FORM 4 MATHEMATICS
APRIL HOLIDAY ASSIGNMENT - 2024

1. The equation of a carve is $Y = 3X^2 - 4X + 1$
   a. Find the gradient function of the curve and its value when X=2.
   b. The equation of the tangent at point (2,5)
   c. The angle which the tangent to the curve at point (2,5) makes with horizontal.
   d. The equation of the line through the point (2,5) which is perpendicular to the tangent in b.(i)

2. A particle move in a straight line such that its displacement S meters from a given point is $S=t^3 - 5t^2 + 3t + 4$ where t is the time in seconds. Find

   a. The velocity of the particle at t = 5
   b. The velocity of the particle at t = 5
   c. The value of t when the particle is momentarily at rest.
   D Acceleration of the particle when t = 2.

3. For a sample of 100 bulbs, the time taken for each bulb to burn was recorded. The table below shows the result of the measurements.

Time (hours)	Number of bulbs
15 - 19	6
20 - 24	10
25 - 29	9
30 - 34	5
35 - 39	7
40 - 44	11
45 - 49	15
50 - 54	13
55 - 59	8
60 - 64	7
65 - 69	5
70 - 74	4

   a. Using an assumed mean of 42, calculate
      i. The actual mean of distribution
      ii. The standard deviation of the distribution
   b. Calculate the quartile deviation

4. The heights of 100 maize plants were measured to the nearest centimeter and the results recorded in the shown below.

Height x(cm)	Frequency	d	D^2	fd	Fd^2	Cf
25 - 29	5			-15		5
30 - 34	12			-24		17
35 - 39	18	-1	1	-18		35
40 - 44	30	0	0	0		65
45 - 49	17	1	1			
50 - 54	11	2				
55 - 59	7	3				

   a. Complete the table
   b. Calculate to 2 d.p
      i. The mean
      ii. The standard deviation
   c. Using the data above plot an orgive and use it to the quartile deviation.

5. a. Fill the table below

x	0	15	30	45	60	75	90	120	150	180
3Sinx - 1	-1		0.5		1.6		2			
Cos x	1		0.87	0.71	0.5		0	-0.5	-0.87	-1

   b. Using the same axis draw on the graph paper provided, the graph of $Y = 3 \sin x - 1$ and $Y = \text{Cos } X$ for $O^o \leq x \leq 180^o$.
   c. Use your graph to solve the equation
      i. $3\sin x - \text{Cos } x = 1$

ii. $3 \sin x = 1$

d. State the amplitude of the curve $y = 3 \sin x - 1$

6. Complete the table below for the functions $Y = 3 \sin 3\Theta$ and $Y = 2 \cos (\Theta + 40^o)$

Θ	O^O	10^O	20^O	30^O	40^O	50^O	60^O	70^O	80^O	90^O
$3\text{Sin } 3\Theta$	0	1.50		3.00			0.00			-3.0
$2\text{Cos}(\Theta+40^o)$	1.53	1.29			0.35			-0.69		-1.29

a. On the grid provided, draw the graphs of $Y = 3\text{Sin } 3\Theta$ and $Y = 2\text{Cos } (\Theta + 40^o)$ on the same axes. Take 1cm to represent 5^o on the x-axis and 4cm to represent 1 unit on the Y – AXIS.

b. From the graph find the roots of the equation

i. $\frac{3}{4} \sin 3\Theta = \frac{1}{2}\cos (\Theta + 40^o)$

ii. $2Cos\ (\Theta + 40^o) = O$ in the range $O^o \leq \Theta \leq 90^o$

7. A plane leaves an airport P at (10^o S, 62^o E) and flies due at north 800km/h

a. Find its position after 2 hrs.

b. The plane turns and flies at the same speed due west. It reaches Q longitude of 12^o W.

i. Find the total distance it has travelled in nautical miles.

ii. Find the time it has taken (Take 1 nautical mile to be 1:853km)

c. If the local time at P was 1300hrs when it reached Q. Find the local time at Q when it landed at Q.

8. An aeroplane that moves at a constant speed of 600knots flies from town A (14^oN, 30^oW) southwards to town B (X^o S, 30^OW) taking 3½hrs. It then changes direction and flies along latitude to town C (X^OS, O^OE). Given π=3.142 and radius of the earth r = 6370km.

a. Calculate

i. The value of X

ii. The distance between town B and town C along the parallel of latitude in km.

b. D is an airport situated at (5^oN, 180^OW), calculate:

i. The time the aeroplane would take to fly C to D following a great circle through the south pole.

ii. The local time at D when the local time A is 12.20p.m.

9. An aircraft leaves A (60^oN, 13^OW) at 1300 hours and arrives at B (60^ON, 47^OE) at1700 hrs.

a. Calculate the average speed of the aircraft in knots.

b. Town C (60^oN, 133^O) has a helipad. Two helicopters S and T leaves B at the same time. S moves due West to C while T moves due North to C. If the two helicopters are moving at 600 knots, find:

i. The time taken by S to reach C.

ii. The time taken by T to reach C.

C. The local time at a town D (23^oN, 5^Ow) IS 1000 hours. What is the local time at B.

10. Complete the table giving your values correct to 2 d.p.

X	O^O	15^O	30^O	45^O	60^O	75^O	90^O	105^O	120^O
$3\text{Cos } X^O$	3.00		2.60		1.50		0	-0.78	
$4\text{Sin}(2x\text{-}10^o)$		1.37		3.94	3.76		0.69		-3.06

b. Taking one cm to represent 15^o on the x-axis and 2cm to represent 1 unit on the Y-axis, draw the graphs of $Y=3\text{Cos } X^o$ and $Y = 4\text{Sin}(2x\text{-}10^o)$ on the same set of axis on the grid provided.

c. Use your graph to find values of x for which $3\text{Cos}x – 4\text{sin } (2x\text{-}10^o) = o$.

d. State:

i. The amplitude of the graph $Y = 3\text{Cos } x$.

ii. The period of the graph $Y = 4\text{Sin } (2x – 10^o)$.

11. a. On the graph paper provided, draw the locus that satisfies the conditions.

$X – y \geq 0$

$(x – 2)^2 + (y – 2)^2 \leq 16$

$X < 5$

$Y \quad 0$

b. Name the locus of P

c. Find the approximate area of the region representing the locus of P.

d. P represents a flower garden in Juhudi High School. What distance does a student cover when he goes round it once?