2017E.C Saden Adea Secondary School Mathematics Worksheet For Grade 12

1. Which one of the following is geometric sequence?

   A. 1,3,5,7, … B.1,4,9,16, … C. 4,2,1, $\frac{1}{2}, \frac{1}{4}$ … D.5,9.13,17, …

2. If $\log_{\sqrt{5}} x + \log_{\sqrt[3]{5}} x + \log_{\sqrt[4]{5}} x +$ …. up to 7 terms is equal to 35, then x is equal to:

   A. 5 B. 25 C. 125 D. 175

3. Let f(x) $= \frac{X}{X+1}$ and g(x) $= \sqrt{x-1}$, then what is the value of f(a − 1) + g(a + 1)?

   A. $\frac{a+a\sqrt{a}-1}{a}$ B. $\frac{a-a\sqrt{a}-1}{a}$ C. $\frac{a+a\sqrt{a}+1}{a}$ D. $\frac{a+a\sqrt{a}-1}{a^2}$

4. The inverse of the function defined by $f(x) = \frac{2x+1}{1-3x}$ is:

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

5. If $f(x) = x^2 + x - 2$ and $\frac{1}{2}(gof)(x) = 2x^2 - 5x + 2$ then $g(x)$ is

   A. $2x - 3$ B. $2x + 3$ C. $x^3 + 3x + 1$ D. $2x^2 - 3x + 1$

6. The first, second and middle terms of an arithmetic sequence are a,b and c respectively. Their sum is?

   A. $\frac{2(c-a)}{b-a}$ B. $\frac{2c(c-a)}{b-a} + c$ C. $\frac{2c(b-a)}{c-a}$ D. $\frac{2b(c-a)}{b-a}$

7. If the function $f: IR \longrightarrow A$ given by $f(x) = \frac{x^2}{x^2+1}$ is surjective then A is :

   A. IR B.[0,1] C.(0,1] D.[0,1)

8. The probability that a company executive will travel by train is $\frac{2}{3}$ and that he will travel by plane is $\frac{1}{5}$. The probability of his travelling by train or plane is

   A. $\frac{2}{15}$ B. $\frac{13}{15}$ C. $\frac{15}{13}$ D. $\frac{15}{2}$

9. If $h(x) = \big(f(x)\big)^2 - \big(g(x)\big)^2$, $f'(x) = -g(x)$ & $g'(x) = f(x)$, then $h'(x)$ is equal to:

   A. $-2[g(x) + f(x)]$ B. $\big(-g(x)\big)^2 - \big(f(x)\big)^2$ C. $-4f(x)g(x)$ D. $-4f(x) + g(x)$

10. Suppose $f(x)$ twice differentiable function satisfying $f(x^2) = f(x) + x^2$, then what are the values of $f'(1)$ & $f''(1)$ respectively? A. 2 & $-\frac{3}{2}$ B. -2 & $\frac{3}{2}$ C. 2 & $-\frac{2}{3}$ D. -2 & $-\frac{2}{3}$

11. Which of the following is not true about $f(x) = \frac{x^2+x-2}{x^2-x-6}$?

    A. The graph of f has no vertical asymptote B. $y = 1$ is a horizontal asymptote to the graph of f

    C. If $x \to 3^-$, then $y \to \infty$ D. The graph of f is discontinuous at $\left(-2, \frac{3}{5}\right)$

12. The absolute maximum value of $f(x) = x^3 - 3x^2 + 12$ on the closed interval $[-2, 4]$ occurs at x equal to: A. 4 B.2 C. 1 D. 0

13. An up turned right circular cone with semi vertical angle 45^0 is being filled with water at a constant rate of 30 cm^3 per second. When the depth of the water is 60 cm, what is the rate at which the area of the water surface is increasing?

A. 1 $cm^2/_{sec}$ B. 60 $cm^2/_{sec}$ C. $\frac{1}{120}cm^2/_{sec}$ D. 30 $cm^2/_{sec}$

14. Which one of the following is equal to $\int_1^e \left(\frac{x^2-1}{x}\right)dx$?

A. $e-\frac{1}{e}$ B. e^2-e C. $\frac{e^2}{2}-e+\frac{1}{2}$ D. $\frac{1}{2}e^2-\frac{3}{2}$

15. The value of β for which the system of equations $\begin{cases} 2x-y-z=12 \\ x-2y+z=-4 \\ x+y+\beta z=4 \end{cases}$ has no solution is:

A. -3 B.2 C. -2 D. 3

16. What is the sum of the series $\sum_{n=6}^{\infty}\frac{(-1)^n 2^{n-3}}{3^{n-2}}$? A. $\frac{8}{135}$ B. $-\frac{8}{135}$ C. 135 D. 127

17. The solution set of $\frac{2}{3x+1}-\frac{1}{x}=\frac{-6x}{3x+1}$ is A. $\left\{-\frac{1}{3},2\right\}$ B. $\left\{-\frac{1}{3},\frac{1}{2}\right\}$ C. $\left\{\frac{1}{2}\right\}$ D. $\left\{\frac{1}{2},-1\right\}$

18. In how many ways 7 men and 7 women can be seated around table such that no two women can sit together? A.7! B. 7! × 6! C. $(7!)^2$ D. $(6!)^2$

19. If $A=\begin{bmatrix}1 & -2\\ 3 & 0\end{bmatrix}$, $B=\begin{bmatrix}-1 & 4\\ 2 & 3\end{bmatrix}$ & $C=\begin{bmatrix}0 & 1\\ -1 & 0\end{bmatrix}$, then $5A-3B+2C$ is equal to :

A. $\begin{bmatrix}8 & -20\\ 7 & -9\end{bmatrix}$ B. $\begin{bmatrix}8 & -10\\ 7 & -9\end{bmatrix}$ C. $\begin{bmatrix}8 & 7\\ -20 & -9\end{bmatrix}$ D. $\begin{bmatrix}-8 & 20\\ -7 & 9\end{bmatrix}$

20. The sum of the first three terms of geometric sequence is 7 and sum of their squares are 21 then what are the ratios of geometric sequence? A. 2 & $\frac{3}{7}$ B. -2 & $-\frac{1}{2}$ C. 2 & $\frac{1}{2}$ D. -2 & $\frac{1}{2}$

21. Balls are arranged in rows to form an equilateral triangle. The first row consists of one ball, the second row of two balls and so on. If 669 more balls are added then all the balls can be arranged in the shape of a square and each of the sides then contains 8 balls less than each side of the triangle did. The initial number of the ball is? A. 1540 B. 55 C.1550 D. 6650

22. For a square matrix A and anon-singular matrix B of the same order. Value of determinate of $B^{-1}AB$ is equal to: A. $|A^{-1}|$ B. $|B|$ C. $|B^{-1}|$ D. $|A|$

23. The following system of equations $\begin{cases} \alpha x+y+z=\alpha-1 \\ x+\alpha y+z=\alpha-1 \\ x+y+\alpha Z=\alpha-1 \end{cases}$ has infinitely many solution if α is?

A. 1 B. 2 C. -1 D. -3

24. For the or the following frequency distribution table the value of the standard deviation is equal to :

A. 1.6 C. 2

B. $\sqrt{1.6}$ D.5

V	3	4	5	6	7
f	1	1	3	3	1

25. What is the image of the circle $(x-2)^2+(y+3)^2=1$ under the translation that takes $(2,3)$ *to* $(1,4)$ followed by the reflection through the y-axis?

A. $(x+2)^2+(y+3)^2=1$ C.$(x+2)^2+(y-3)^2=1$

B. $(x-1)^2+(y-3)^2=1$ D. $(x+1)^2+(y+2)^2=1$

26. Let two lines L_1 and L_2 are intersecting at$(0,0)$ in a plane and passes through $(1,1)$ and $(0,1)$ respectively .Then the angle between them is equal A.30^0 B.45^0 C.60^0 D.90^0

27. The unit vector in the opposite direction of V= (2, 4) is A. $(-\frac{-2}{\sqrt{5}},\frac{-4}{\sqrt{5}})$ B.$(\frac{-1}{\sqrt{5}},\frac{-2}{\sqrt{5}})$ C.$(\frac{1}{\sqrt{5}},\frac{2}{\sqrt{5}})$ D.$(\frac{2}{\sqrt{5}},\frac{4}{\sqrt{5}})$

28. Find k, so that the vector from a point A (1,-1, 3) to a point B(3, 0, 5) is perpendicular to the vector from point A to point (k, k, k). A. $\frac{2}{5}$ B.$\frac{-8}{5}$ C.$\frac{12}{5}$ D.$\frac{7}{5}$

29. The image of a line given by $(x,y):(1,0)+t(1,2)$ under a translation T that takes $(1,0)$to$(0,1)$).

A. $y=2x-2$ B.$y=2x$ C.$y=2x-1$ D. $y=2x+1$

30. The image of a point $(1,0)$ rotated by 60^0 about a point$(3,2)$

A.$\left(2+\sqrt{3},1-\sqrt{3}\right)$ B.$\left(2-\sqrt{3},1-\sqrt{3}\right)$ C. $\left(2+\sqrt{3},1+\sqrt{3}\right)$ D. $\left(2-\sqrt{3},1+\sqrt{3}\right)$

32. For the following frequency distribution table

V	3	4	5	6	7
f	1	1	3	3	1

The value of the standard deviation is equal to

A. 1.6 B.$\sqrt{1.6}$ C.2 D.5

33. For the following data 1,2,3,3,5,6,8 Which of the following is not true?

A. Mean devation about mean =2 C. Mean devation about mode =1.86

B. Mean devation about median =1.86 D. Mean =Median=Mode

34. The mean and the standard deviation of incomes of two companies are given below.

Company	Mean	Standard deviation
A	6000	120
B	6000	220

The which of the following is not true about the companies?

A. Company A is more consistent than company B

B. Company A has variable income than company B

C. Coefficient of variation , C.V_A=2

D. Coefficient of variation , C.$V_{B=}$ 3.6

35 Let $f\left(x+\frac{1}{x}\right)=x^2+\frac{1}{x^2}$, $x\in R-\{0\}$, then $f(x)$ is equal to:

A. x^2 B. x^2-1 C. x^2-2 D. x^2+1

36.*If* $A=\begin{bmatrix}2 & 2\\ -3 & 2\end{bmatrix}$ & $B=\begin{bmatrix}0 & -1\\ 1 & 0\end{bmatrix}$, then $(B^{-1}A^{-1})^{-1}$ is equal to:

A. $\begin{bmatrix}2 & -2\\ 2 & 3\end{bmatrix}$ B. $\begin{bmatrix}3 & -2\\ 2 & 2\end{bmatrix}$ C. $\frac{1}{10}\begin{bmatrix}2 & 2\\ -2 & 3\end{bmatrix}$ D. $\frac{1}{10}\begin{bmatrix}3 & 2\\ -2 & 2\end{bmatrix}$

37. Suppose the profit earned by 100 companies in 2007 to 2008 is given below in million Birr. Then which of the following is not true?

A. The first quartile Q1=47.72
B. The Median=57.17
C.20% of the companies earn an annual profit of less than Birr 75.5 million
D. The fourth deciles D4=53.83

Profit	f	C.f
19-30	4	4
31-40	8	12
41-50	18	30
51-60	30	60
61-70	15	75
71-80	10	85
81-90	8	93
91-100	7	100

36. If the sequence is defined by $a_1 = 1$, $a_2 = 2$ and for $n \geq 1$. $a_{(n+2)} = a_{(n+1)} + (a_n)^2 + 1$, then the 6^{th} term is: A.383 B. 108 C. 784 D. 26

37. If a_n is an arithmetic progression and $a_1 + a_4 + a_7 + \cdots a_{16} = 147$, then $a_1 + a_6 + a_{11} + a_{16} =$
A. 96 B. 98 C. 100 D. 90

38. Let $f(x) = \sqrt{3x-1}$,what is the equation of the tangent to the graph of f and perpendicular to the line $3y + 2x = 3$ A. $y = \frac{3}{2}x$ B. $y = \frac{3}{2}x + 3$ C. $y = -\frac{5}{2}x + 4$ D. $y = -\frac{3}{2}x$

39. The range of the function $f(x) = \lfloor x \rfloor - x$ is :A.$[-1, 0)$ B. $(-1,0)$ C. $[0, 1)$ D. $(-1, 0]$

40. For the rational function $f(x) = \frac{x^2}{2x^2-5x-3}$ which one of the following is NOT true?

A. Vertical asymptote are the lines $x = -\frac{1}{2}$ & $x = 3$ C. Horizontal asymptotes is $y = \frac{1}{2}$

B. Oblique asymptote is $y = \frac{1}{2}x$ D. $f(x)$ intersect the horizontal asymptote at $x = \frac{3}{5}$

41. What s the sum of the finite series $\sum_{n=1}^{200}\left(\frac{1}{n} - \frac{1}{n+1}\right)$ A.$-\frac{100}{101}$ B. $\frac{198}{201}$ C. $\frac{200}{201}$ D. $-\frac{199}{200}$

42. Suppose a manufacture can sell x items per week for a revenue $r(x) = 190x$ birr and its costs $c(x) = \frac{1}{20}x^2 + 70x + 22{,}000$ Birr. What is the number of items that yield the maximum profit?
A. 120 B. 150 C. 150,000 D. 1200

43. If $f(x) = x\sqrt{3x-1}$, then which of the following is anti derivative of $f(x)$?

A. $\frac{2}{45}(3x-1)^{\frac{5}{2}} + \frac{2}{27}(3x-1)^{\frac{3}{2}} + c$ C. $\frac{2}{45}(3x-1)^{\frac{5}{2}} + \frac{2}{27}(3x+1)^{\frac{3}{2}} + c$

B. $\frac{2}{45}(3x+1)^{\frac{5}{2}} + \frac{2}{27}(3x-1)^{\frac{3}{2}} + c$ D. $\frac{2}{27}(3x-1)^{\frac{5}{2}} + \frac{2}{45}(3x-1)^{\frac{3}{2}} + c$

44. The solution set of the equation $\frac{x}{x+3} + \frac{1}{x} = 1 - \frac{2x-3}{x^2+3x}$ is

A. $\mathbb{R}$ B. $\mathbb{R}/-3 \,\&\, 0$ C. $\{-1,0,1\}$ D. $\{-3,0\}$

45. How many different four letters words can be formed (the word need not be meaning full) using the letters of the word GREGARIOUS such that each word starts with G and ends with R?

A. P(8,2) B. $\frac{p(8,2)}{2!2!}$ C. $\frac{p(8,4)}{2!2!}$ D. $\frac{p(10,2)}{2!2!}$

46. What is the solution set of the system $\begin{cases} x+2y-4z=1 \\ 2x+y-5z=-1 \\ x-y+z=-2 \end{cases}$

A. $\{(-1,1,0)\}$ B. $\{(-1,-1,0)\}$ C. $\{(-1,0,1)\}$ D. $\{(1,1,0)\}$

47. Suppose that function f and g and their first derivatives have the following values at $x=-1$ and $x=0$

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
-1	0	-1	2	1
0	-1	-3	-2	4

Then what is $\frac{d}{dx}[g(x+f(x))]$ at $x=0$? A. -1 B. 3 C. 1 D. 0

48. The position function of a particle given by $s(t)=3t^2-t^3, t\geq 0$ when does the particle has acceleration $0\,{}^{m}/_{sec.^2}$ A. $t=\frac{1}{2}sec.$ B. $t=2sec.$ C. $t=5sec.$ D. $t=1sec.$

49. Two sides of a triangle have lengths of $12m$ *and* $15m$. The angle between them is increasing at a rate of $2\,{}^{rad}/_{min.}$. How fast is the area of the triangle increasing when the angle between the sides of fixed length is 60^0?

A. $60\,{}^{m^2}/_{min.}$ B. $90\,{}^{m^2}/_{min.}$ C. $60\,{}^{m^2}/_{min.}$ D. $\frac{1}{90}\,{}^{m^2}/_{min.}$

50 . Thirty airmail and forty ordinary envelopes are the only envelops in a bag. Thirty five envelops in the bag are unstamped and $\frac{5}{7}$ of the unstamped envelopers are airmail letters. What is the probability that an envelope picked randomly from the bag is unstamped airmail envelope?.A. $\frac{13}{35}$ B. $\frac{1}{3}$ C. $\frac{1}{35}$ D. $\frac{1}{7}$

51. A meeting is attended by 750 professionals.450 Of the attendees are female. Half the female attendees are less than thirty years old and one-fourth of the male attendees are less than thirty years old. If one of the attendees of the meeting is selected at random to receive a prize. What is the probability that the person selected is less than thirty years old? A. $\frac{1}{8}$ B. $\frac{1}{2}$ C. $\frac{3}{8}$ D. $\frac{2}{5}$

52. For $f(x)=3x^4+4x^3-12x^2+2$ which of the following is true?

A. The function $f(x)$ has local maximum at $x=-2$ & $x=0$

B. The function $f(x)$ is strictly increasing on $(-\infty,-2]$ & $[0,1]$

C. The function $f(x)$ is strictly decreasing on $(-\infty,-2]$ & $[0,1]$

D. The function $f(x)$ is concave up on $(-\infty,-2]$ & $[0,1]$

53. In a Geometric sequence, the sum of the k^{th} term and $(k+1)^{th}$ term is a and the sum of the$(k+1)^{th}$ term and $(k+2)^{th}$term is b then the k^{th} term of the sequence in terms of a & b is?

A. $\frac{-a^2}{a-b}$ B. $\frac{a^2}{a-b}$ C. $\frac{a^2}{a+b}$ D. $\frac{-a^2}{a+b}$

54. The following is a frequency distribution on 4 observations .Then the standard deviation is?

x	$10-20$	$20-30$	$30-40$	$40-50$
f	1	1	1	1

A. $10\sqrt{3}$ B. $5\sqrt{5}$ C. $5\sqrt{3}$ D. $10\sqrt{5}$

55. If $\int_{-2}^{4} f(x)dx = 4\int(x)dx=4$ and $\int_{-2}^{0}[2-f(x)]dx=10$, then $\int_{0}^{4} f(x)dx$ is equal to_.

A. 10 B.−10 C. 12 D.−12

56. Let matrix A=$\begin{bmatrix}1 & 1 & 1\\ 3 & 5 & 4\\ 3 & 6 & 5\end{bmatrix}$ with $|A|$ =1 be given then its inverse of A is?

A. $\begin{bmatrix}1 & -3 & 3\\ 1 & 2 & 4\\ 3 & 6 & 5\end{bmatrix}$ B. $\begin{bmatrix}1 & 1 & 1\\ -3 & 2 & -1\\ 3 & -3 & 2\end{bmatrix}$ C. $\begin{bmatrix}1 & 1 & 1\\ 3 & 2 & 1\\ 3 & 3 & 2\end{bmatrix}$ D. $\begin{bmatrix}1 & 1 & 1\\ 3 & -2 & 1\\ 3 & 3 & 2\end{bmatrix}$

57. If $P(0\,,2)$ *and* $Q\ (-1\,,3)$ are two points in the coordinate plane and if P is the /reflection of Q through a line, then the equation of the line of reflection is:

A. $y=x+2$ B. $y=x+3$ C. $2y+x=3$ D. $y=2x+3$

58. If the translation T takes the point $(3\,,5)$ to the point $(5\,,7)$ then which of the following is the image of the line $3y+2x+6=0$ under T? A. $3x+2y-4=0$ C. $2x+3y-16=0$

B. $3y+2x-4=0$ D. $2x+3y+16=0$

59 . Given the vectors $\vec{a}=2i+3j$ *and* $\vec{b}=3i-j$, which of the following NOT TRUE?

A. $\left|\vec{a}+\vec{b}\right|=\sqrt{29}$ C. Unit vector in the direction of $\vec{a}+\vec{b}$ is $\frac{5i\ +2j}{\sqrt{29}}$

B. $\left|2\vec{a}+3\vec{b}\right|=\sqrt{178}$ D. $\vec{a}+\vec{b}=5i-2j$

60. A parametric vector equation of the line through $(2\,,3)$ and perpendicular to the line containing the vector $(-1\,,2)$ is: A. $(x,y)=(2\,,3)+(2\,,1)t$ C. $(x,y)=(-2\,,-3)+(2\,,1)t$

$B.(x,y)=(2\,,3)+(-2\,,-1)t$ D. $(x,y)=(-2\,,3)+(-2\,,1)t$

61. For two vectors $\vec{A}=2i-j+2k$ *and* $\vec{B}=i-j$ the angle between is : A.$\frac{\pi}{2}$ B.$\frac{\pi}{6}$ C.$\frac{\pi}{4}$ D. 2π

62. How many four-digit even numbers can be formed from the digits 1, 3, 5, 7, 8, and 9, where the digits used at most once? A. 120 B. 80 C. 60 D. 180

63. If $f'(x)=x^2+2x$ and $(1)=\frac{2}{3}$, then $f(x)$ is equal to_____.

A. $\frac{x^3}{3}+x$ B. . $\frac{x^3}{3}+x-\frac{2}{3}$ C. $\frac{x^3}{3}+x-\frac{2}{3}$ D. $2x-1$

64. In a class there are 45 students with class list numbers from $1-45$ and you need to select a sample of 5 students from the list. If the sixth student is chosen randomly from the first five students, which list of students will you choose using the systematic sampling technique? A. 6, 15, 24, 33, 42 C. 6, 11, 16, 21, 26

B. 6, 17, 22, 33, 42 D. 5, 14, 23, 32, 41

The following is the frequency distribution of a grouped data.

Class interval	$3-7$	$8-12$	$13-17$	$18-22$
frequency	2	2	10	6

The inter-quartile range of the distribution is _____. A.$\frac{16}{3}$ B. $\frac{32}{3}$ C.$\frac{22}{3}$ D. $\frac{22}{6}$

65. For negatively skewed distribution, which one of the following is necessarily true?

A. mean > median > mode B. mean < median <mode C. mean= *m*edian =mode D. mean< median =mode

66. The sum of 15 observations whose median is 8 was found to be 150. If the coefficient of variation is 20, then the Pearson's coefficient of variation is: _____. A. 0.03 B. 0.01 C. 0.1 D. 0.16