MATHEMATICS HOLIDAY WORK

TIME: $2\frac{1}{2}$ **HOURS**

Instructions: Attempt all from **Section A** and **Section B**

1. Express 2.454545...as a fraction in its simplest form.

2. Find the equation of the line which passes through the point (-1, 2) and is parallel to the line x + 2y = 3.

3. Given that f(x) = ax - 7 and f(8) = 17. Find the value of :   (i) a   (ii) f(4)

4. The scale on a map is 1:5000. A rice field is represented on the map by an area of 2.6 cm^2. Find the actual area in km^2.

5. Find the L.C.M and H.C.F of 15, 45 and 90.

6. Form a quadratic equation whose roots are 3 and -2   .

7. If F ={ All factors of 12 } and P = { All Prime numbers less than 20 }
    (a) Find the members of F ∩ P.
    (b) Hence find ∩(F ∩ P)

8. Given that $\sin \theta = \frac{3}{5}$ and θ is an acute angle, find without using tables or a calculator

   the value of $\cos \theta$.

9. Make e the subject of the formula $b^2 = a^2\left(1 - e^2\right)$ and hence find e if $a = 10 \ and \ b = 8$.

10. Factorize completely 8a^2 - 18b^2

SECTION B:

11. (a) Given the matrices $P = \begin{pmatrix} 3 \\ 0 \\ 7 \end{pmatrix}$, $Q = \begin{pmatrix} 2 & 2 & 1 \\ 3 & 4 & 0 \\ 0 & 1 & -2 \end{pmatrix}$. State the order of each matrix and

    find QP. *(05 mks)*

(b) Use matrix method to solve the pair of simultaneous equations: *(07 mks)*

$$8x - 2y = 28$$
$$5x + 3y = 9.$$

12. (a) If A and B are points with coordinates A (2, -4) and B (4, -12). Find:
    (i) The length of **AB**
    (ii) M the midpoint of **AB**
    (iii) $|OM|$

    (b) Given vector $\mathbf{a} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$, $\mathbf{b} = \begin{pmatrix} 4 \\ 10 \end{pmatrix}$, $\mathbf{c} = \begin{pmatrix} 1 \\ -2 \end{pmatrix}$. Evaluate
      (i)   The length of $\mathbf{a} + \mathbf{b} + \mathbf{c}$
      (ii)   The length of $2\mathbf{a} + \dfrac{1}{2}\mathbf{b}$

                                                (12 marks)

13. a) Draw a graph of $y = 2x^2 + x - 6$ for values of x from -3 to 3.

   b) Using the graph find the values of x for which $2x^2 + x - 6 = 0$

   c) Find the values of x for which $2x^2 + x - 6 = 4$ using the same graph in (a) above.

                                                (12 marks)

14. a) Simplify $4 \times 2^{n+3} \quad \text{x} \quad 16^{\frac{1}{2}}$

    b)   Simplify $\sqrt{20} + \sqrt{45} - \sqrt{80}$

    c)   Express $\dfrac{2\sqrt{3} + 5\sqrt{2}}{\sqrt{2} - \sqrt{3}}$ in the form $A + B\sqrt{C}$

                                                  (12 marks)

15. The masses of **40** candidates measured to the nearest kilogram are as follows:

46	52	62	55	61	48	57	46
70	60	54	49	47	52	48	52
60	55	50	53	64	54	54	53
57	58	51	64	56	61	52	58
41	59	57	44	51	58	68	65

(a) Construct a frequency distribution table with equal class intervals beginning

with 41 – 45 class.   *(3 marks)*

(b) Calculate the;

(i) mean mass of the candidates,   (2 marks)

(ii) Mode   (3 marks)

(c)   Using graph paper, draw an ogive and use it to estimate the median. (4 mks)

16. Using a ruler, a pencil and pair of compasses only,
- (i)   Construct triangle ABC such that AB=8cm, BC=12cm and angle BAC=120^0 .
- (ii)   Construct the perpendicular from A onto BC to meet it at D. Measure the length AD.
- (iii)   Draw a circle circumscribing triangle ABC. Measure its radius.
- (iv)   Find the area of triangle circumscribing circle.   (12 marks)

17. A triangle with vertices **A** (2, 0) , **B** (2, -3) and **C** (0, -3) undergoes a translation

$T = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ to give triangle $A'B'C'$. Triangle $A'B'C'$ is enlarged by a scale factor of -2 using point

(1, 2) as the centre of enlargement to give triangle A**"**B**"**C**".** Plot triangle ABC on a Cartesian plane and use it to:
- (a) Find (i) the coordinates of triangle $A'B'C'$.
-       (ii) the coordinates of triangle A**"**B**"**C**".**
- (b) Find the area of triangle $A"B"C"$.   (12 marks).

END