

NAME:

INDEX NO:

SCHOOL:

DATE:

SIGN:

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

05

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 (50MARKS)

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

1. Use logarithms to evaluate the value of

$$\frac{(0.4027)^{\frac{1}{3}}}{(0.098 + 5.6)^{-2}}$$

Give your answer correct to **4 significant** figures.

(3mks)

2. Pipes S and T can fill a tank in 2 hours and 3 hours respectively. Pipe U can empty the full tank in 4 hours. How long will it take to fill the tank with all the pipes running?

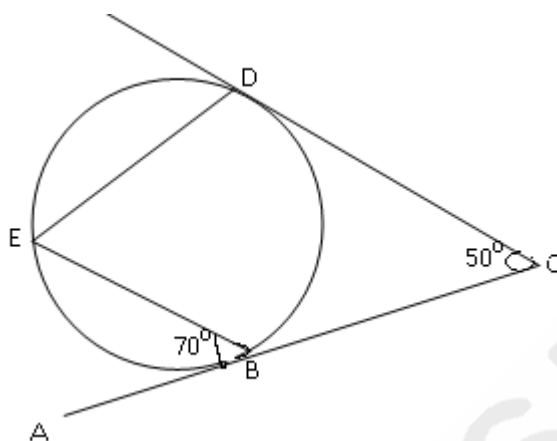
(2mks)

3. Make d the subject in the given formula.

$$U = \frac{Vd^2}{2w + d^2}$$

(3mks)

4. In the figure below, the tangents DC and BC meet at point C, angle BCD=50° while angle ABE=70°



Calculate the sizes of angles

i) $\angle CBD$

(2mks)

ii) $\angle CDE$

(1mk)

5. Solve for x in the equation below.

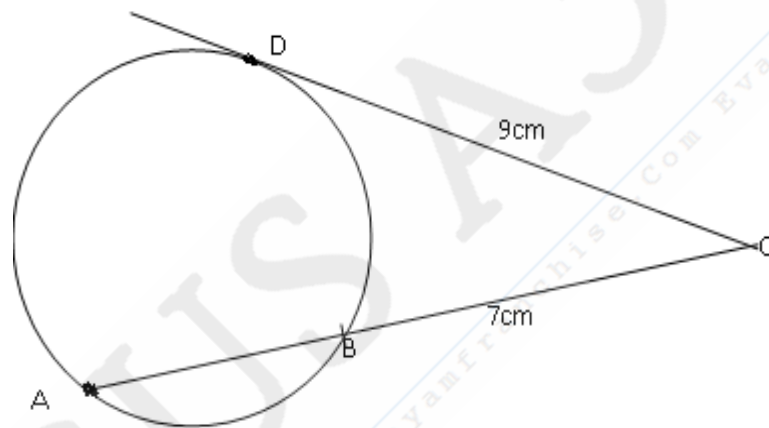
$$\log_x 4 + \log_4 x = 2$$

(4mks)

6. Solve the equation $3 \sin x = 2 \cos^2 x$ where $0^\circ \leq x \leq 360^\circ$

(4mks)

7. In the diagram below, CD is a tangent to the circle at point D. If $BC = 7\text{cm}$ and $CD = 9\text{cm}$, calculate the length of the chord AB. (2mks)



8. Calculate the relative error in $7.9 \div 4.3$

(3mks)

9. Determine the semi-interquartile range for the given set of data.

40,20,30,42,10,18,26,32

(3mks)

10. a) Expand $\left(1 + \frac{x}{2}\right)^8$ up to a term in x^3

(2mks)

b) Use the expansion in(a)above to find the value of $(0.9)^8$

(2mks)

11. Mrs. Ondiek invested Ksh63560 in a bank where the interest was compounded quarterly at the rate of 12% per month. Determine the amount of money she had after $2\frac{1}{2}$ years.

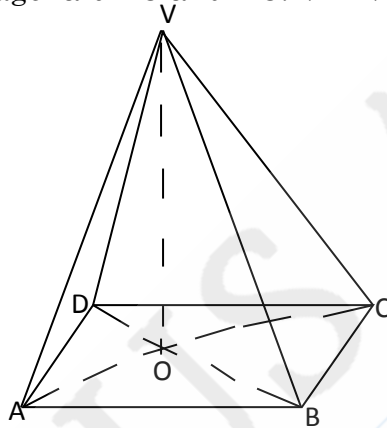
(2mks)

12. Simplify without using mathematical tables or calculator.

$$\frac{6}{\sqrt{7} + \sqrt{3}} - \frac{4}{\sqrt{7} - \sqrt{3}}$$

(3mks)

13. The figure below is a square-based pyramid with vertex V. Point O is the intersection of diagonals AC and BC. $VA=VB=VC=VD=12\text{cm}$ and $AB=BC=4\text{cm}$.



a) Name the projection of line VA on plane ABCD.

(1mk)

b) Find the angle between line VB and the plane ABCD.

(2mks)

14. An equation of a curve is given as $y = 5x^3 - 7x^2 + 3x + 2$

Find the equation of the tangent to the curve at $x=1$ (4mks)

15. Find the equation of a circle whose diameter has the end points $(-2,6)$ and $(6,2)$

(3mks)

16. The distance between two places $P(\theta^\circ S, 35^\circ E)$ and $(\theta^\circ S, 145^\circ W)$ on the earth via South Pole is 3240nm. Find

a) the value of θ° . (2mks)

b) the distance between P and Q along the parallel of latitude in nautical miles. (2mks)

SECTION II (50 MARKS)

Answer only five questions in this section.

17. The table below shows income tax rates.

Income p.a in K£	Rate %
1 - 3000	10
3001 – 5400	15
5401 -9,000	20
9001 -13,500	25
13,501 and above	30

Agnes earns a monthly salary of Ksh. 20,000 per month, Her house allowance is Ksh. 15000P.M. She is entitled to a personal relief of Ksh. 1260P.M. Her deductions are NHIF sh.960, cooperative loan sh. 3500 and service charge of Ksh.400 per month.

Calculate

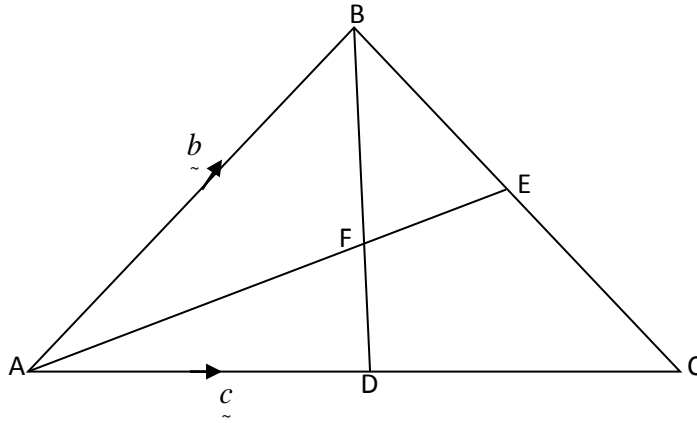
a) the taxable income. (2mks)

b) the tax charged on Agnes earning. (4mks)

c) the tax paid. (2mks)

d) the net salary. (2mks)

18. In the figure below, E is the midpoint of BC, $AD:DC=3:2$ and AE intersect with BD at F.



a) Given that $\vec{AB} = \vec{b}$ and $\vec{AC} = \vec{c}$, express in terms of \vec{b} and \vec{c}

i) \vec{AE} (2mks)

ii) \vec{BD} (1mk)

b) If $\vec{BF} = t\vec{BD}$ and $\vec{AF} = s\vec{AE}$, where t and s are scalars, find the values of t and s.

(6mks)

c) What is the ratio in which F divides \vec{AE} .

(1mk)

19. Using a ruler and a pair of compasses only.

- a) Construct a $\triangle ABC$ in which $AB = 7.4\text{cm}$, $AC = 8.2\text{cm}$ and $\angle BAC = 45^\circ$. (3mks)
- b) On the same diagram, construct $\triangle ACD$ such that D, and B are on the opposite sides of line AC, D is equidistant from A and C and $BD = 8.5\text{cm}$. Measure AD. (3mks)
- c) Draw locus of Q which passes through C and is parallel to BD. (2mks)
- d) The normal from C meets BD at N. Mark the points M_1 and M_2 on the locus of Q such that $M_1N = M_2N = 4.1\text{cm}$. Measure the lengths M_1M_2 and CN. (2mks)

20. a) i) On the grid (graph paper) plot and draw triangle ABC where A(4,3), B(4,6) and C(7,6). (1mk)

GRID

ii) Triangle ABC is given a rotation of $+90^\circ$ about (0,0) to map onto $A^I B^I C^I$. Plot $A^I B^I C^I$ and state its co-ordinates. (3mks)

iii) Triangle $A^I B^I C^I$ is transformed by the matrix $\begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix}$ to map onto $A^{II} B^{II} C^{II}$. Plot $\Delta A^{II} B^{II} C^{II}$ and state its co-ordinates. (4mks)

b) $A^{II} B^{II} C^{II}$ is further transformed by a reflection on the line $x=0$ to map onto $A^{III} B^{III} C^{III}$. Plot $A^{III} B^{III} C^{III}$. What single transformation will map $A^{III} B^{III} C^{III}$ onto triangle ABC? (2mks)

21. A particle P moves in a straight line so that its velocity V m/s at time t seconds where $t \geq 0$ is given by $V = 28 + t - 2t^2$

Find

a) The time when P is instantaneously at rest. (2mks)

b) The speed of P at the instant when the acceleration of P is zero. (2mks)

c) Given that P passes through point O of the line when $t = 0$

i) Find the distance of P from O when P is instantaneously at rest. (3mks)

ii) Find the distance covered by the particle during the 3rd second.

(3mks)

22. The table below shows the masses in kg of some form three students in a school.

Mass	20 -29	30-39	40-49	50-59	60-69	70-79	80-89	90-99
No. of students	5	12	15	28	8	4	6	2

a) i) State the median class. (2mks)

ii) Using an assumed mean of 54.5, calculate the mean mass. (5mks)

b) Calculate the standard deviation of the data, give your answer correct to 2 decimal places. (3mks)

23. The probability that it will rain on a certain morning is $\frac{1}{3}$. If it rains, the probability that Sagero misses the bus is $\frac{3}{4}$. If it does not rain, the probability that he catches the bus is $\frac{5}{6}$.

a) Represent the above information in a tree diagram. (2mks)

b) Calculate the probability that on a given morning

i) it rains and he catches the bus. (2mks)

ii) it rains and he misses the bus. (2mks)

iii) he misses the bus. (2mks)

iv) it does not rain and he misses the bus. (2mks)

24. A small scale farmer wishes to buy some sheep and goats for rearing. A sheep costs sh.400 and a goat costs sh.300. The farmer has enough space for only 20 animals and may spend at most sh.6800. The number of goats should not exceed twice the number of sheep.

a) By letting x and y to represent the number of sheep and goats he can buy respectively, write down all inequalities from the above information. (4mks)

b) Represent the inequalities on the grid provided. (4mks)

PASTE A GRID

c) From your graph; find the maximum number of animals he can buy at the lowest cost. (2mks)