**Name………………………………………………………. IndexNo…………………/…….**

 **Adm number……………… Stream……………. Candidate’s Signature…………… ………….Date………………………………..**

**121/1**

**MATHEMATICS**

**PAPER 1**

**SEPT/OCT 2018**

**TIME: 2 ½ HRS**

**ORIWO BOYS HIGH SCHOOL**

**POST MOCK EXAMINATION**

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

**INSTRUCTIONS TO CANDIDATES.**

1. **Write your name, index number,**
2. **adm. number and stream in the spaces provided above**
3. **The paper contains two sections: section I and section II**
4. **Answer ALL questions in section I and ANY FIVE questions in section II**
5. **All answers and working must be written in the blank spaces provided below each question**
6. **Marks may be given for correct working even if the answer is wrong**
7. **Non – programmable and silent Electronic calculators and mathematical tables may be used unless stated otherwise.**

**FOR EXAMINER’S USE ONLY**

**SECTION I**

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

**SECTION II**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **17** | **18** | **19** | **20** | **21** | **22** | **23** | **24** |
|  |  |  |  |  |  |  |  |

**Grand Total**

*This paper consists of 14 printed pages .Candidates should check the question paper to*

*Ensure that all the pages are printed as indicated and no questions are missing.*

*Answer all the questions in this section*

1. **Evaluate without using mathematical tables** $\left(1000\sqrt{\frac{0.0128}{200}}\right)$ **(3mks)**

1. **Factorize a2 – b2 (1mk)**

**Hence find the exact value of 25572 - 25472 (2mks)**

1. **The mass of 6 similar books and 4 similar biology books is 7.2 kg. The mass of 2 such art books and 3 such biology books is 3.4 kg. Find the mass of one art book and mass of one biology book. (3mks)**
2. **A salesman gets a commission of 2.4% on sales up to Kshs 100.00. He gets an additional commission of 1.5% on sales above this. Calculate the commission he gets on sales worth Kshs 280.000**
3. **In the figure below, AB is parallel to DE, DE bisects angle BDG, angle DCF = 600 and angle CFG = 1100**

**Find, giving reasons for your answers,**

* 1. $<$ **CDF (2mks)**

 **(b)** $ <$ **ABD (2mks)**

1. **A point A is directly below a window. Another point B is 15 m from A and at the same horizontal level. From B angle of elevation of the the bottom of the window is 30**$° $**and the angle of elevation of the top of the window is 35**$°$**. Calculate the vertical distance.**
	1. **From A to the bottom of the window (1mk)**
	2. **From the bottom to top of the window (2mks)**
2. **The third and fifth term of an arithmetic progression are 10 and -10 respectively**
	* 1. **Determine the first and the common difference**
		2. **The sum of the first 15 terms**
3. **A matrix A is given by A =** $\left(\begin{matrix}x&o\\5&y\end{matrix}\right)$

 **(a)Determine A2 (1mk)**

 **(b)Given that A2=**$\left(\begin{matrix}1&0\\0&1\end{matrix}\right)$**,Find the values of x and y (2mks)**

1. **Given that log y = log (10n ) make n the subject. (3mks)**
2. **A quantity T is partly constant and partly varies as the square root of S.Using constants a and b, write down an equation connecting T and S.If S = 16, when T = 24 and S = 36 when T = 32, find the values of the constants a and b (3mks)**
3. **A cylindrical container of radius 15cm has some water in it. When a solid is submerged into the water, the water level rises by 1.2 cm.If the solid is a circular cone of height 9 cm, calculate the radius of the cone to 2 decimal places. (3mks)**
4. **Six weeks after planting the height of bean plants were measured correct to the nearest centimeter. The frequency distribution is given in the table below.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Height (x)** | **0 ≤ x ≤ 4** | **4 ≤ x ≤ 8** | **8≤ x ≤ 12** | **12 ≤ x ≤ 16** | **16 ≤ x ≤ 20** |
| **Frequency** | **3** | **8** | **19** | **14** | **6** |
| **Cumulative Frequency** |  |  |  |  |  |

1. **Enter the cumulative frequency values in the above table (1mk)**
2. **Estimate the median height of the plants (2mks)**
3. **A financial institution charges compound interest on money borrowed. A business woman borrowed Kshs. 16, 000 from the financial institution. She paid back Kshs 25,000 after 2 years. Find the interest rate per annum. (3mks)**
4. **Solve the equation cos (3θ + 1200) = √3/2 for 0 ≤ θ ≤ 1800 (3mks)**
5. **The radius of circle is given as 2.8 cm to 2 significant figures.If C is the circumference of the circle, determine the limits between which C/∏ lies (3mks)**

1. **A and B are towns 360 km apart. An express bus departs form A at 8 am and maintains an average speed of 90 km/h between A and B. Another bus starts from B also at 8 am and moves towards A making four stops at four equally spaced points between B and A. Each stop is of duration 5 minutes and the average speed between any two spots is 60 km/h. Calculate distance between the two buses at 10 am. (3mk)**

**SECTION II:ATTEMPT ANY 5 QUESTIONS IN THIS SECTION.**

**17. Line QR = 6.5cm is given below:-(*Do not use a protractor for this question*)**

 **(a) Draw triangle PQR such that P lies above line QR, PQR = 30o and PQ = 7cm (2mks)**

Q

R

**(b) By accurate construction on the diagram above, show the locus of a point which lies within the triangle such that:-**

* 1. **T is more than 2.5cm from line PQ and (2mks)**

 **(ii) T is not more than 4.5cm from Q (2mks)**

 **Shade the region in which T lies**

**(c) Lines QP and QR are produced to K and M respectively**

 **(i) Show by construction on the diagram above, the locus of a point C which is**

 **equidistant from each of the lines PK, PR and RM (2mks)**

 **(ii) With centre C and an appropriate radius, draw a circle to touch each of the lines PK, PR and RM only once .Measure the radius (2mks)**

**END**

**18. The diagram below shows the speed-time graph for a bus traveling between two towns. The bus starts from rest and accelerates uniformly for 50seconds. It then travels at a constant speed for 150seconds and finally decelerates uniformly for 100seconds.**

***Speed m/s***

 ***30 Time in seconds 80***

 **30**

 **0 130**

 **Given that the distance between the two towns is 2700m, calculate the ;**

1. **maximum speed in km/h, the bus attained (3mks)**

1. **acceleration (3mks)**

1. **distance the bus traveled during the last 50seconds (2mks)**

1. **time the bus takes to travel the first half of the journey (2mk)**

**19.On the Cartesian plane below, triangle PQR has vertices P(2, 3), Q ( 1,2) and R ( 4,1) while triangles P” Q “ R” has vertices P” (-2, 3), Q” ( -1,2) and R” ( -4, 1)**

****

1. **Describe fully a single transformation which maps triangle PQR onto triangle P”Q”R”**

 **(2mks)**

 **(b) On the same plane, draw triangle P’Q’R’, the image of triangle PQR, under reflection in line**

 **y = -x (2mks)**

1. **Describe fully a single transformation which maps triangle P’Q’R’ onto triangle P”Q”R**

 **(2mks)**

1. **Draw triangle P”Q”R” such that it can be mapped onto triangle PQR by a positive quarter turn about (0, 0) (2mks)**

 **(e) State all pairs of triangle that are oppositely congruent (2mks)**

**20.The figure below represents a model of a solid structure in the shape of frustrum of a cone with ahemisphere top. The diameter of the hemispherical part is 70cm and is equal to the diameter of thetop of the frustrum. The frustrum has a base diameter of 28cm and slant height of 60cm.**

****

**Calculate:**

1. **The area of the hemispherical surface (2mks)**

1. **The surface area of frustrum (2mks)**

1. **The area of the base (2mks)**

 **(e) The total surface area of the model (2mks)**

**21.Four towns P,Q,R, and S are such that town Q is 120km due east of town P. Town R**

**is 160km due north of town Q. Town S is on a bearing of 3300 from P and on a bearing of 3000 from R. Use a ruler and compasses ONLY for all constructions in this question. Taking a scale of 1cm = 50km, construct a scale drawing to show the positions of towns P,Q,R, and S. (5mks)**

 **Use your scale drawing to determine**

 **(i) the distance SP (1mk)**

 **(ii) the bearing and distance of P from R (2mks)**

 **(iii) the bearing and distance of town S from town Q. (2mks)**

**22. Last year Homabay Teachers Sacco received a gross income of sh. 12.5 Million from 50,000 shares. After paying salaries and other expenses, the Sacco had a balance of sh. 6.5 Million. Each year. 60% of a balance is paid to members as dividends which is calculated per share. This year the sacco’s gross income increased by 15%, the salaries and other expenses increased by 35% while members’ share went up by 15000 shares calculate:**

1. **The amount of dividends paid per share last year (2marks)**
2. **The amount of dividends paid per share this year. (5 marks)**
3. **If Mr. Wamono had saved by 31st December last year Shs 40,000 and a share is sh 225, how much dividend did he receive this year? (2 marks)**

**23. The diagram below shows a histogram representing the marks obtained in a certain test:-**

0

***Marks***

***Frequency Density***

1

2

3

4

5

6

7

4.5

9.5

19.5

39.5

49.5

**(a) If the frequency of the first class is 20, prepare a frequency distribution table for the data ) (4mks)**

**(b) State the modal class (1mk)**

**(c) Estimate: (i) The mean mark (2mks)**

 **(ii) The median mark (3mks)**

**24. a) Solve the inequality and write your answer as a single statement and represent on a number line (4mks)**

 **2x – 4 < 4 > - 3x – 5 (4mks)**

 **b) Write the inequalities satisfying the region below. (3mks) (5mks)**

****

 **c) Find the area of the required region. (3mks) (2mks)**

***This is the last page printe***

**21.The table below shows some values of the function; y = *x*2 + 2*x* – 3 for -6≤ *x* ≤ -3**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***X*** | **-6** | **-5.75** | **-5.5** | **-5.25** | **-5** | **-4.75** | **-4.5** | **-4.25** | **-4.0** | **-3.75** | **-3.5** | **-3.25** | **-3** |
| **Y** | **21** | **18.56** |  | **14.06** |  | **10.06** | **8.25** |  | **5** |  | **2.25** | **1.06** | **0** |

1. **complete the table (2mks)**

 **(b) using the completed table and the mid-ordinate rule with six ordinates, estimate the area of the region bounded by the curve; y = *x*2 + 2*x* – 3 and the lines y = 0 , *x* = -6 and *x* = -3 (2mks)**

**GRAPH**

1. **(i) by integration find the actual are of the region in (b) above (3mks)**

 **(ii) Calculate the percentage error arising from the estimate in (b) (3mks)**