

# FOCUS A365

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## FORM 4 TERM I MATHEMATICS PPI EXAMINATIONS 2018

NAME: \_\_\_\_\_ ADM NO: \_\_\_\_\_ CLASS: \_\_\_\_\_

### INSTRUCTION TO CANDIDATE'S:

1. Write your **name, admission number, class and date** in the spaces provided above.
2. This paper consists of **two** Sections; Section **I** and Section **II**.
3. Answer **ALL** the questions in Section **I** and any **five** questions from Section **II**.
4. All answers and working must be written on the question paper in the spaces provided below each question.
5. Show all the steps in your calculation, giving your answer at each stage in the spaces provided **below** each question.
6. Marks may be given for correct working even if the answer is wrong.
7. Non-programmable silent electronic calculators and KNEC Mathematical tables **may be** used, except where stated otherwise.
8. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.
9. Candidates should answer the questions in English.

### FOR EXAMINER'S USE ONLY:

#### SECTION I

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

S  
ECTI  
ON

II

GRAND TOTAL

17	18	19	20	21	22	23	24	TOTAL

**SECTION I (50 MKS)**

Answer **ALL** the questions from this section.

1. Use logarithms to evaluate

(4 marks)

$$\left( \frac{0.96}{8.764 \times 0.0034} \right)^{\frac{1}{4}}$$

2. Given that point A is (-8, -2) and B is (-4, 2), find the co-ordinates of point C which divides AB in the ratio 7:-3.

(3 marks)

3. Make r the subject of the formula.

(3 marks)

$$V = \frac{1}{3}\pi h (R^2 - r^2)$$

4. M varies with  $\sqrt{\left(\frac{p}{n}\right)}$ . Find the percentage change in M when p increases by 32% and n decreases by 17%. (3 marks)

5. A and B are grades of flour that cost Kshs 40 and Kshs 50 per kilogram respectively. In what ratio should the two grades be mixed in order to produce a mixture that costs sh 48 per kilogram? (3 marks)

6. Chords AB and TS of a circle intersect internally at point Q. Given that QA = 8cm, AB = 14cm and QT = 4cm, calculate the length of QS. (2 marks)

7. Find the term independent of  $y$  in the expression; (3 marks)

$$\left(3y + \frac{1}{2y^2}\right)^6$$

8. The circle given by the equation  $x^2 + y^2 + 2x - 8y + p = 0$  passes through point  $(2, 4)$ . Determine the value of  $p$ , hence find the equation of the tangent to the circle at point  $(-1, 1)$  (4 marks)

9. Without using mathematical tables or calculator, express  $\frac{1 - \cos 30^\circ}{1 + \frac{2}{\sin 45^\circ}}$  in surd form and simplify. (3 marks)

10. Find the equation of a curve which passes through the points  $(-3, 0)$  and  $(2, 0)$ , in the form  $y = ax^2 + bx + c$ , where  $a$ ,  $b$  and  $c$  are constants. (3 marks)

11. A businessman invested sh. 450000 in a bank for two years. Calculate the amount he got after the two years if interest was compounded semi-annually at the rate of 3% per annum. (3mks)

12. The sides of a triangle are measured and recorded as 10cm, 12cm and 20cm. Calculate the percentage error in its perimeter, correct to 2 decimal places. (3 marks)

13. Given that the matrix  $\begin{pmatrix} 3 & 5 \\ (x+2) & x \end{pmatrix}$  is singular, find the value of x. (2 marks)

14. Find the value of y in the equation  
 $2 - \log (3x + 2) = \log 25 - \log (x - 1)$  (3 marks)

15. The 10<sup>th</sup>, 25<sup>th</sup> and the last term of an AP are 313, 193 and -7. Find the number of terms in the series. (4 marks)

16. In this question use a pair of compasses and a ruler only

- (a) construct triangle ABC such that  $AB = 6$  cm,  $BC = 8$  cm and  $\angle ABC = 135^\circ$   
(2 marks)

- (b) Construct the height of triangle ABC in a) above taking BC as the base  
(1 mark)

**SECTION II (50 marks)**

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

17. OAB is a triangle in which  $OA = a$  and  $OB = b$ . M is a point on OA such that  $OM:MA = 2:3$  and N is another point on AB such that  $AN:NB = 1:2$ . Lines ON and MB intersect at X.

(a) Express the following vectors in terms of  $a$  and  $b$ .

(i)  $\vec{AB}$  (1mk)

(ii)  $\vec{QN}$  (1mk)

(iii)  $\vec{BM}$  (1mk)

(b) If  $\vec{OX} = k\vec{ON}$  and  $\vec{BX} = h\vec{BM}$  express  $\vec{OX}$  in two different ways. Hence or otherwise find the values of h and k. (6mks)



(c) Determine the ratio OX: XN.

(1mk)

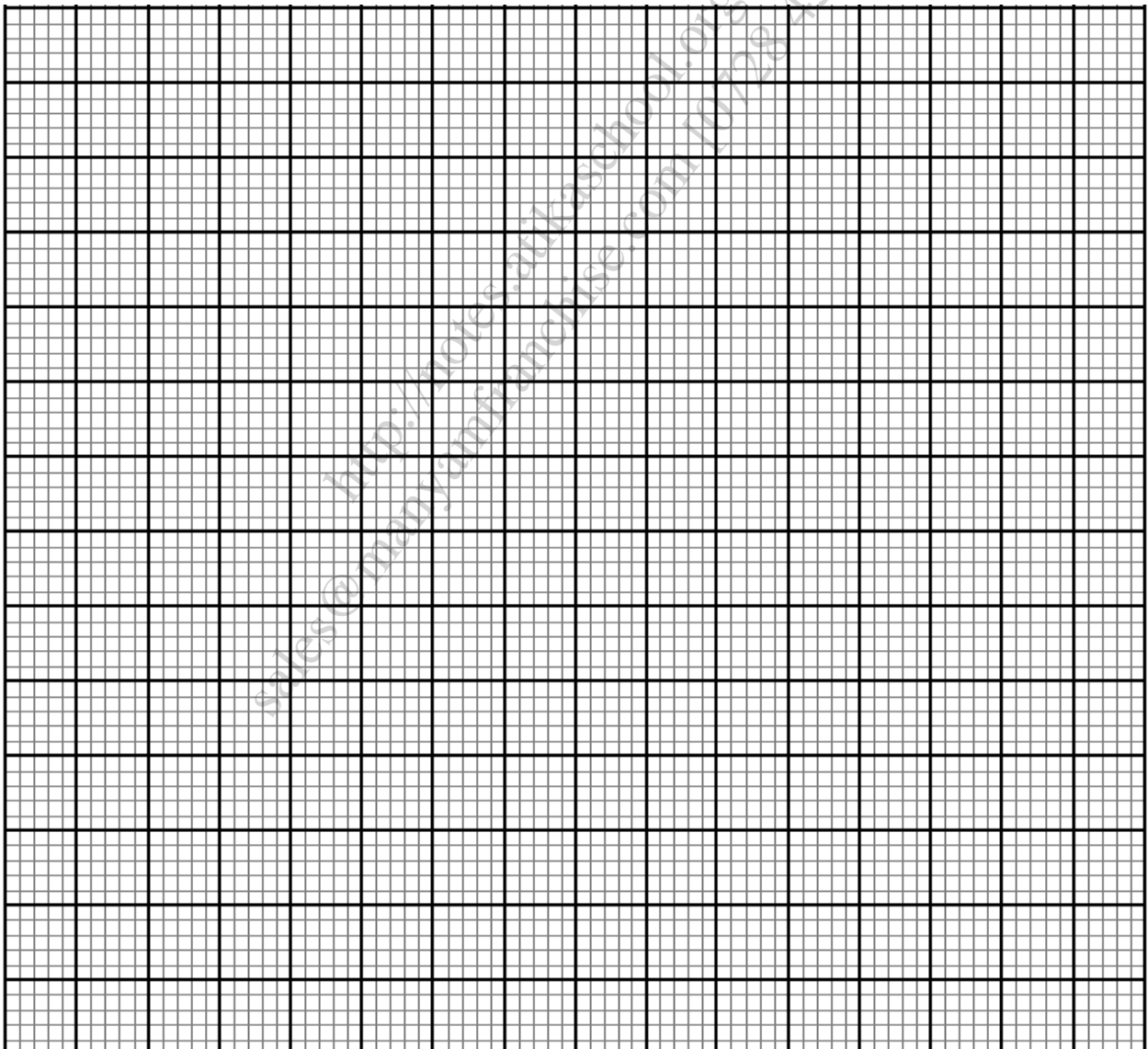
18. a) Complete the table below for the equation  $y = x^3 - 2x^2 - 9x + 8$

(2 marks)

x	-3	-2	-1	0	1	2	3	4	5
y	-10		14	8		-10		4	

b) Using the scale 1cm to represent 1 unit on the x axis and 1cm to represent 10 units on the y axis draw the graph of  $y = x^3 - 2x^2 - 9x + 8$

(3 marks)



c) (i) Use your graph to estimate the roots of the equation;  $x^3 - 2x^2 - 9x + 8 = 0$  1mk

(ii) By drawing an appropriate straight line, use your graph to solve the equation;  
 $x^3 - 2x^2 - 11x + 6 = 0$  (4 mark)

19. An examination involves a written and a practical test. The probability that a candidate passes the written test is  $\frac{6}{11}$ . If a candidate passes a written test then the probability of passing the practical test is  $\frac{3}{5}$ ; other wise it would be  $\frac{2}{7}$ .

(a) Illustrate this information on a tree diagram (2mks)

(b) Determine the probability that a candidate

(i) Passes both tests (2mks)

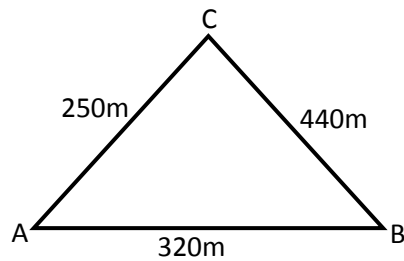
(ii) Passes the written test only (2mks)

(iii) passes the practical test only (2mks)

(iv) Fails all test

( 2mks)

20. Karis owns a farm that is triangular in shape as shown below.



(a) Calculate the size of angle BAC

(2 Mark

(b) Find the area of the farm in hectares

(3 Marks)

(c) Karis wishes to irrigate his farm using a sprinkler machine situated in the farm such that it is equidistant from points A, B and C.

(i) Calculate the distance of the sprinkler from point C.

(2 Marks)

(ii) The sprinkler rotates in a circular motion so that the maximum point reached by the water jets is the vertices A, B and C. Calculate the area outside his farm that will be irrigated.

(3 Marks)

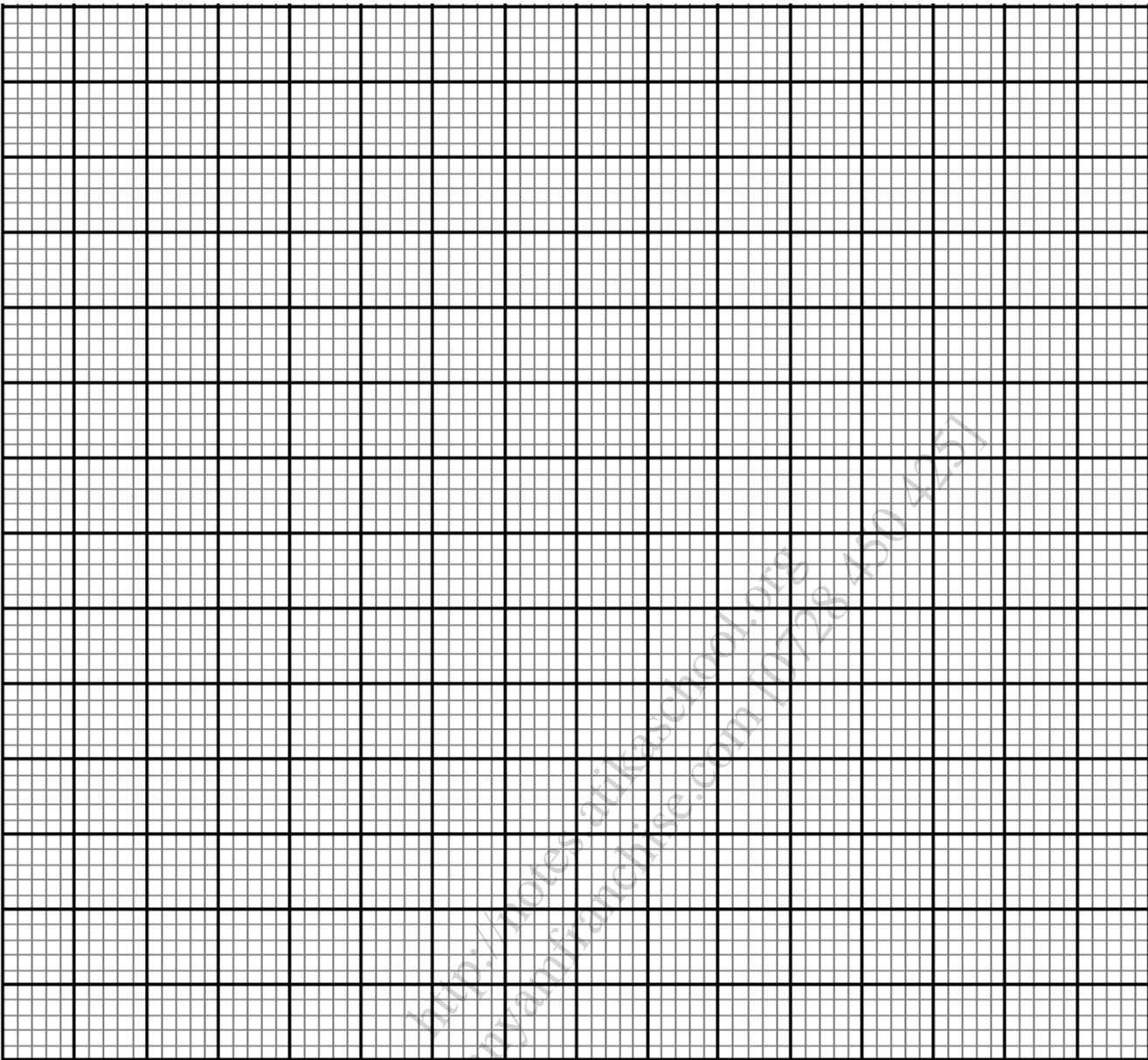
21. Complete the table given below by filling the blank spaces.

(2 Marks)

X	$0^\circ$	$15^\circ$	$30^\circ$	$45^\circ$	$60^\circ$	$75^\circ$	$90^\circ$	$105^\circ$	$120^\circ$	$135^\circ$	$150^\circ$	$165^\circ$	$180^\circ$
4 Cos 2x	4.00		2.00	0	-2.00	-3.46	-4.00	-3.46	-4.00	-3.46	-2.00		4.00
2 Sin (2x + 30)	1.00	1.73	2.00	1.73		0	-1.00	-1.73	-2.00	-1.73		0	1.00

(b) On the grid provided draw the graph of  $y = 4 \text{ Cos } 2x$  and  $y = 2 \text{ Sin } (2x + 30^\circ)$  for  $0^\circ \leq x 180^\circ$ .  
Take the scale 1cm for  $15^\circ$  on the x – axis and 2cm for 1 unit on the y-axis.

(5 Marks)

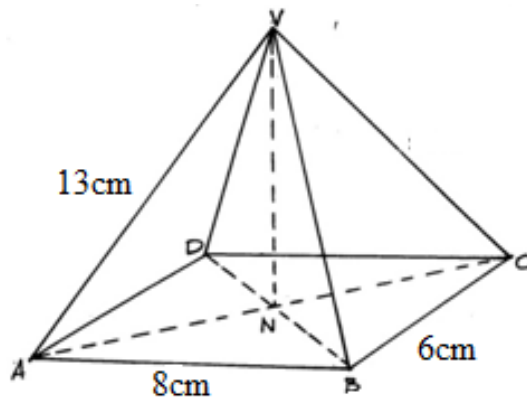


(c) (i) State the amplitude of  $y = 4 \cos 2x$  (1 Mark)

(ii) Find the period of  $y = 2 \sin (2x + 30)^\circ$  (1 Mark)

(d) Use your graph to solve  $4 \cos 2x - 2 \sin (2x + 30) = 0$  (1 Mark)

22. The figure below represents a right pyramid on a rectangular base.  $AV=13\text{cm}, AB=8\text{cm}, BC=6\text{cm}$



Calculate, correct to 1 decimal place.

- (a) the length AC (2mks)
- (b) the length VN (2mks)
- (c) the angle between line AV and the base ABCD (2mks)
- (d) the angle between plane VAD and the base ABCD (2mks)
- (e) the angle between the plane VAB and the base ABCD (2mks)

23. The table below shows marks obtained by 100 Form four students in a school in Kakamega county

%	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79
Marks										
No of students	5	7	2x	10	19	4x	20	6	2	1

(a) Determine the value of x (2mks)

(b) Using an assumed mean of 52, calculate;

i) the mean (6mks)

ii) the standard deviation (2mks)

24. A painter dealer mixes three types of paint A, B and C in the ratios A:B = 3:4 and B:C = 1:2. The mixture is to contain 168 litres of C.

a) Find the ratio A:B:C (2 mks)

b) Find the required number of litres of B. (2 mks)

c) The cost per litre of type A is Ksh. 160, type B is Ksh. 205 and type C is Ksh. 100.  
(i) Calculate the cost per litre of the mixture. (2 mks)

(ii) Find the percentage profit if the selling price of the mixture is Ksh. 182 per litre. (2 mks)

(iii) Find the selling price of a litre of the mixture if the dealer makes a 25% profit. (2 mks)