. Take out the answer booklet now.

3. Check that you have the correct number of pages.

4. Write your province, school and candidate number, your name and your school name in the space provided in the answer booklet.

5. This paper contains 25 questions in 3 sections:

   Section A consists of 8 questions worth 1 mark each.

   Section B consists of 9 questions worth 2 marks each.

   Section C consists of 8 questions worth 3 marks each.

   Total **50** marks. Answer **ALL** questions.

6. Calculators, rulers and protractors are allowed.

7. Answer all questions on the answer sheet. Answers on any other paper including rough work paper and the question paper will not be marked

8. ALL working must be shown step by step to get full marks. Students may lose marks for writing down final answers only.

9. Enough spaces have been allocated for answers to every question. Questions must be answered in spaces as allocated. Answers all over the answer booklet may not be marked.

10. Rubbers and Correctional Fluid are not allowed on the answer sheet. Where you have made an error, cross out all the working and start on a new line.

11. **Graphical Calculators are NOT permitted.**

THE PENALTY FOR CHEATING OR ASSISTING OTHERS TO CHEAT IN NATIONAL EXAMINATIONS IS NON-CERTIFICATION.

DO NOT TURN OVER THE PAGE AND DO NOT WRITE UNTIL YOU ARE TOLD TO START.

SECTION A (QUESTIONS 1 TO 8)

These questions are worth 1 mark each

QUESTION 1

Transpose for r in $V = \dfrac{4}{3}\pi r^3$

QUESTION 2

Simplify $1 - \dfrac{3x+1}{1-x}$

QUESTION 3

$2 + \sin \varnothing$ can never be negative.
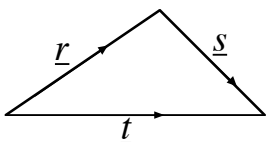
Is this true or false?

QUESTION 4

Find the derivative of $y = x^2 - 3x + 4$

QUESTION 5

Find the exact value of the product $\sec \theta \csc \theta$ given that $\sin \theta = \dfrac{3}{5}$ and $\cos \theta = \dfrac{4}{5}$

QUESTION 6

Express vector $\underline{s}$ in terms of vectors $\underline{r}$ and $\underline{t}$.

QUESTION 7

Solve for x, $2^x = \dfrac{1}{16}$

QUESTION 8

Find the tenth term of the sequence

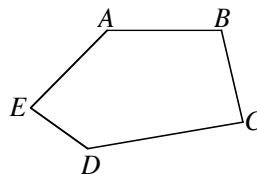$1, \dfrac{1}{a}, \dfrac{1}{a^2}, \ldots\ldots$

SECTION B (QUESTIONS 9 TO 17)

These questions are worth 2 marks each

QUESTION 9

Find the __exact__ value of $\sin 2\theta = 2\sin\theta\cos\theta$ given that $\cos\theta = \dfrac{2}{3}$, $0 < \theta < \dfrac{\pi}{2}$

QUESTION 10

Find a single vector which is equal to

  a) $\overrightarrow{BC} + \overrightarrow{CA}$

  b) $\overrightarrow{BA} + \overrightarrow{AE} + \overrightarrow{EC}$

QUESTION 11

Solve for x

$\dfrac{2}{2-x} = \dfrac{x+1}{1-x}$

QUESTION 12

Solve for x. Write your answer without index.

$x^{\frac{3}{2}} = \dfrac{1}{8}$

QUESTION 13

The gradient of the tangent line to the curve $y = ax^2 + 4x - 5$ at $x = 2$ is 10.

Find the value of a.

QUESTION 14

The series $\dfrac{1}{3} - \dfrac{1}{6} + \dfrac{1}{12} - \ldots$ is geometric.

  a) What is the common ratio?

  b) Find T_4

QUESTION 15

A stone is projected vertically upwards and its height in metres after t seconds is given by $h = 50t - t^2$.

Find the time taken for the stone to first reach a height of 120 metres.

QUESTION 16

a) The line $5x + ky = 12$ passes through the point (2, -1). Find the value of k.

b) Find an equation of a line that is parallel to the line in part (a).

QUESTION 17

Let $p(x) = x^3 + 4x^2 + x - 6$.

Find a polynomial $g(x)$ and a constant (remainder) r, such that $p(x)$ can be expressed in the form $p(x) = (x - 2)g(x) + r$

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SECTION C (QUESTIONS 18 TO 25)
These questions are worth 3 marks each

QUESTION 18

The graphs of $y = x^2 - 3x$ and $y = 2x - x^2$ intersect at two points. Find the values of x where the graphs intersect.

QUESTION 19

Show that

$$\sin x - \frac{1}{2}\sin^2 x + \frac{1}{4}\sin^3 x - \frac{1}{8}\sin^4 x + \ldots = \frac{2\sin x}{2 + \sin x}$$

QUESTION 20

A light aircraft takes off flying due north then turns and flies 1100 metres due west. The plane now has a bearing of 340° from its starting point.

How far is it from its starting point?

QUESTION 21

Draw and shade in the region, satisfied by the following inequalities

$x - y \le -1$

$x + y < 3$

$x \ge 0$

QUESTION 22

Find the equation of a straight line that passes through the midpoint of the line joining the points (-3,8) and (3,2) and is perpendicular to the line connecting the points (-3,8) and (3,2).

QUESTION 23

A sports field has circular ends and straight sides as illustrated. The circular ends have radius 22m, and the straight side has length 90m.
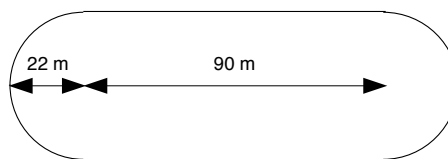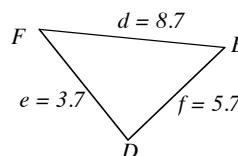

Find the area of the field.

QUESTION 24

Differentiate $f(x) = 2x^2 - x - 1$ from <u>first principles</u>.

QUESTION 25

In triangle DEF, DE = 5.7cm, EF = 8.7cm and DF = 3.7cm. Find angle EDF in degrees to 3 decimal places.

END OF EXAMINATION