KCSE 2022 PREDICTIONS

5 STAR EXAMS SERIES 001/1/2022

121/1 – MATHEMATICS ALT A – PAPER 1

TIME: 2 Hours

Name: …… **Adm No:** ……

Index No: …… **Sign:** …… **Date:** ……

Instructions to candidates

1. The paper contains two sections: **Section I** and **Section II**.
2. Answer **ALL** the questions in **Section I** and **ANY FIVE** questions from **Section II**.
3. Marks may be awarded for correct working even if the answer is wrong.
4. Non-programmable silent electronic calculators and mathematical tables are allowed for use.
5. ***This booklet contains 17 printed pages. Please confirm that all the pages exist and are properly printed before starting the exam.***

For Examiner's use only

Section I

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total

Section II

17	18	19	20	21	22	23	24	Total

Grand Total %

TURN OVER

SECTION I (50 marks)

*Answer **all** the questions in this section in the spaces provided.*

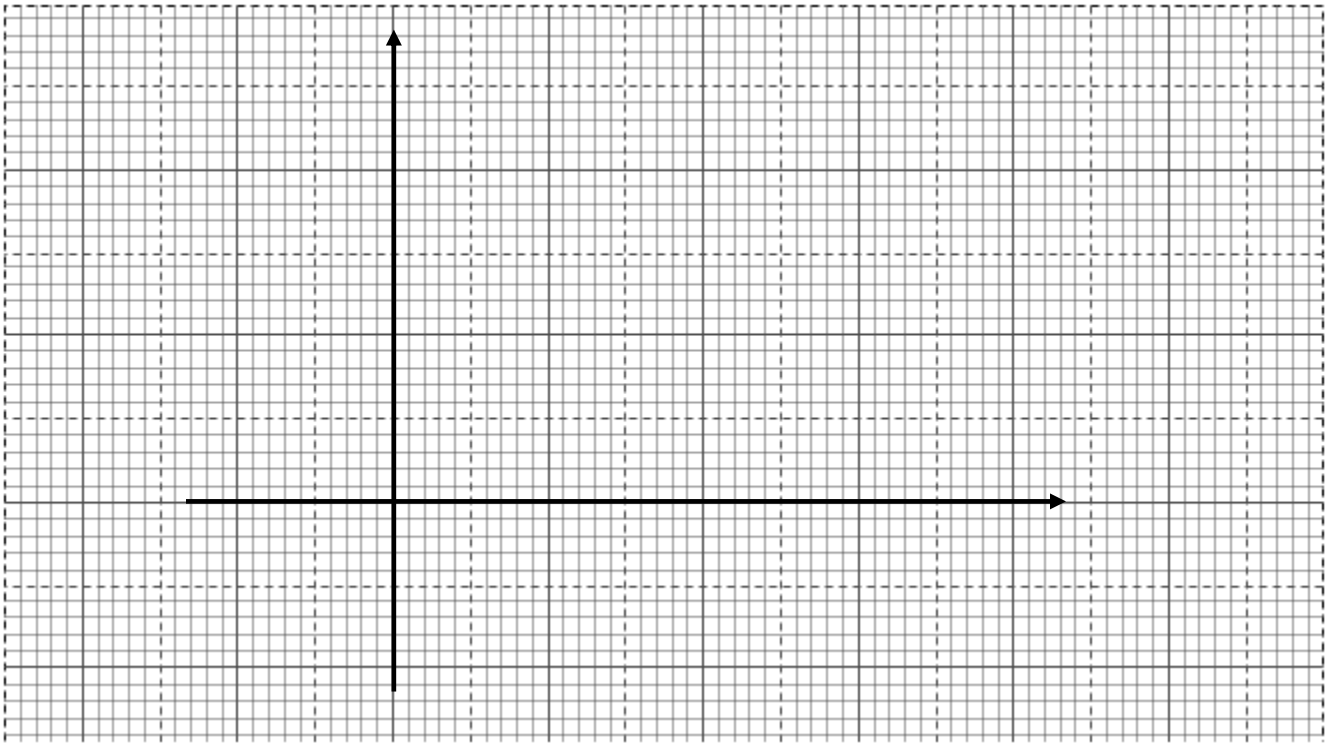
1. Without using a calculator evaluate (3 marks)

$$\frac{-2(5+3)-9\div 3+5}{-3 \times -5+-2 \times 4}$$

2. Solve the equation $3x^2 + 4x = 2$ giving the roots correct to two decimal places. (4 marks)

3. A line which passes through points P(4,a) and Q(2a,2) is parallel to the line whose equation is 2y-3x=6. Find the value of *a.* (3marks)

4. Using the grid provided below, draw and shade the unwanted regions to show the region satisfied by R given the following inequalities; $y + x < 5, y - x \leq 1$ and $x + 5y > 5$ (3 marks)



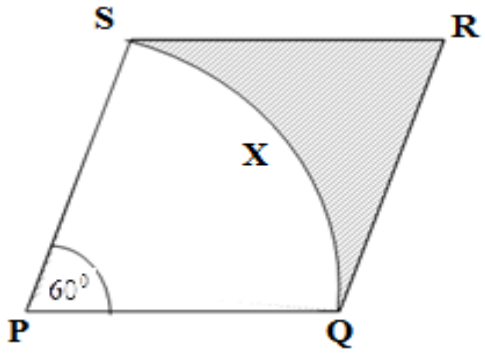
5. Given that $a = -2$, $b = -1$ and $c = 3$, evaluate $\dfrac{2(a+c)^2 - (a-b)(b-c) - 2c}{3(a+b) - 2(b-c)}$ (3 marks)

6. Winnie bought maize and millet flour from a vendor. She then mixed them in the ratio 4:3. She bought the maize flour at kshs.41 per kg and the millet flour at kshs.61 per kg. If she was to sell and make a profit of 20%. What should be the selling price of 1kg of the mixture? Give you answer correct to the nearest 10cent. (3marks)

7. Two boys and a girl shared some money .The elder boy got $\frac{4}{9}$ of it, the younger boy got $\frac{2}{5}$ of the reminder and the girl got the rest. Find the percentage share of the younger boy to the girl's share. (3 marks)

8. Annette has some money in two denominations only. Fifty shilling notes and twenty shilling coins. She has three times as many fifty shilling notes as twenty shilling coins. If altogether she has sh. 3400, find the number of fifty shilling notes and 20 shilling coins. (3 marks)

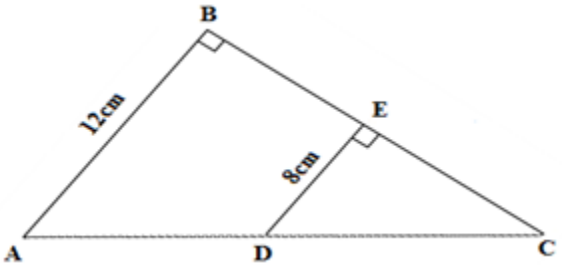
9. The figure below shows a rhombus PQRS with PQ = 9cm and $\angle SPQ=60^0$. SXQ is a circular arc; centre P.



Calculate the area of the shaded region correct to two decimal places. (Take $\pi = \frac{22}{7}$) (4 marks)

10. A particle accelerates uniformly from rest and attains a maximum velocity of 30m/s after 16 seconds. It travels at this constant velocity for the next 20 seconds before decelerating to rest after another 8 seconds. Calculate the total distance covered by the car. (3 marks)

11. The figure below shows a right angled triangle with AB = 12cm. ED is parallel to BA, CE = 6.3cm and ED = 8cm.



Given that the area of EBAD = 31.5cm^2, find the length of BC (4 marks)

12. Find the value of x in the equation $5^{\frac{x}{4}} = \frac{1}{25}$ (3 marks)

13. Given that $\tan x = 2.4$, evaluate without use of tables and calculators, $\sin x - \cos x$ in the form of $\frac{a}{b}$ where a and b are integers. (4 marks)

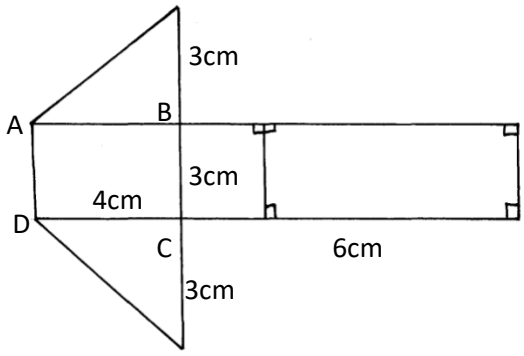
14. The difference between the interior and exterior angles at each vertex of a regular polygon is 162^0. Find the number of sides of the polygon. (2 marks)

15. A number n is such that when it is divided by 27 and 30 or 45, the remainder is always 3. Find the smallest value of n. (2 marks)

16. The net of a solid is shown below.

(a) Sketch the solid if ABCD is the base. (1 marks)

(b) Calculate the angle that the plant height makes with the base. (2 marks)



SECTION II (50marks)

*Answer only **five** questions in this section in the spaces provided.*

17. Three business partners, Bela, Joan and Trinity contributed Kshs. 112, 000, Kshs. 128, 000 and Kshs. 210, 000 respectively to start a business. They agreed to share their profits as follows:
    30% to be shared equally
    30% to be shared in the ratio of their contributions
    40% to be retained for the running of the business.

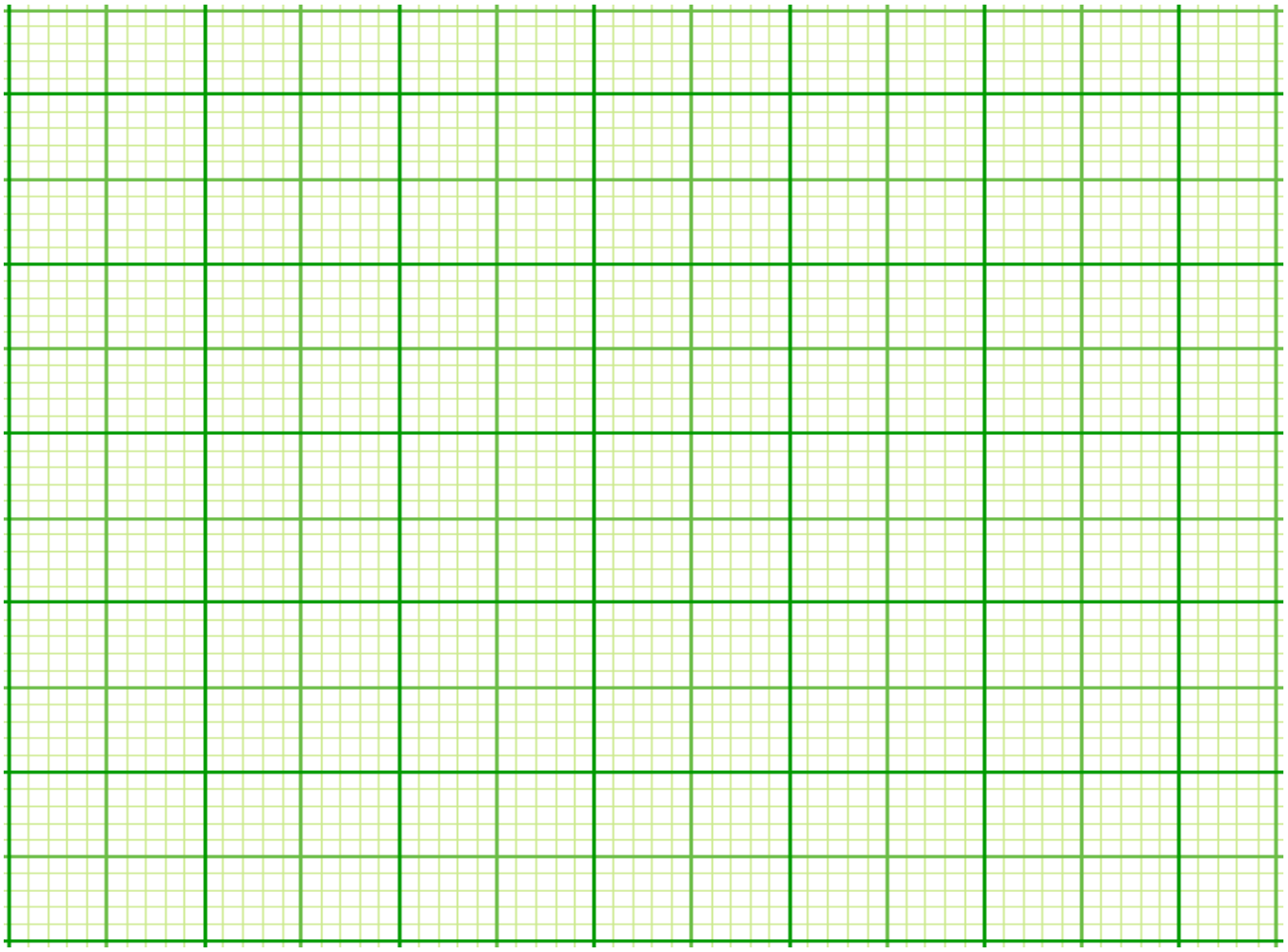
If at the end of the year, the business realized a profit of Kshs. 1. 35million
Calculate:

(a) The amount of money retained for running the business at the end of the year. (1mark)

(b) The difference between the amounts received by Trinity and Bela. (6marks)

(c) Express Joan's share as percentage of the total amount of money shared between the three partners. (3 marks)

18. The vertices of triangle PQR are P(O,O), Q(6, 0) and R(2, 4)
    (a)Draw triangle PQR on the grid provided. (lmark)



b). Triangle P1Q1R' is the image of a triangle PQR under an enlargement scale factor, ½ and Centre (2, 2). Write down the coordinates of triangle $P^1Q^1R^1$ and plot on the same grid. (2 marks)

c). Draw triangle $P^{11}Q^{11}R^{11}$ the image of triangle $P^1Q^1R^1$ under a positive quarter turn about points (1, 1). (3 marks)

d). Draw a triangle $P^{111}Q^{111}R^{111}$ the image of triangle $P^{11}Q^{11}R^{11}$ under reflection in the line y=l. (2marks)

e). Describe fully a single transformation that maps triangle $P^{111}Q^{111}R^{111}$ onto triangle $P^{/}Q^{/}R^{/}$ (2 mks)

19. Chemelil Sugar Academy hall has 200seats. During the District Drama Festival, tickets were sold atsh 150 for a dults and sh 75 for students.
(a)On day one of the festival 80% of the seats in the hall were occupied and twenty of the seats were occupied by students. Calculate the total money collected from the sale of tickets this day.
(3mrks)

(b)On the last day of the festival, **x** students occupied the seats and all seats were occupied. The money collected from the tickets sales was sh 25,350.

(i) Write down an equation of **x**. (2mrks)

(ii) Calculate the value of **x**. (2mrks)

(c)The money collected from the sale of tickets during the festival was divided among cost of hosting,allowances for adjudicators and electricity bill in the ration 7: 3: 2. If the allowances amounted to sh 126,000 calculate the

(i) Amount collected during the festival. (3mrks)

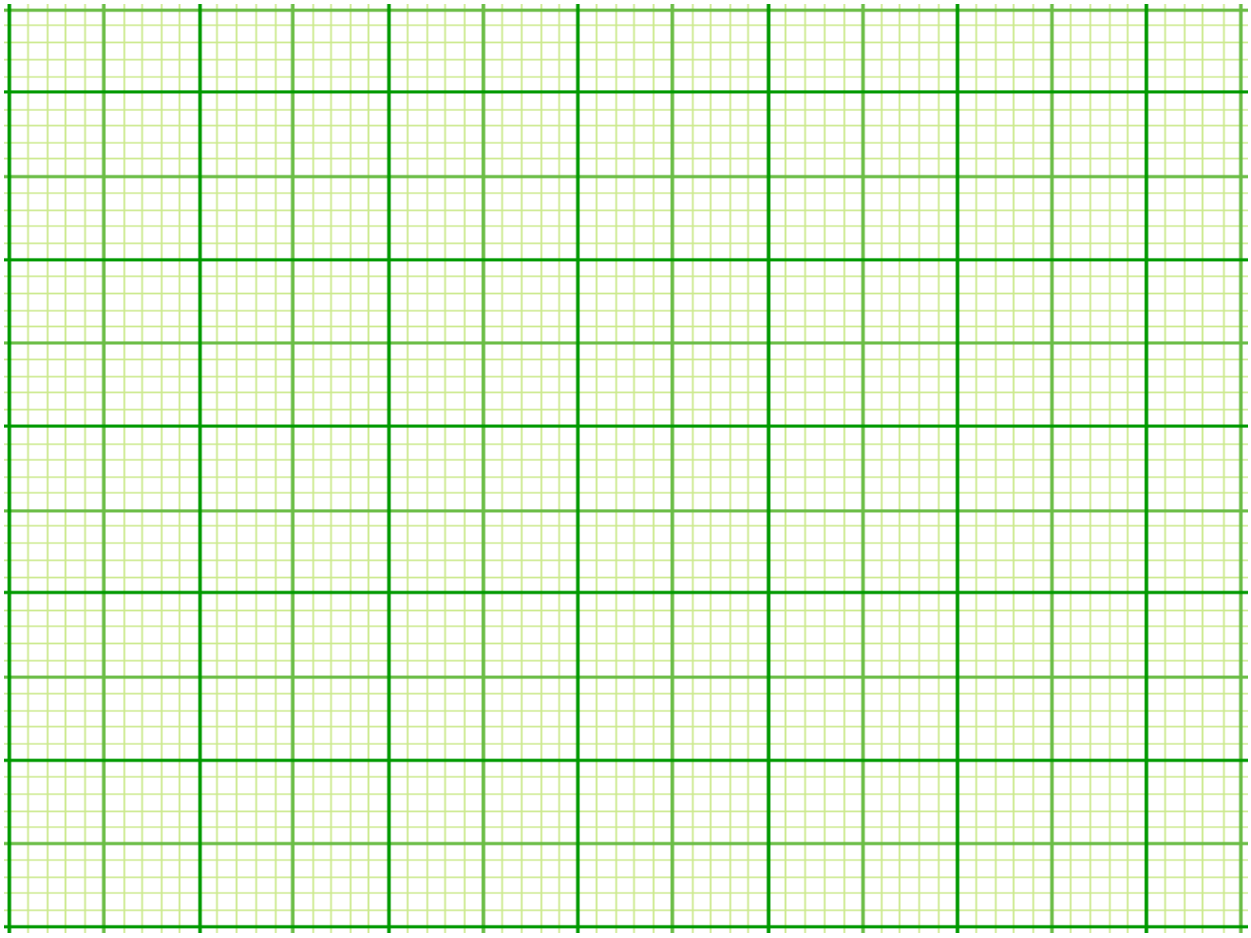
(ii) The cost of electricity bill during the festival. (1mrk)

20. Complete the table below for the function $y = x^3 + 6x^2 + 8x$ for $-5 \le x \le 1$ (3 marks)

x	-5	-4	-3	-2	-1	0	1
x^3	-125	-64			-1	0	1
$6x^2$			54		6	0	
$8x$	-40		-24	-16		0	8
y		0	3			0	15

(a) Draw the graph of the function $y = x^3 + 6x^2 + 8x$ *for* $-5 \le \times \le 1$ (3 marks)

(Use a scale of 1cm to represent 1 unit on the x axis. 1 cm to represent 5 units on the y-axis)



(b) Hence use your graph to estimate the roots of the equation

$x^3 + 5x^2 + 4x = -x^2 - 3x - 1$ (4 marks)

21. Three islands P, Q, R and S are on at ocean such that island Q is 400kmon a bearing of 030^0 from island P. Island R is 520kmand on a bearing of $120^0$from island Q. A port S is sighted 750km due south of island Q.

(a) Taking a scale of 1cm to represent 100km, give a scale drawing showing the relative positions of P, Q, R and S. (4 marks)

Use the scale drawing to

(b) Find the bearing of:

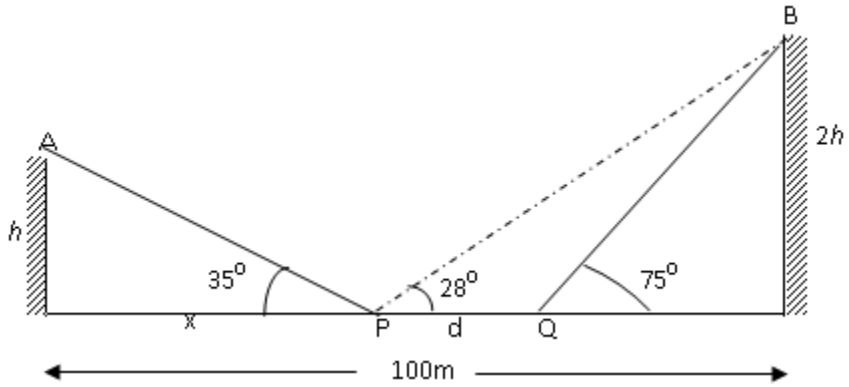
(i) Island R from island P (1 mark)

(ii) Port S from island R (1 mark)

(c) Find the distance between island P and R (2 marks)

(d) A warship T is such that it is equidistant from the islands P, S and R. By construction locate the position of T (2 marks)

22. Two vertical columns A and B of height h and $2h$ respectively stand on level ground and are 100m apart. Two points P and Q are d metres apart, the elevation of the top of A and B from point P are 35^0 and 28^0 respectively and the elevation of top of B from point Q is 75^0



Calculate

(a) The vertical heights of the two columns in metres (7 marks)

(b) The distance PQ in metres (3 marks)

23. The frequency table below shows the marks scored by the 40 pupils in a mathematics test.

Marks	30 - 39	40 - 49	50 - 59	60 - 69	70 - 79	80 - 89	90 - 99
Number of pupils	2	3	10	12	8	3	2

(a) State the modal mark. (1mrk)

(b) Calculate the mean mark. (5mrks)

(c) Calculate the median mark. (4mrks)

24. A swimming pool is 20m by 12m and it slopes gently from a depth of 1m at the shallow end to a depth of 3m at the deep end.

(a) Calculate the volume of water in the swimming pool (in m^3) when it is full. (3marks)

(b) If the swimming pool is to be drained by a pump which removes water at the rate of $2.5m^3$ per minute, how long will it take this pump to drain the swimming pool if it was full? (3marks)

(c) If the sides of the swimming pool and its floor are to be covered with square tiles of side 20cm, find to the nearest 100 the number of tiles required. (4marks)

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