MID-TERM 1 EXAMINATION

FORM 4: MATHEMATICS

TIME: 2 HRS

**SECTION I:** *Answer all question in this section on the spaces provided*

1. Without using calculators or mathematical tables, evaluate, leaving your answer in surd form

$\frac{\sin(60^{0}×\cos(30^{0}))}{\tan(30^{0}\sin(30^{0}))}$ (3mks)

1. The mass in kg of nine sheep in a pen were 13, 8, 16, 17, 19, 20, 15, 14, and 11. Determine the quartile deviation (3mks)
2. Find
	1. The equation of the tangent to the curve $y=2x^{2}+2$ at (2, 8). (3mks)
	2. The equation of the normal to the curve at the same point. (2mks)
3. The figure below is a sketch of a curve whose equation is $y=x^{2}+x+5$.

It cuts the line y = 11at points P and Q.



Find the area bounded by the curve $y=x^{2}+x+5$ and the line y = 11 using the trapezium rule with 5 strips

1. Using a ruler and a pair of compasses only:
	1. Construct a parallelogram PQRS in which PQ=6 cm, and QR = 4 cm and angle SPQ = 750  (3mks)
	2. Determine the perpendicular distance between PQ and SR (1mk)

**SECTION II (30MKS): *Answer any three questions from this section in the spaces provided***

1. A quadrilateral with vertices at K(1,1), L(4,1), M(2,3), and N(1,3) is transformed by matrix T= $\left[\begin{matrix}1&3\\0&1\end{matrix}\right]$ to quadrilateral K’L’M’N’.
	1. Determine the coordinates of the image (3mks)
	2. On the grid provided, draw the object and the image (2mks)
	3. Describe fully the transformation which maps KLMN onto K’L’M’N’ (2mks)
		1. Determine the area of the object (1mk)
	4. Find the matrix which maps K’L’M’N’ to KLMN (2mks)
2. The positions of three ports A, B, and C are (340N, 160W), (340N, 240E) and (260S, 160W) respectively.
	1. Find the distance in nautical miles between;
		1. Ports A and B to the nearest nautical mile. (3mks)
		2. Ports A and C (2mks)
	2. A ship left port A on Monday at 1330 h and sailed to port B at 40 knots. Calculate:
		1. The local time at port B when the ship left port A; (2mks)
		2. The day and the time the ship arrived at port B. (3mks)
3. (a) Complete the table below by filling in the blank spaces. (2mks)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| X | 00 | 150 | 300 | 450 | 600 | 750 | 900 | 1050 | 1200 | 1350 | 1500 | 1650 | 1800 |
| 3cos 2x |  | 2.6 | 1.5 |  | -1.5 | -2.5 | -3 | -2.6 | -1.5 |  | 1.5 |  |  |
| 2sin(2x+300) |  |  | 2 |  | 1 | 0 |  | -1.7 | -2 |  | -1 |  |  |

(b) On the grid provided; draw on the same axis; the graph of y = 3 cos 2x and y = 2sin (2x +300) for 00≤ x ≤1800.

*(Take the scale: 1cm for 150 on the x-axis and 2cm for 1 unit on the y-axis)*. (5mks)



(c) Using the graph in part (b) above;

 (i) Estimate the solution to the equation 3cos 2x – 2 sin (2x+300) = 0 (2mks)

(ii) Estimate the range of values of x for which 3cos 2x ≤ 2 sin (2x + 300) giving your answer to the nearest degree. (1mk)

1. The table below shows the number of goals scored in handball matches during a tournament.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. of goals | 0-9 | 10-19 | 20-29 | 30-39 | 40-49 |
| No. of matches | 2 | 14 | 24 | 12 | 8 |

1. Draw a cumulative frequency curve on the grid provided (5mks)
2. Using the curve drawn in (a) above, determine
	* 1. The median (1mk)
		2. The number of matches in which goals scored were not more than 37 (1mk)
		3. The inter-quartile range (3mks)