ADDIS ABABA CITY GOVERNMENT OF EDUCATION BUREAU
YEKA SUB– CITY EDUCATION OFFICE SECONDARY SCHOOLS
MATHEMATICS MODEL EXAMINATION FOR GRADE 10TH
STUDENTS GINBOT 2011 E.C / MAY 2019 G.C

TIME ALLOWED: 3 HOURS

GENERAL INSTRUCTIONS:

THIS BOOKLET CONTAINS **MATHEMATICS** EXAMINATION. THE EXAMINATION CONTAINS 60 QUESTIONS. ATTEMPT ALL THE QUESTIONS. FOLLOW THE INSTRUCTIONS ON THE ANSWER SHEET AND THE EXAMINATION PAPER EXACTLY. USE ONLY **PENCIL** TO MARK YOUR ANSWERS.

THERE IS ONLY **ONE BEST** ANSWER FOR EACH QUESTION. CHOOSE THE BEST ANSWER FROM THE SUGGESTED OPTIONS AND BLACKEN THE LETTER OF YOUR CHOICE ON THE ANSWER SHEET. YOUR ANSWER MARK SHOULD BE HEAVY AND DARK, COVERING THE ANSWER SPACE COMPLETELY. PLEASE ERASE ALL UNNECESSARY PENCIL/PEN MARKS COMPLETELY FROM YOUR ANSWER SHEET.

YOU WILL BE LOWED TO WORK FOR **3:00** (OR 3 HOURS). IF YOU FINISH BEFORE TIME IS CALLED, YOU MAY GO BACK AND REVISED. WHEN TIME IS CALLED, YOU MUST IMMEDIATELY STOP WORKING, LAY YOUR PENCIL DOWN, AND WAIT FOR FURTHER INSTRUCTIONS.

ANY FORM OF CHEATING OR AN ATTEMPT TO CHEAT IN THE EXAMINATION HALL WILL RESULT IN AN AUTOMATIC DISMISSAL FROM THE EXAMINATION HALL AND CANCELLATION OF YOUR SCORE(S).

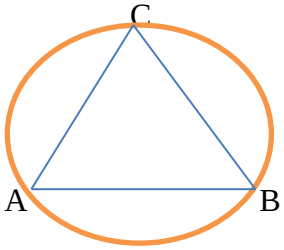
DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

Yeka Sub– City Education Office Secondary Schools Mathematics
Model Examination for Grade 10th students
Ginbot 2011 E.C / May 2019 G.C

Time Allowed: 3 hours

DIRECTIONS: For each of the following questions, choose the best answer from the given alternatives and carefully **blacken** the letter of your best choice on the separate answer sheet provided.

1. Let the GCF and LCM of 60 and X are 12 and 180 respectively. Then what is the value of X ?
   A. 36 B. 72 C. 90 D. 18
2. If a, and b are real numbers and a<b, then which of the following is necessarily true?
   A. $b < \frac{a+b}{2}$ C. $a < \frac{a+b}{2}$
   B. $a^2 < b^2$ D. ac < bc for any real number c.
3. Which one of the following system of linear equations has infinitely many solutions?
   A. $\begin{cases} 3x + 2y = 5 \\ x + y = 10 \end{cases}$ C. $\begin{cases} y + 3x = 5 \\ -3y + 2x = 7 \end{cases}$
   B. $\begin{cases} x + 2y = 6 \\ 2x + 3y = 5 \end{cases}$ D. $\begin{cases} -2y + 3x = 1 \\ 8y - 12x = -4 \end{cases}$
4. Which of the following interval satisfy the inequality {x: -1 ≤ x -2 ≤ 4}?
   A. (-∞ , 4) C. (-∞ , 1] U [4, ∞)
   B. [1 ,6] D. [6, ∞]
5. If f(x) = $\sqrt{x-1}$ and g (x) =$\sqrt{x-5}$. Then what is the domain of $(\frac{f}{g})$ (x)?
   A. {x : x ≥ 5} C. {x: x > 1}
   B. {x : x ≥ 1} D. {x : x > 5}
6. Which of the following is **not** true about f(x) =x^2 + 12x + 29 = 0?
   A. The vertex is (-6 ,-7) C. the axis of symmetry is x = −6
   B. The range is {y: y ≥ -7} D. the y –intercept is -7.
7. Which one of the following is true reference angleθ?
   A. $\sin 195° = \sin 15°$ C. $\tan 345° = \tan 15°$
   B. $\cos 695° = \cos(25°)$ D. $\sin 330° = -\sin 60°$
8. In the figure below an equilateral triangle is inscribed in a circle of radius 4cm .What is the area of the segments?



   A. $8(2\pi - 3\sqrt{3})cm^2$ C. $4(4\pi - 3\sqrt{3})cm^2$
   B. $8(2\pi - \sqrt{3})cm^2$ D. $4(2\pi - \sqrt{3})cm^2$
9. Let p = $\{x^3 - x$, x ∈{1, 3, 4}} then which of the following is **not** a subset of set p?
   A. {0} B. {0,24} C. {60} D. {1,3,4}

10. Let m>0,n>0,if $\log_2 m + \log_4 n = 2$, then which of the following is True ?

A.mn =2 B. $m\sqrt{n} = 4$ .C. $m + \sqrt{n} = 4$ D. 2m + n =2

11. Which one of the following is **not** a polynomial expression?

A/ $\frac{2X^2-72}{X^2+1}$ B/ $\cos\frac{3}{4}\pi$ C/ $\frac{4X^2-4}{\pi+6}$ D/ $\frac{X^4-5x^2+4}{x^2-4}$

12. Let $a = -0.4\dot{2}$ and b= $-0.\dot{1}$. Then what is the value of $\frac{a}{b}$?

A. $\frac{-19}{5}$ B. $\frac{23}{9}$ C. $\frac{-23}{9}$ D. $\frac{19}{5}$

13. What is the solution set of the equation $3^{x^2} = 27\,(\frac{1}{3})^{5x+9}$?

A. {-3 , -2} B. {2 , 3} C. {-2 , 3} D. {2 , -3}

14. Which of the following set has an empty intersection with the set of {0, ∅ , 1}?

A. {∅ } B. { 0 } C. { { 1 } } D. {0 , ∅ }

15. Let p (1, 2) and Q (4, 6) be two points in a plane. Then what is the magnitude of $\overrightarrow{PQ}$?

A. 5 units C. 4 units

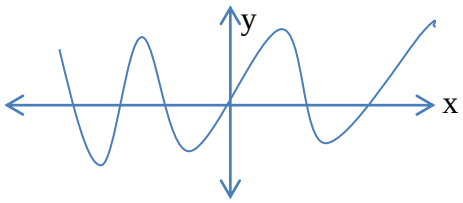
B. 3 units D. 6 units

16. Which of the following intervals may NOT contains a zero of $P(x) = -5x + 2x^3 + 1$?

A. (-2 , -1) C. (0 ,1)

B. (-1 , 0) D. (1 , 2)

17. The graph of a certain polynomial function f is given below which of the following is true about this function?



A. The degree of f is an odd number

B. The constant term is positive

C. The leading coefficient is positive

D. It has three local maximum.

18. Let b> 1 and $0 < b < 1$ be a real number, f(x) = $\log_b x$ and g(x) = $\log_{\frac{1}{b}} x$. Then which of the following is true about f(x) and g(x)?

A. For 0 < x < 1, f(x) is positive C. For x > 1, f(x) is negative.

B. For x> 1, g(x) is negative. D. For ∅ < x < 1, g(x) is negative.

19. Which of the following is characteristics of log $(\frac{1}{30,000})$?

A. -4 B. -3 C. 4 D. 3

20. Let the chord of length 10cm at a distance of $\sqrt{11}$ cm from the center of the circle. Then what is the radius of the circle?

A. $2\sqrt{3}$ cm B. $\sqrt{11}$ = cm C. 89cm D. 6cm

21. From a bag contain 6 white, 4red and 2 black balls of the same size. If one ball is drawn randomly, what is the probability of getting a red or black ball?

A. $\frac{1}{3}$ B.$\frac{1}{2}$ C. $\frac{1}{6}$ D. $\frac{2}{3}$

22. Let $f(x) = x^3 - 3x^2 + 3x - 1$, then which one of the following is true about the function?

A. f(x) has only one root with multiplicity 3

B. f(x) is decreasing function

C. f(x) has two real roots, with multiplicity 1and 2

D. f(x) has no real roots.

23. In a parallelogram ABCD, if the length of the sides AB = x+ 4, DC = 3x – 36 and BC=2x -16. What type of a parallelogram is it?

A. Rhombus C. Square

B. Rectangle D. Trapezium

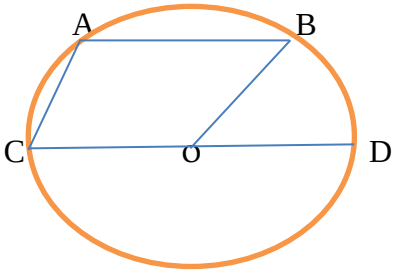
24. If an angle of θ is in standard position whose equation is y = -x and its terminal side lies in quadrant III. Then what is the value of $\csc\theta$?

A. $\frac{-\sqrt{2}}{2}$ B. $-\sqrt{2}$ C. $\sqrt{2}$ D. $\frac{\sqrt{2}}{2}$

25. Which of the following is equal to $\cos\frac{\pi}{6}$?

A. $\cos\frac{12\pi}{5}$ B. $\cos\frac{22\pi}{5}$ C. $\cos\frac{24\pi}{5}$ D. $\cos\frac{11\pi}{5}$

26. In the given figure below, 0 is the center of a circle if AB // CD, then m(<BOD) = 27^0 . Then which one of the following is true?



A. ABOC is a cyclic quadrilateral

B. arc AB = arc CD

C. M(<AOB) = 126°

D. M(<ABO) = $\frac{1}{2}$m (AC)

27. Which one of the following is not true about the function f(x) = $\sin x$?

A. The graph increases throughout its domain B. The graph has y- intercept at (0, 0)

C. The period of sine function is 2π D. The graph of f(x) decrease from $(\frac{\pi}{2}, \pi)$

28. What is the solution set of the inequality $1- x - 2x^2 \geq 0$?

A. $[-\frac{1}{2}, -1]$ B. [2 , -1] C. $[\frac{1}{2}, -1]$ D. $(-\infty, -1] \cup [\frac{1}{2}, -1]$

29. Let $\theta = -\frac{35}{9}\pi$. Then what is the reference angle of θ?

A. -20^0 B. 20^0 C. 340^0 D. 70^0

30. Let the total area of a circular cylinder is $56\pi cm^2$ and its altitude is 12cm. Then what is the radius of the cylinder?

A. 3cm B. 4cm C.2cm D. $2\sqrt{2}$

31. Let $\tan(3A^0) = \cot(A^0 - 10^0)$. Then what is the value of A^0?

A. 50^0 B. 65^0 C. 20^0 D. 25^0

32. Let $f(x) = x^5 + x - 1$ be a polynomial. Then is the remainder when the polynomial divided by x + 1? A. -2 B. 1 C. -3 D. 4

33. What is the truth set of $|2x + 3| = x - 1$?

A. {-4} B. ∅ C.$\{-4, \frac{-2}{3}\}$ D. $\{\frac{-2}{3}\}$

34. Let the altitude of aright equilateral triangular pyramid is 8cm and if one of its base is 10cm long. Then what is the volume the pyramid?

A. $\frac{200}{3}\sqrt{3}\ cm^3$ B. $200\sqrt{3}\ cm^3$ C. $\frac{100}{3}\sqrt{3}\ cm^3$ D. $\frac{400}{3}\sqrt{3}\ cm^3$

35. Given a vector V = $\begin{pmatrix}-2\\6\end{pmatrix}$, then which of the following vector is not parallel to V?

A. U = $\begin{pmatrix}-4\\12\end{pmatrix}$ B.U = $\begin{pmatrix}1\\6\end{pmatrix}$ C. U = $\begin{pmatrix}-1\\3\end{pmatrix}$ D. U = $\begin{pmatrix}1\\3\end{pmatrix}$

36. In a certain frequency distribution shown in the following table below,

Variable (x)	2	4	6	8	10
No of students (f)	5	3	7	2	3

Which one of the following is true about the given data?

A. the median is 10 B. the mode is 8 C. the range is 5 D. the mean is 11.5

37. If A (4, 3) and B (-2, -5) be two opposite vertices of a square, then what is the area of a square?

A. 10sq un B. 50 sq. un C. 100sq un D. 25 sq. un

38. What is the equation of a line whose x –intercept is -3 and y – intercept is 2?

A. $Y = -\frac{2}{3}x + 2$ C. $Y = \frac{2}{3}x + 2$

B. $Y = \frac{-2}{3}x - 2$ D. $-3y = 2x - 2$

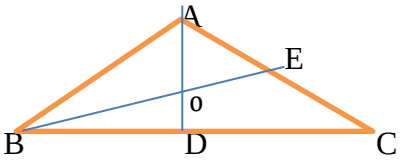
39. In ΔABC shown below, 0 is the intersection point of the medians AD and BE, if the length of AC is 4cm and area of the triangle 30 squ.cm. What is the length of BE?

A. 12cm

B. 15cm

C. 20cm

D. 8cm



40. Let $\log_5 (0.0016)^{\frac{-3}{4}} = a$, then what is the value of a?

A.3 B. 5 C.-3 D. -5

41. What is the solution set of $3x^2 + 4x + 1 > 0$?

A. $(-\infty, 1\,] \cup [\frac{1}{3}, \infty)$ C. $(-\infty, -1) \cup (-\frac{1}{3}, \infty)$

B. $(-\infty, -1\,] \cup [-\frac{1}{3}, \infty)$ D. $(-1, -\frac{1}{3})$

42. Which of the following is **not** correct about regular hexagonal of radius 8 units?

A. The area is $96\sqrt{3}$ unit squ C. The side length is 8 unit

B. The perimeter is 48 unit D. The apothem is $8\sqrt{3}$ unit

43. Which of the following is true about the similarity and congruence of plane figures?

A. Any two isosceles triangles are congruent C. Any congruent figures are Similar

B. Any two equilateral triangles are congruent D. Any two squares are congruent

44. Which one of the following variable is not quantitative data?

A. Age B. Gender C. height D. Temperature

45. Which one of the following is true about $f(x) = a^x$ where $a > 0$ and $a \neq 1$?

A. The graph of f(x) never cross the x-axis

B. The graph of f(x) is decreasing for $x > 0$ and $a > 1$

C. $F(x) < 1$ for $x < 0$ and $0 < a < 1$

D. The graph includes the point (1 , 0)

46. Let $\log_2^x + 3\log_2^y = 4$. Then which one of the following is false about the value of x and y?

A. $xy^3 = 16$ B. y=2,when x=2 C. y=4, when x=$\frac{1}{4}$ D. x+3y=4

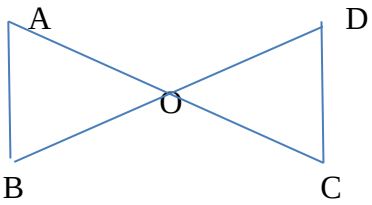
47. In the given figure below, if AB// CD and O is the midpoint of BD, then by what theorem ΔAOB ≡ ΔCOD?

A. SSS

B. SAS

C. ASA

D. AA



48. What is the value of x for which $27^{x-1} + 2 = 3^{3x-2}$?

A.0 B. $\frac{1}{2}$ C.$\frac{3}{2}$ D. 1

49. If the product of roots of the equation $kx^2 + 8x + 3 = 0$ is 1, then what is the possible value of K?

A. 3 B. 21 C.-3 D. -7

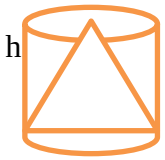
50. A cone is contained a cylinder so that their base radius and height are same. What is the ration of the cylinder to the volume of the cone?

A. 1:3

B. 9:1

C. 1:1

D. 3:1



51. A frustum of altitude 4cm is formed from a right circular cone of altitude 8cm and base radius 6cm. then the lateral surface area of the frustum is?

A. 200π cm^2 C. 45π cm^2

B. 90π cm^2 D. $100\sqrt{3}\,\pi$ cm^2

52. If a line passes through A (0, 0) and B ($4\sqrt{5}$, $-2\sqrt{5}$), then what is the degree measure of the angle of inclination that makes with the positive x- axis?

A. 120^0 B. 150^0 C. 135^0 D. 30^0

53. If the prism is right prism, then which one of the following is **not** true about the prism?

A. All lateral edges are perpendicular to the bases

B. The lateral faces are rectangles

C. The altitude is equal to the base edge

D. The altitude is equal to the lateral edge.

54. If the number of sides of a regular polygon is 9. Then what is the measure of each interior angle of a polygon?

A. 150^0 B. 140^0 C. 160^0 D. 40^0

55. If $\cos\theta + \sec\theta = 6$ then which of the following is equal to $\cos^2\theta + \sec^2\theta$?

A. 36 B. 38 C. 34 D. 6

56. If the height & base area of a prism is equal to the pyramid then the volume of the prism is 123 cm^3. Find the volume of the pyramid?

A. 41 cm^3 B. 369 cm^3 C.12 cm^3 D.123 cm^3

57. Out of 50 boys 30 play football (F) and 37 play basketball (B) .If 7 boys play neither game, and then which of the following is **false**?

A. n(FUB) =43 B. n(F/B) =6 C. n(F$\cap B) = 24$ D.$n(B/F) = 43$

58. Which of the following is **not** true about graph of f(x)=3^x + 2

A. The range of f is $\{y: y \geq 2\}$ C. The horizontal asymptote is x=2

B. The y-intercept of the graph is 3. D. When 2<x<3 f(x) is less than zero.

59. Let the point (2, 0) is x –intercept of the graph of the polynomial f(x) = x^4-hx^2 +kx and when f(x) is divided x-1 the remainder is 1.Then what is the value of k +h?

A.-8 B.8 C. -16 D.16

60. From atop of a mountain 200 meters above sea level, the angle of depression of two bouts are 45° and 60° respectively. Then how far apart are the boats?

A. $\frac{200\sqrt{3}}{3}$ B. 100 C. $200(1-\frac{\sqrt{3}}{3})$ D. $100(1-\frac{\sqrt{3}}{3})$