CHERCHER SECONDARY SCHOOL
MATHEMATICS MODEL EXAM FOR GRADE 12, 2016 E.C.
NUMBER OF QUESTIONS: 65 **TIME ALLOWED: 3:00**

DIRECTION : FOR EACH OF THE FOLLOWING PROBLEMS CHOOSE THE BEST ANSWER FROM THE GIVEN ALTERNATIVES AND CARFULLY BLACKEN THE LETTER OF YOUR CHOICE ON THE ANSWER SHEET PROVIDED.

1. If $A=\{\varnothing\}$, Then which one of the fallowing is not true
A. $\varnothing\subseteq\{A\}$ **B.** $\varnothing\in A$ **C.** $A\in\{\{\varnothing\}\}$ **D.** $A\subseteq\{\{\varnothing\}\}$

2. The quotient of $(6.4\times10^{2})\div(2\times10^{-2})$ is written in standard notation form is?
A. 3.2×10^{-3} **B.** 3.2×10^{4} **C.** 3.2×10^{-4} **D.** 32×10^{2}

3. Which one of the fallowing is not necessarily prefect square?
A. $(a-b)(a-b)$ **B.** $(a+b)(a-b)$ **C.** $(a+b)^{2}$ D. $64a^{2}$

4. If the measure a enteral angle a regular polygon is 18^{0} then the measure of its interior angle is equal to?
A. 20 **B.** 15 **C.** 81 **D.** 162

5. If the radius of square is $\sqrt{8}cm$, then apothem of the square is
A. 8cm **B.** 2cm **C.** $8\sqrt{2}$ cm **D.** $\sqrt{3}$ cm

6. The solution set of $4^{x-2}-172^{x-4}+1=0$ is
A. $\{0,4\}$ **B.** $\{0\}$ **C.** $\{0,-4\}$ **D.** $\{-4\}$

7. If the equation $(\frac{a}{b}-\frac{b}{a}¿-2c=(\frac{a}{b}+\frac{b}{a})c$, for $ab\neq0, a\neq0$ and $b\neq0$ then the value of c is equal to -----
A. $\frac{-2ab}{a-b}$ **B.** $\frac{b-a}{a+b}$ **C.** $\frac{a+b}{a-b}$ **D.** $\frac{a-b}{a+b}$

8. Let $f=\{(2,4),(-1,1),(0,0)\}$ and $g=\{(0,1),(1,2),(2,0),(3,-1)\}$, then $f(g(1+x))$ is equal to
A. $\{(2,0),(1,4),(-1,1)\}$ **B.** $\{(0,1),(4,0),(1,2)\}$ **C.** $\{(0,2),(4,1),(1,-1)\}$ **D.** $\{(1,0),(0,4),(2,1)\}$

9. The graph of $g(x)=¿$ can be obtained by shifting the graph of $f(x)=x^{2}$ two units in the direction of
A. negative x and negative y **C.** negative x and positive y
B. positive x and negative y **D.** positive x and positive y

10. If a and b are two distinct roots of the equation $-kx^{2}-x+15=0$and the sum of the roots is $-¿4$ then which of the fallowing is not true about the roots?
A. $\frac{ab}{a+b}=15$ **B.** $(a+b)^{2}=100$ **C.** $a^{2}+b^{2}=136$ **D.** $\frac{1}{a}+\frac{1}{b}=\frac{1}{15}$

11. If the height and the base edge of a regular hexagon pyramid is doubled then the new lateral surface area will be how many times to the original?
A. 6 **B.** 4 **C.** 2 **D.** 3

12. If the altitude of the equilateral triangle is a cm, then its area will be
A. $\frac{a^{2}\sqrt{3}}{3}cm^{2}$ **B.** $\frac{2a^{2}\sqrt{3}}{3}cm^{2}$ **C.** $\frac{a^{2}\sqrt{3}}{4}cm^{2}$ **D.** $\frac{3a^{2}\sqrt{3}}{4}cm^{2}$

13. The greatest common factor and least common factor of (72,108,240) are
A. $2^{2}*3\wedge2^{3}*3^{3}*5$ **B.** $2*3^{2}\wedge2^{4}*3^{2}*5$ **C.** $2^{2}*3\wedge2^{4}*3^{3}*5$ **D.** $2^{2}*3\wedge3^{3}*5$

14. If the sequence is defined by $a_{n+1}=(a¿¿n-1)^{2}+1¿$ and $a_1=1$ and $a_2=2$ for all $n\geq2$ then which one of the fallowing is true?

A. the seventh terms of sequence is 5
B. the sum of the sixth terms & seventh terms is 52
C. The first three terms of the sequence are {5,5,26}
D. the common difference of sequence is 0

15. If n arithmetic means are inserted between 1 and 36 and the sum of S_{n+2} is 148, then the value of n and common difference respectively are

A. 6 and 7 **B.** 8 and 5 **C.** 6 and 5 **D.** 8 and 6

16. For decreasing geometric sequence $\{Gn\}$ for $n \geq 1$ and G_3=-2 and G_5=-32 then which one of the fallowing is not true?

A. $\frac{G_n}{G_{n+1}}=\frac{1}{4}$ **B.** $\frac{G_{n-1}}{G_n}=\frac{1}{4}$ **C.** $\frac{G_{n-1}}{G_{n+1}}=\frac{1}{16}$ **D.** r = -4

17. In arithmetic progression if k^{th} terms is m and m^{th} terms is k then $(k+m)^{th}$ terms is equal to

A. 1 **B.** -1 **C.** 0 **D.** 2

18. Which one of the fallowing is not geometric sequence

A. $\frac{3}{4}, \frac{3}{4^3}, \frac{3}{4^5}, \bullet\bullet\bullet$ **B.** $\frac{-1}{3^2}, \frac{-1}{3^4}, \frac{-1}{3^6}, \frac{-1}{3^8} \bullet\bullet\bullet$ **C.** 5, -5, 5, -5$\bullet\bullet\bullet$

D. $\frac{3}{2}, \frac{-3}{2}, \frac{3}{4}, \frac{-3}{8}, \bullet\bullet\bullet$

19. The sum of $\sum_{n=1}^{\infty} \frac{(-1)^n}{3^{2n}}$ is equal to

A. $\frac{9}{8}$ **B.** $\frac{9}{10}$ **C.** $\frac{-9}{10}$ **D.** $\frac{-1}{10}$

20. Let $g(x)=¿\sqrt{x}$ and $a=3$ then the value of $\frac{g(h+a)-g(a)}{h}$ as h is tending to zero is

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

21. Suppose (f+g¿' (-3) = -16 and g(x) = x^3+2x, then f^1(-3) = --------
A. – 45 B. -13 C. 20 D. 13

22. If a continuous function f has relative extreme at c then which one of the fallowing must be true about f.

A. f^1(c) is exist **B.** f^1 (c) = 0 **C.** c is in the domain of f(x) **D.** f^1(c) is does not exist

23. The absolute maximum value of the function f(x) = $2x^2$-x^4-4 on [0,4]?

A. -3 **B.** -228 **C.** -4 **D.** 3

24. At what the function f(x) = 1/4x^4 - $2x^2$ has local maximum value?

A. $x=2$ and $x=-2$ **B.** $x=0$ **C.** $x=4$ **D.** $x=0$ and $x=2$

25. The graph f(x) = $\frac{x}{x^2+9}$ is increasing on the interval

A. $(-\infty, \infty ¿$ **B.** $[-3,3]$ **C.** ¿ **D.** ¿

26. The derivative of the function $f(x)=\frac{2}{x\sqrt{x}}$ is

A. $\frac{-3}{¿¿¿}$ **B.** $\frac{-3}{\sqrt{x}}$ **C.** $\frac{-3}{2\sqrt{x}}$ **D.** $\frac{3}{¿¿¿}$

27. If the radius of right circular cylinder of height 10cm is increasing at the rate of 3cm/min, then what is the rate of change of volume of cylinder at radius 2cm?

A. $120\pi \frac{cm^3}{min}$ **B.** $80\pi \frac{cm^3}{min}$ **C.** $640\pi \frac{cm^3}{min}$ **D.** $320\pi \frac{cm^3}{min}$

28. If $f'(x)=3x^2+1$ and $f(0)=1$, then the general formula of function $f(x)$ is

A. x^3+x+1 B. 6x+1 **C.** x^3+x+c **D.** $9x^3$+x+1

29. $\int_0^4 \sqrt{x}\,dx$ is equal to

A. 16/3 **B.** 2 **C.** ¼ **D.** -16/3

30. The area of the region bounded by graph $f(x)=x3$ and x-axis between $x=-1$ and $x=2$ is

A. 15/4 **B.** 17/4 **C.** 4 **D.** 16

31. If $f(x)=-4x^6\sqrt[3]{x^2}$ then the derivative of $f(x)$ at $x=-1$ is equal to

A. 20/3 **B.** 17/3 **C.** -3/20 **D.** 80/3

32. Which one of the fallowing is not true about measure of dispersion.

A. It is absolute measure of dispersion measures only the variability of data in the same units.

B. It is relative measure of dispersion compare the vitiation of two or more distribution without units.

C. It is relative measure of dispersion measures the variability of data in the same units.

D. It is scatter or variation of variable about central value.

33. If the frequency distribution of grouped data is given as

Class interval	4-6	7-9	10-12	13-15
frequency	14	39	27	16

Then the coefficient of range of data is equal to

A. 11/19 **B.** 12/19 **C.** 6/13 **D.** 19/12

34. If the standard deviation of data $x_1, x_2, x_3, x_4 \ldots, x_n$ is 10. then which one of the fallowing is true about the new data $2x_1+1, 2x_2+1, 2x_3+1, 2x_4+1 \ldots, 2x_n+1$.

A. The standard deviation of new data is 21 **B.** the variance of new data is 400

C. The standard deviation of new data is 10 **D.** variance of new data is 401

35. For given data as 1,14,19,31,50. then $\sum \frac{(x_i-\bar{x})}{n}$ is equal to

A. 0 **B.** -11 **C.** 1 **D.** 3

36. If the data are given as 105, 101, 102, 109, 60, 100, 120. then which one of the fallowing is not true about the data.

A. Interquartile range is 9 **B.** quartile deviation is 4.5 **C.** range of data is 15 **D.** median of data is 102

37. The maximum value of $Z=4x+5y$ subject to $\begin{cases} 2x+2y\le 10 \\ x+2y\le 6 \\ x\ge 0, y\ge 0 \end{cases}$

A. 19 **B.** 20 **C.** 21 **D.** 22

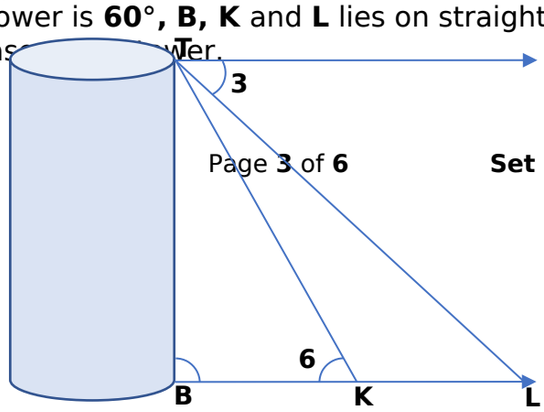
38. Dietician wishes to mix two types of food in such ways that vitamin contents of mixture contain at least 8 units of vitamin A and at least 10 units of vitamin C. Food one contains 2 units of vitamin A and 2 units of vitamin C and food two contains 1 units of vitamin A and 2 units of vitamin C. Its cost birr 50 per units of food one and cost birr 70 per units of food two. Then the objective function to minimize the cost of such mixture is?

A. $Z=2x+y\ge 8$ **B.** $Z=x+2y\ge 10$ **C.** $Z=50x+70y$ **D.** $Z=8x+10$

39. If $f(x)=\frac{\sqrt{x+2}}{x+2}$ and $g(x)=\frac{1}{x}-2$ then $f(g(x))$ is equal to?

A. $\sqrt{5}$ **B.** $\sqrt{x}$ **C.** $\sqrt{x}$ – 2 **D.** $\frac{\sqrt{x}}{x}$

40. The diagram blew is representation of **25m** vertical observation of tower **TB** and two cars **K** and **L** on a road the angle of depression from **T** to car **L** is **30°**,The angle of elevation from car **K** to top of the tower is **60°, B, K** and **L** lies on straight line and lies on the same horizontal plane at the bas[illegible]wer.



What is the distance between two cars (K to L)?

A. $\frac{50\sqrt{3}}{3}$ m **B.** 5 $\sqrt{3}$ m **C.** $\frac{5\sqrt{3}}{2}$ m **D.** 5 + $\sqrt{3}$ m

41. What is the equation of line passing through $p(5,-1)$ and perpendicular to the line L: $-¿$ x $-3y = -¿7$

A. Y=3x-16 **B.** y =$-3x$+14 **C.** y =$-3x-¿14$ **D.** Y=3x$-¿4$

42. Which one of the following are polynomial function?

A. f(x) = $\frac{x}{x}$ **B.** f(x) = $2x^{-4}+x^2$ +8x +1 **C.** f(x) =$\sqrt{(x+1)^2}$ **D.** f(x) = $\frac{x^2+1}{x^2+1}$

43. The Values of x where the graph f(x) =$\frac{x^2-4x+3}{x^3}$ crosses its horizontal asymptote is------

A. x=-2 **B.** x=3 and x=1 **C.** x=0 **D.** x=-2 and x=1

44. If partial function decomposing $f(x)=\frac{5x-7}{(x-1)^3}=\frac{A}{x-1}+\frac{B}{(x-1)^2}+\frac{C}{(x-1)^3}$ the value of A, B & C respectively are ____

A. 5, 0 and -3 **B.** 0, 5 and -2 **C.** 5, 3 and 7 **D.** 2, 5 and 7

45. A bag contains 7 white, 6 red and 9 black balls. Two balls are drawn at random, the probability that the ball will be black is

A. $\frac{1}{11}$ **B.** $\frac{12}{77}$ **C.** $\frac{5}{77}$ **D.** $\frac{9}{77}$

46. If we toss a coin three time, what is the number of possible events of getting at least two heads?

A. 3 **B.** 4 **C.** 6 **D.** 5

47. What is the range of the function $f(x)=sgnx+3$?

A. {4, 3 ,2} **B.** {1, 2 ,3} **C.** {1, 3, 5} **D.** {0, 2, 3}

48. From the following which one is the function?

A. R= {(x, y)}:x, y∈R and x^2-y^2=0 **C.** R= {(1, 2) (1, 3), (2,4)}

B. R= {(x, y)}:x, y∈R and y=2x+1 **D.** R= {(x, y)}:x, y∈R and $x^2+y^2=9$

49. Let $f(x)=\frac{3x+1}{x-2}$ then What is the range of f(x)?

A. $\mathbb{R}\setminus\{2\}$ **B.** $\mathbb{R}$ **C.** $\mathbb{R}\setminus\{3\}$ **D.** $\mathbb{R}\setminus\{\frac{-1}{3}\}$

50. What is the inverse of the function $f(x)=\frac{x+3}{2x-4}, x\neq 2$

A. f^{-1}(x) =$\frac{4x+3}{2x-1}$ for x≠$\frac{1}{2}$ **B.** f^{-1}(x) =$\frac{x+3}{3x+1}$ for x≠$-\frac{1}{3}$ **C.** f^{-1}(x) = $\frac{4x+3}{2x+1}$ for x≠$-\frac{1}{2}$ **D.** f^{-1}(x) =$\frac{x+3}{2x+1}$ for x≠$-\frac{1}{2}$

51. Which one of the following is not true about the equation Ellipse $\frac{x^2}{100}+\frac{y^2}{36}$

A. Eccentricity is $\frac{8}{10}$ **C.** The center is C (0 ,3)

B. the length of major axis is 20 **D.** The minor axis is 12

52. Which one of the following sentences has a truth value?

A. Man is selfish **C.** Man is mortal

B. Tomorrow is beautiful day **D.** We shall win!

53. If the vector $V=2i+3j$ and $U=3i-j$ then, the unit vector in the direction $U+V$ is

A. $\frac{5i}{\sqrt{29}}+\frac{2j}{\sqrt{29}}$ **B.** $\frac{5i}{\sqrt{29}}-\frac{2j}{\sqrt{29}}$ **C.** $\frac{5i}{\sqrt{21}}+\frac{3j}{\sqrt{29}}$ **D.** $\frac{5i}{\sqrt{21}}-\frac{3j}{21}$

54. The modulus of $\frac{1}{i^3}+\frac{-5+3i}{12-5i}$ is equal to -----

A. $\frac{15}{13}$ **B.** $\frac{\sqrt{15}}{13}$ **C.** $\frac{18}{12}$ **D.** $\frac{2+\sqrt{34}}{12}$

55. A polar form of Z= $\frac{1+\sqrt{3i}}{1+i}$ is -------

A. $\sqrt{2}(\cos 15°+i\sin 15°)$ **B.** $\sqrt{2}(\cos 60°+i\sin 60°)$ **C.** $\sqrt{2}(\cos 30°+i\sin 60°)$ **D.** $\sqrt{2}(\cos 45°+i\sin 45°)$

56. For what values of K does the system $\begin{cases} kx+4y=5 \\ 9x+ky=2 \end{cases}$ have unique solution?

A. k=6 and k=−¿6 **B.** $k\neq 6\wedge k\neq -6$ **C.** $k=\frac{8}{5}$ and k≠$-\frac{8}{5}$ **D.** $k\neq\frac{8}{5}$

57. Let $A=\begin{bmatrix}1 & 2\\ 3 & 4\end{bmatrix}$ then, the inverse of A is------

A. $\begin{bmatrix}1 & -2\\ -3 & 4\end{bmatrix}$ **B.** $\begin{bmatrix}-1 & 2\\ 3 & -4\end{bmatrix}$ **C.** $\begin{bmatrix}2 & 1\\ \frac{-3}{2} & \frac{1}{2}\end{bmatrix}$ **D.** $\begin{bmatrix}-2 & 1\\ \frac{3}{2} & \frac{-1}{2}\end{bmatrix}$

58. Let $A=\begin{bmatrix}a & -a\\ a+1 & -a-1\end{bmatrix}$ and $B=\begin{bmatrix}a+2 & -a-1\\ a+1 & -a\end{bmatrix}$ then which one of the following not true?

A. A^{-1} doesn't exist **B.** A^T = B **C.** AB=A **D.** |B|=1

59. What is the solution set of the system $\begin{cases} x+y-z=1 \\ x+2y-3z=1 \\ 2x+3y-4z=2 \end{cases}$?

A. {(1−,2k,k¿}, kϵR **B.** {(0, 2, 1¿} **C.** {(2k+1,−k,k¿} kϵR **D.** ∅

60. Which one of the following is not true?

A. sin(-x) = -six **B.** cos(-x) =cost **C.** tan(-x) =−¿tanx **D.** cos(-x)=−¿

61. Which one of the following names can correctly applies to the function $f(x)=\sqrt{x^4}$

A. constant function B. Absolute value function **C.** linear function

D. Quadratic function

62. let $x, y\in R$, then which one of the following is true?

A. (□x¿(□y) (x^2+y+3=0) **B.** (□x¿(∃y) (x^2+y+3=0) **C.** (□y¿(∃x) (x^2+y+3=0) **D.** (□x¿(□y) (x^2+y^2+3=0)

63. L et $R(x)=\frac{ax^2+bx+1}{cx+d}$ be rational function, which one of the following is not true about $R(x)$?

A. If y-intercept is 2 then d=$\frac{1}{2}$

B. If the line y=2x is its oblique asymptote then a=2c and b=2d

C. If the line x=4 is its vertical asymptote then d=-4c
D. None of the above

64. Allocate Birr 1500 in the ratio 2:3:7 respectively in their ratio are _____
A. 260, 370, 870 **B.** 265, 355, 880 **C.** 230, 338 ,876 **D.** 250, 375, 875

65. If you buy a gold ring for 498 Birr and sell it for 750 Birr, then what is markup percent with respect to selling price?
A. 30.6% **B.** 34.6% **C.** 44% **D.** 33.6 %