

NAME:

INDEX NO:

SCHOOL:

DATE:

SIGN:

121/2
MATHEMATICS
PAPER 2
JULY/AUGUST - 2018
TIME: 2 ½ HOURS

01

FOCUS A365 PREDICTION REVISION KITS - 2018

Kenya Certificate of Secondary Education (K.C.S.E)

INSTRUCTIONS TO CANDIDATES

1. Write your name and index number in the spaces provided at the top of this page.
2. This paper consists of two sections: **Section I and Section II**
3. Answer all questions in section I and any five questions from **Section II**.
4. Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
5. Marks may be given for correct working even if the answer is wrong.
6. Non- programmable silent electronic calculators **and** **KNEC** Mathematical tables may be used..

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

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This paper consists of 16 printed pages. Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing.

SECTION I (50 Marks)

Answer ALL the questions in this section in the spaces provided.

1. Form the quadratic equation given that the roots are

$$2 + \sqrt{3} \quad \text{and} \quad 2 - \sqrt{3} \quad (3 \text{ marks})$$

2. A triangular flower garden measures 5.5m, 6.0m and 7m. Find the percentage error in calculating the perimeter. (3 marks)

3. If $\cos P = \frac{3}{5}$ and P is an acute angle, evaluate without using tables or calculator.

(3 marks)

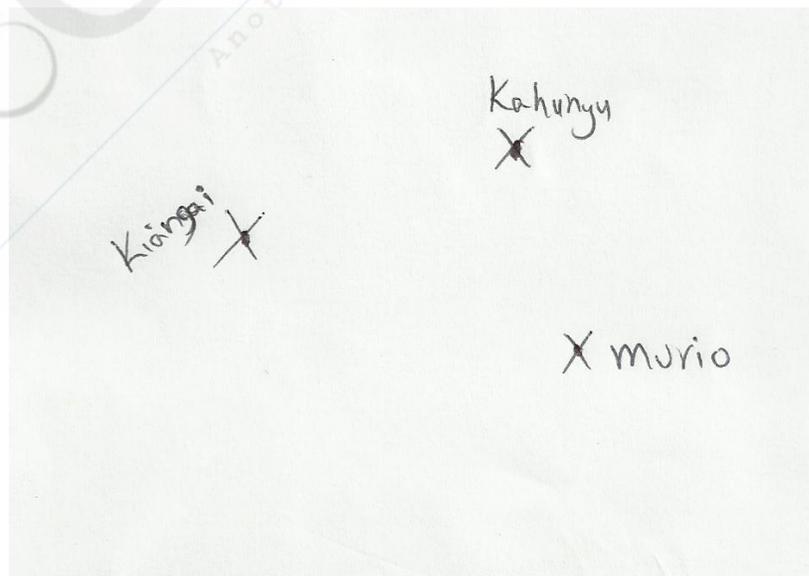
$$\frac{\tan p - (\sin p)^2}{2 - \tan p \tan(90-p)}$$

4. Solve for x in the equation

$$\frac{1}{2} \log_2 81 + \log_2 (x^2 - \frac{x}{3}) = 1 \quad (3 \text{ marks})$$

5. Kijana Manyaga bought a new Tonando motor bike at sh80,000 last year. If Kijana Manyaga was to sell the Tonando motor bike after 2 years time and the rate of depreciation is 15% semi-annually, what will be the value of the Tonando motor cycle? (3 marks)

6. A bore hole was to be dug by Gatundu C.D.F equidistance to three villages namely Kahungu, Kiangai and Murio. Using construction locate where the bore hole will be dug in the shown villages below. (3 marks)



7. Make n the subject of the formula.

$$P = \sqrt{\frac{a^2 + b}{b - m^n}} \quad (4 \text{ marks})$$

8. Given the co-ordinates of $A(3,5,-8)$ and $B(9,-3,4)$; Find

(i) the mid-point of AB (2 marks)

(ii) $|AB|$ (2 marks)

9. The sine wave is given by the equation $y=3\sin(\frac{1}{2}x + 30)$

Find:

(i) amplitude (1 mark)

(ii) period (2 marks)

10. A curve is given by the equation

$$y=5x^3 - 7x^2 + 3x + 2$$

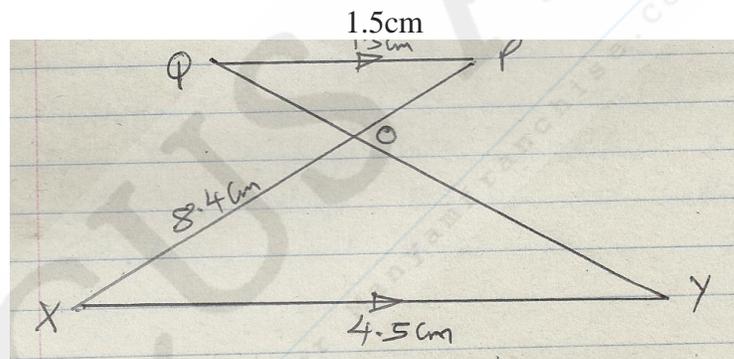
Find the:

a) gradient of the curve at $x=1$ (2 marks)

b) equation of the normal line to the tangent at point $(1,3)$ (2 marks)

11. A triangle PQR is such that angle PQR = 25° , length QR = 7.5cm . If the area of the triangle is 38cm^2 , find length PQ. (3 marks)

12. In the diagram below QP is parallel to XY. QP = 1.5cm, XY = 4.5cm, OX = 8.4cm, QY = 9.0cm



Calculate the lengths

(i) OP (2 marks)

(ii) OQ (2 marks)

13. Find the value of x for which the matrix below has no inverse.

(2 marks)

$$\begin{pmatrix} x-1 & 2 \\ x-1 & x \end{pmatrix}$$

14. Ida after graduating with her masters in mathematics, she was offered a scholarship at New York university to pursue her P.H.D majoring in Mathematics. Her air ticket costs U.S dollar 2788.75. If the exchange rate at Gatundu Bureau are:

Buying US dollar 85.85 and selling U.S dollar 85.08,

Calculate how much Kenyan shillings she requires. (2 marks)

15. If P varies directly as Q and inversely as T , Find the percentage change in P if Q decreases by 20% and T increases by 25%. (3 marks)

16. The eleventh term of an arithmetic progression is four times its second term. The sum of the first seven terms of the same progression is 175. Find the first term and the common difference of the progression. (3 marks)

SECTION II (50 MARKS)

ANSWER ANY FIVE QUESTIONS FROM THIS SECTION

17. Mrs. Maneno the principal of Maarifa Girls Sec. School has sh.7200 available for the purchase of cups. Trader A offers each cup at a price which is sh.6 below the normal price, but trader B offers each cup at the normal price. If Mrs. Maneno purchases cups from trader A, she finds that, she is able to purchase 600 more cups than she can obtain from trader B. If the normal price for a cup is sh.x.

a) Write down in terms of x the number of cups she can purchase from trader A.
(1 mark)

b) Write down in terms of x the number of cups she can purchase from trader A.
(1 mark)

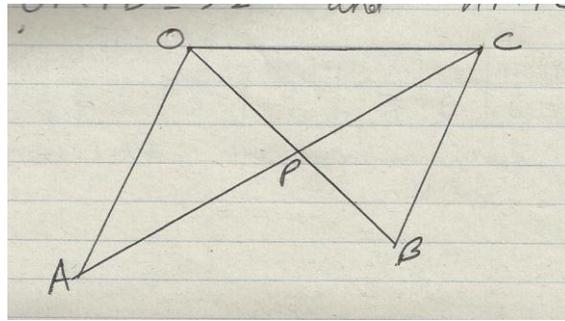
c) Form an equation in x and solve it. (4 marks)

d) Hence find:
the price per cup purchased from:

(i) Trader A: (2 marks)

(ii) Trader B: (2 marks)

18. In the figure below $\vec{OA} = \underline{a}$ $\vec{OC} = \underline{b}$ $OP:PB = 3:2$ and $AP:PC = 4:3$



a) Express in terms of \underline{a} and \underline{b}

(i) \vec{AC} : (1 mark)

(ii) \vec{OP} : (4 marks)

(iii) \vec{OB} : (3 marks)

b) Hence obtain the value of \underline{h} and \underline{r} if $\vec{OB} = \underline{h}\underline{a} + \underline{r}\underline{b}$ (2 marks)

19. The table below shows the distribution of marks scored in a mathematics test at the old Gatundu South District.

marks	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64
No. of pupils	1	5	9	13	8	6	4	3	2

a) Calculate the median mark. (2 marks)

b) Using 42 as an assured mean mark, calculate the actual mean. (6 marks)

c) Calculate the standard deviation of marks. (2 marks)

20. Mr. Mapesa is married and earns a salary of sh.25,000, medical allowance sh2,400, house allowance of sh13,000, commuter allowance of sh4,500 and also pays sh.3,000 for his life insurance. He is entitled to a personal relief of sh.1,760.

The table below shows the rate at which income tax is charged.

Annual taxable income in K.£	Rates sh per K.£
1 – 9680	2
9861 – 18,800	3
18801 – 27,920	4
27,921 – 37,040	5
37,041 and above	6

Calculate Mr. Mapesa:

(a) Taxable income in K£. (2 marks)

(b) P.A.Y.E (6 marks)

(c) Net salary (2 marks)

21. VABCD is a square based pyramid of side length 8cm and V is 6cm above the base ABCD.

Calculate;

(i) the length of the diagonal of the base ABCD. (3 marks)

(ii) the distance from V to the mid-point x of AD. (3 marks)

(iii) the angle VAC (2 marks)

(iv) the angle VX makes with the horizontal ABCD. (2 marks)

22. A basket contains two green oranges, three yellow oranges and five red oranges. Two oranges are drawn one at a time without replacement.

(a) Draw a tree diagram to show all the possibilities. (2 marks)

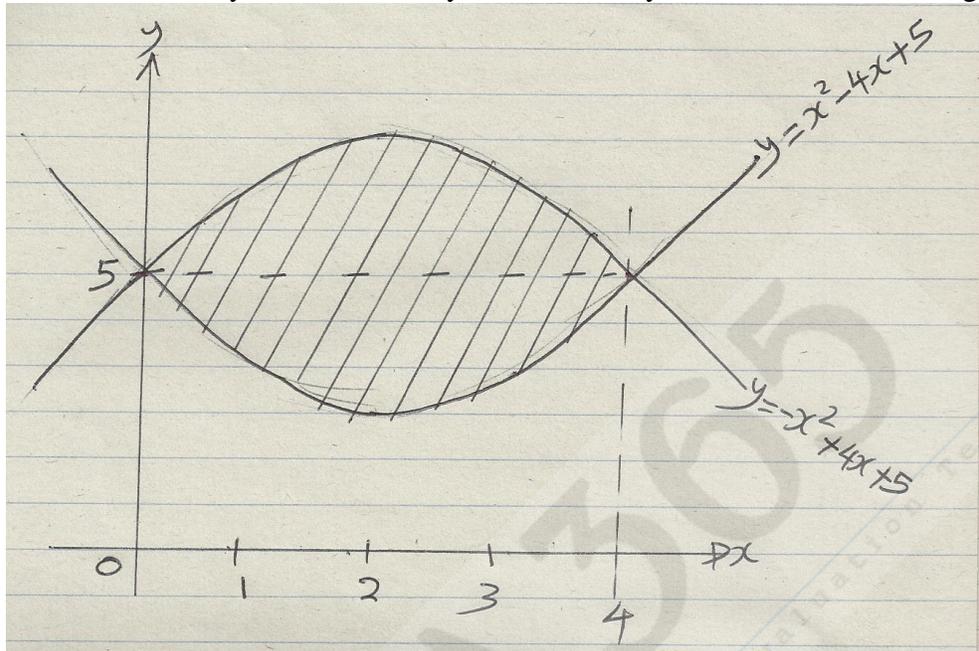
(b) Find the probability that:

(iii) the two oranges are of the same colour. (3 marks)

(iv) the two oranges are red. (2 marks)

(v) at least one of the oranges is green (3 marks)

23. Find the area shaded, enclosed by the two curves $y=x^2-4x+5$ and $y=-x^2+4x+5$ below using:



a) Mid-ordinate rule using 4 mid-ordinates. (4 marks)

b) Integration (4 marks)

c) Find the percentage error found when finding area using mid-ordinate rule to integration. (2 marks)

24. The relationship between two variables is known to be of the form $m=aN^2+bN$ where a and b are constant. The values of M and N obtained experimentally were as follows.

M	0.5	2.6	5.3	7.7	9.2	11.4	12.7
N	4.5	38.5	121.4	231.8	318.3	469.7	565.2

a) By drawing a suitable straight line graph determine the values of a and b . (Use grid provided)
(4 marks)

b) Hence find:

(i) the value of M when $N=10.6$ (3 marks)

(ii) the positive value of N when $M =150$. (3 marks)

