

NAME:..... INDEX NO:.....  
 CANDIDATE'S SIGNATURE:.....  
 DATE:.....

**121/2**  
**MATHEMATICS**  
**JULY, 2018**  
**PAPER 2**  
**TIME: 2½ HOURS**

# BUURI EAST STANDARDS

*Kenya Certificate of Secondary Education*  
**MATHEMATICS Alt. A**  
**2 ½ Hours**

**Instructions to candidates.**

- (a) Write your name and index number in the spaces provided above.
- (b) Sign and write the date of the examination in spaces provided above.
- (c) This paper consists of two sections: Section **I** and **II**.
- (d) Answer **all** the questions in section I and **only five** questions from section II.
- (e) Show **all** the steps in your calculations, giving your answer at each stage in the space provided.
- (f) Marks may be given for correct working even if the answer is wrong.
- (g) Non-programmable silent electronic calculators and **KNEC** mathematical tables may be used, except where stated otherwise.
- (h) *Candidates should check the question paper to ascertain that no questions are missing.*
- (i) *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

SECTION II

17	18	19	20	21	22	23	24	TOTAL

GRAND  
TOTAL

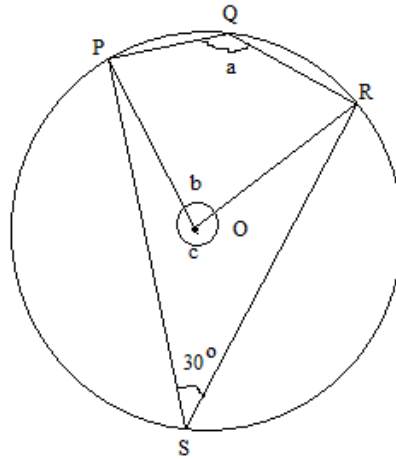
**SECTION I (50 MARKS): Answer all the questions in this section in the spaces provided.**

1. Make P the subject of the formula in;  $x = \sqrt{\frac{y(p-y)}{p-i}}$  (3 marks)

2. The length of a rectangle is 8.3cm and its width is 5.45cm. Calculate.  
a) The relative error in the area of the rectangle. (3 marks)

b) The percentage error in the area. (1 mark)

3. The figure shown below is a circle centre O (not drawn to scale). Find the value of angles a, b and c given that  $\angle PSR = 30^\circ$ . (3 marks)



4. The first term of an arithmetic sequence is -5 and the common difference is 3.  
a) List the first 5 terms of the sequence. (1 mark)

- b) Determine the sum of the first 40 terms of the sequence. (2 marks)

5. a) Given the vectors  $\mathbf{a} = 3\mathbf{i} - \mathbf{j} + 2\mathbf{k}$ ,  $\mathbf{b} = 4\mathbf{i} + 2\mathbf{j} - \mathbf{k}$  and  $\mathbf{p} = 2\mathbf{a} - \mathbf{b}$ . Express  $\mathbf{p}$  in terms of  $\mathbf{i}$ ,  $\mathbf{j}$  and  $\mathbf{k}$ . (2 marks)

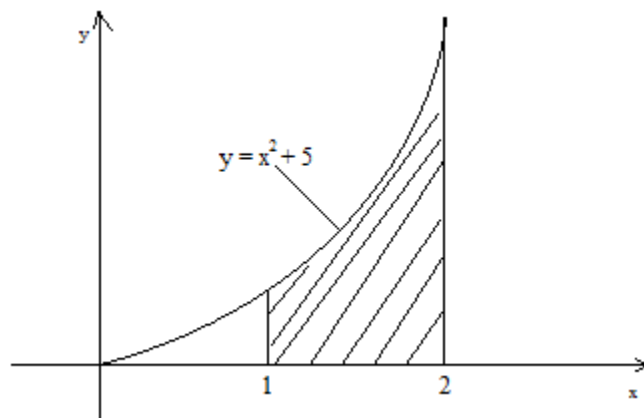
b) Hence calculate  $|p|$  correct to 3 significant figures. (1 mark)

6. A quantity  $X$  varies directly as  $Y$  and the square of  $Z$ . when  $Y = 2$  and  $Z = 5$ ,  $X = 150$ .  
Find:-

a) The law governing  $X$ ,  $Y$  and  $Z$  (2 marks)

b) The value of  $X$  when  $Y = 4$  and  $Z = 3$  (1 mark)

7. Find accurately the shaded area. (3 marks)



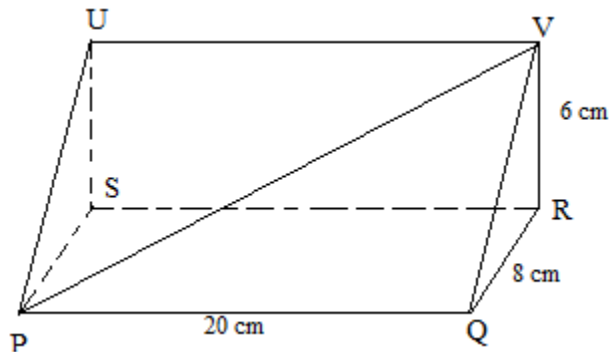
8. Simplify the following surd leaving answer in the form  $a + b\sqrt{c}$  (3 marks)

$$\frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$$

9. Evaluate the following expression without using mathematical tables or a calculator. (3 marks)

$$3\log_{10}4 + \log_{10}125 - 3\log_{10}2$$

10. The diagram below represents a wedge whose cross – section is a right angle triangle. PQVU is a rectangle and the dimensions are as shown.



Calculate to 2 decimal places:-

- a) The length of PV (2 marks)

- b) The size of the angle between PV and plane PQRS. (2 marks)

11. a) Expand  $(1 + x)^6$  upto the fourth term. (1 mark)
- b) Using the binomial expansion in (a) above estimate the value of  $1.9^6$  (2 marks)
12. A transporter has two types of trucks to transport maize. Type A carries 2000 bags while type B carries 3000 bags per trip. The transporter has to transport 120,000 bags. He has to make not more than 50 trips. Type B trucks are to make at most twice the number of trips made by type A. Taking  $x$  to be the number of trips made by type A truck and  $y$  to be the number of trips made by type B. Write down all the inequalities representing this information. (3 marks)
13. The equation of a circle is  $x^2 + y^2 - 4x + 8y = 5$ . Find the centre and the radius of the circle. (3 marks)

14. Solve for x in the equation below using the completing the square method. (3 marks)

$$x^2 - 7x + 10 = 0$$

15. Mr Sudan works for a company earning a basic salary of 30,000 and house allowance of 12,000. In a certain year the government charged tax on PAYE basis using the table below.

<b>Income in Ksh per Month</b>	<b>Rate(% per Ksh)</b>
<i>1 – 10,000</i>	<i>5</i>
<i>10,001 – 20,000</i>	<i>10</i>
<i>20,001 – 30,000</i>	<i>20</i>
<i>Over 30,0000</i>	<i>30</i>

If Sudan is given a personal relief of sh. 3,000 per Month, find tax he pays in that month.

(3 marks)

16. Triangle A'B'C' is the image of triangle ABC under a transformation matrix  $T = \begin{pmatrix} 1 & 3 \\ 2 & 2 \end{pmatrix}$ . If the area of triangle A'B'C'D' is  $25.6\text{cm}^2$ , find the area of the object. (3 marks)

**SECTION II(50 marks). Answer *only five* questions in this section in the spaces provided.**

17. a) On the same diagram construct:-
- i) Triangle PQR such that  $PQ = 9\text{cm}$ ,  $PR = 7\text{cm}$  and  $\angle RPQ = 60^\circ$  (2 marks)
  
  - ii) The locus of a point M such that M is equidistant from P and Q. (1mark)
  - iii) The locus of a point N such that  $RN \leq 3.5\text{cm}$ . (1 mark)
- b) On the diagram in part (a)
- i) Shade the region B, containing all the points enclosed by the locus on M and the locus of N such that  $PM \geq QM$ . (2marks)
  - ii) Find the area of the region shaded in part (b) (i) above. (4 marks)



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

a) Illustrate this information in a tree diagram. (2 marks)

b) Determine the probability that a candidate

i) Passes both tests (2 marks)

ii) passes the written test only (2 mark)

iii) passes only one test (2 marks)

v) fails both test (2 marks)

19. Mr Rao is a water supplier in a certain market. He has a tank which holds 20,000 litres. The tank is being filled with water from two pipes P and Q. water flows at the rate of 150L/minute through pipe P and 100l/minute through pipe Q.

a) If the tank is empty and the two pipes are opened at the same time, calculate the time taken to fill the tank. (3 marks)

c) On a certain day Mr Rao started with an empty tank, opened pipes P and Q for 30 minutes, after which he opened pipe R to supply his customers. R supplies water at a rate of 20 litres per minute. Calculate the time it took to fill the tank. (7 marks)

20. Complete the table below by filling in the blank spaces.

(2 marks)

$x^{\circ}$	$0^{\circ}$	$30^{\circ}$	$60^{\circ}$	$90^{\circ}$	$120^{\circ}$	$150^{\circ}$	$180^{\circ}$	$210^{\circ}$	240	$270^{\circ}$	300	330	$360^{\circ}$
$\cos x^{\circ}$	1.00		0.50			- 0.87		- 0.87					
$2 \cos \frac{1}{2} x$	2.00	1.93					0.00						

a) On the grid provided using a scale of 1cm to represent  $30^{\circ}$  on the horizontal axis and 4 cm to represent 1 unit on the vertical axis draw the graph of  $y = \cos x^{\circ}$  and  $y = 2 \cos \frac{1}{2} x^{\circ}$

(4 marks)

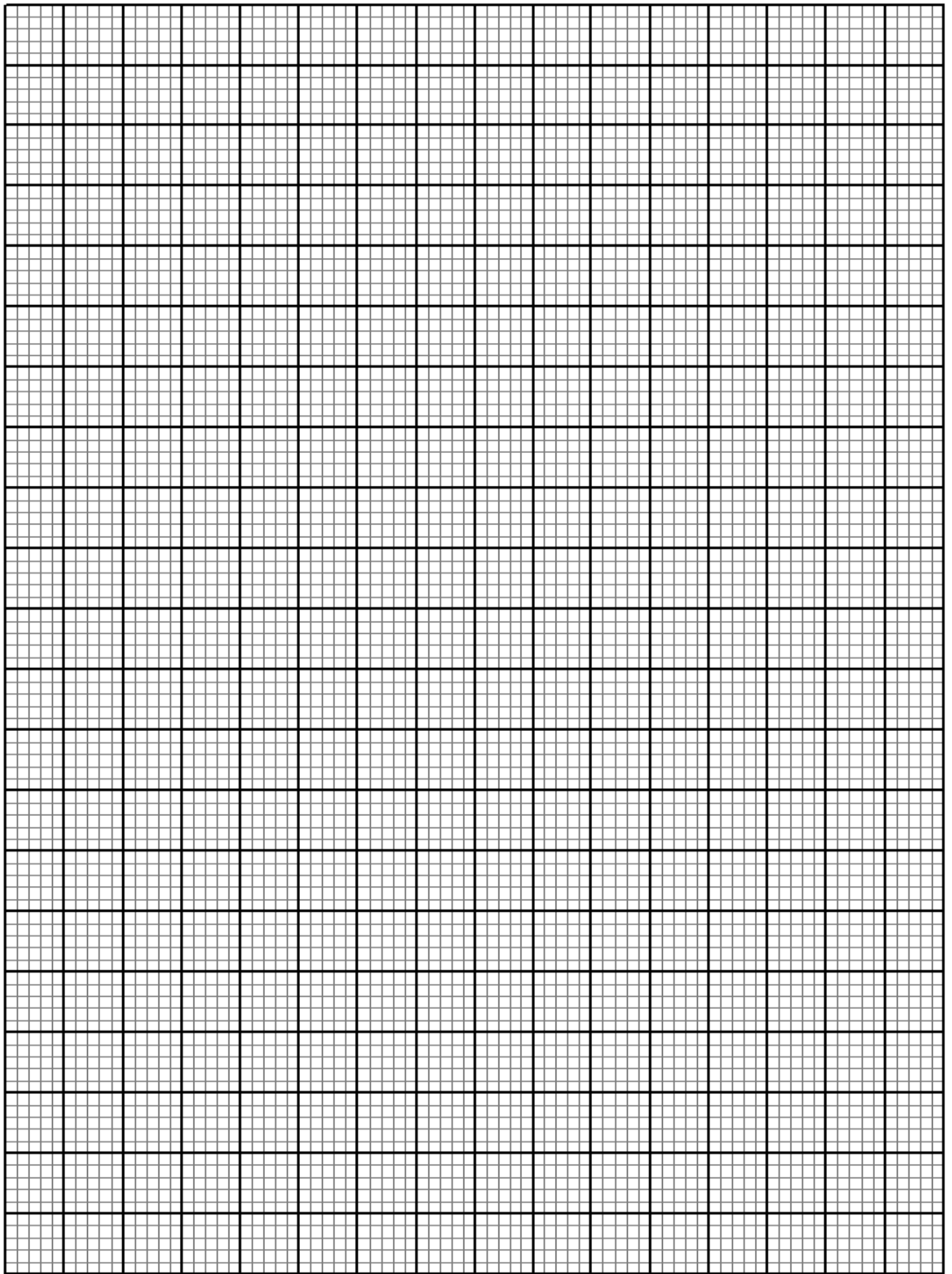
b) State the amplitude and period of  $y = 2 \cos \frac{1}{2} x$

(2 marks)

c) Use your graph to solve the equation

(2 marks)

$$2 \cos \frac{1}{2} x - \cos x = 0$$



21. a) Taking the radius of the earth  $R = 6371\text{km}$  and  $\pi = \frac{22}{7}$ , calculate correct to 2 d.p the distance between the two cities, A ( $60^{\circ}\text{N}$ ,  $29^{\circ}\text{W}$ ) and B ( $60^{\circ}\text{N}$ ,  $31^{\circ}\text{E}$ ) along the parallel of latitude. (3 marks)
- b) If it is 1200hrs at city A, what is the local time at city B? (3 marks)
- c) An aeroplane flew due South from a point P ( $60^{\circ}\text{N}$ ,  $45^{\circ}\text{E}$ ) to point Q. The distance covered by the aeroplane was 800km. Determine the position of Q. (4 marks)

22. The marked price of a television set is 25,600. On cash payment a customer is given a discount of 5% on the marked price. The T.V can also be bought on hire purchase terms by paying a deposit of sh 12,640 and 16 equal Monthly installments of sh. 1450 each.

a) Calculate

i) Cash price of the machine (2 marks)

ii) The hire purchase value (3 marks)

iii) Calculate the rate of compound interest charged per Month for hire purchase terms. (4 marks)

iv) Find difference between cash price value and hire purchase value. (1 mark)

23. The table below shows masses of 100 form 4 students.

Mass Kg	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69
No of students	4	6	10	14	22	24	14	6

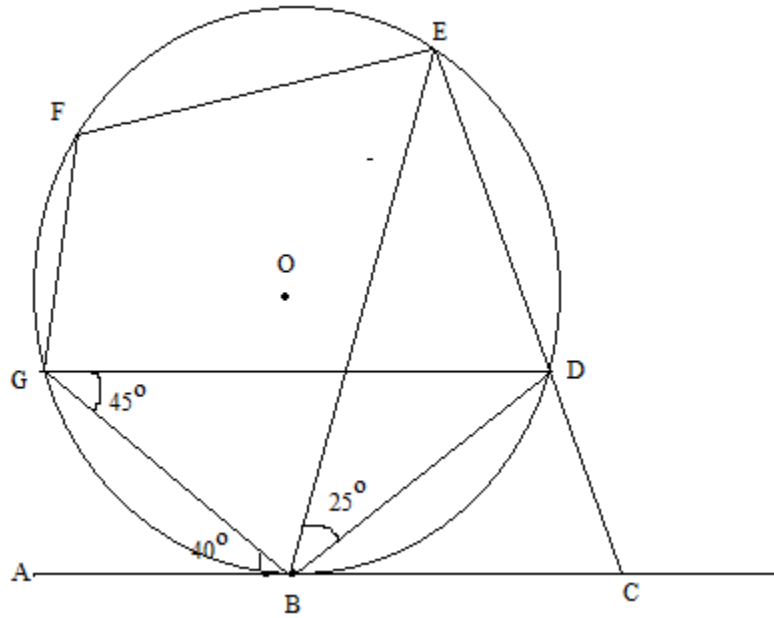
Find:-

a) Mean mass (4 marks)

b) Variance (5 marks)

c) Standard deviation (1 mark)

24. In the figure below  $ABC$  is a tangent to the circle at  $B$ . Given that  $\angle ABG = 40^\circ$ ,  $\angle BGD = 45^\circ$  and  $\angle DBE = 25^\circ$



Find the size of the following angles giving reasons in each case

- a)  $\angle BDG$  (2 marks)
- b)  $\angle DGE$  (2 marks)
- c)  $\angle EFG$  (2 marks)
- d)  $\angle CBD$  (2 marks)
- e)  $\angle BCD$  (2 marks)

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