

Dej\Wondirad Senior Secondary School Grade 12 Mathematics Worksheet for Social Science(Oct. 2014 E. c)

Choose the best answer and write the letters of your choice on the answer sheet provided

- The equivalent definition of the function given by $f(x) = \begin{cases} 2x, & x \geq 0 \\ 0, & x < 0 \end{cases}$ is
 A. $f(x) = |x|$ B. $f(x) = 2x$ C. $f(x) = |x| + x$ D. $f(x) = 2|x|$
- Suppose $h(x) = (f \circ g^{-1})(x)$ and $f(1) = 2, f(-3) = 5, g(-3) = 1, g(1) = 10$, then $h(1) =$ _____
 A. -6 B. 5 C. 2 D. 1
- Let $f: \mathbb{R} \rightarrow B$ is defined by $f(x) = x^2 + 4x + 7$. What should be set B so that f is an onto function?
 A. $[3, \infty)$ B. $(\infty, 4]$ C. $[7, \infty)$ D. $\mathbb{R}$
- If $f(x) = e^{2x} - 3$, then which of the following is equal to $f^{-1}(x)$?
 A. $\frac{1}{2} \ln(y - 3)$ B. $\frac{1}{2} \ln\left(\frac{y+3}{2}\right)$ C. $\sqrt{\ln(y+3)}$ D. $\frac{1}{2} \ln(y+3)$
- What is the n^{th} term of the sequence $25, -125, 625, -3125, \dots$?
 A. $(-5)^{2n-1}$ B. $(-1)^{2n} 5^{n+1}$ C. $(-1)^{2n-1} 5^{n+1}$ D. $(-1)^{n-1} 5^{n+1}$
- How many two-digit numbers are divisible by 4?
 A. 21 B. 22 C. 24 D. 25
- A 32- team Ethiopian super league has birr 320,000 to be awarded as prize money, if the last-place team is awarded birr 5,500 in prize money and the award increases by the same amount for each successive finishing place, how much will the first team receive?
 A. Birr 11,000 C. Birr 14,500
 B. Birr 12,500 D. Birr 10,250
- If the second term of a G.P is 2 and the sum of its infinite terms is 8, then the G.P is
 A. $8, 2, \frac{1}{2}, \frac{1}{8}, \dots$ C. $4, 2, 1, \frac{1}{2}, \dots$
 B. $10, 2, \frac{2}{5}, \frac{2}{25}, \dots$ D. $6, 3, \frac{3}{2}, \frac{3}{4}, \dots$
- The sum of the series $\sum_{n=2}^{\infty} \left[\left(\frac{3}{4}\right)^{n+1} \left(\frac{2}{3}\right)^{n-1} \right]$ is equal to
 A. $\frac{27}{32}$ B. $\frac{9}{16}$ C. $\frac{1}{2}$ D. $\frac{27}{16}$
- Which of the following is the *lub* of the sequence $\left\{(-1)^n \frac{(n-1)}{3^n}\right\}$
 A. 0 B. $-\frac{1}{2}$ C. $-\frac{2}{27}$ D. $\frac{1}{9}$
- The $\lim_{x \rightarrow 0} \frac{\tan x - \sin x}{x^3}$ is equal to
 A. 0 B. $\frac{1}{2}$ C. 2 D. $\frac{3}{2}$

12. If $\frac{x-4}{x^3+2x} = \frac{A}{x} + \frac{Bx+C}{x^2+2}$, then the sum $A + B + C$ is equal to
 A. -2 B. 2 C. 1 D. 0
13. Which of the following is true about the graph of $f(x) = \frac{x^2+2x+1}{2x^2-10x+12}$?
 A. Its y- intercept is the point (0,6)
 B. Its horizontal asymptote is $y = 2$
 C. Its vertical asymptote are $x = 3$ and $x = 2$
 D. The graph is symmetrical with respect to the y-axis
14. The simplified form of the rational expression $\frac{2}{x-1} + \frac{3}{x+1} - \frac{4x-2}{x^2-1}$, $x \neq -1, 1$
 A. $\frac{x+1}{x-1}$ B. $\frac{1}{x+1}$ C. $\frac{1}{x-1}$ D. -1
15. Which one of the following is equal to the complex conjugate of $\frac{i-\sqrt{3}}{1+i\sqrt{3}}$?
 A. $-i$ C. $\frac{-1}{2} - \frac{3}{4}\sqrt{3}i$
 B. $2 + i$ D. $\frac{2\sqrt{3}-3}{4} - \frac{(2+3\sqrt{3})}{4}i$
16. The modulus and argument of the complex number $\frac{1+2i}{1-3i}$ are respectively
 A. $\sqrt{2}$, $\frac{3\pi}{4}$ C. $\frac{1}{\sqrt{2}}$, $\frac{3\pi}{4}$
 B. $\frac{1}{\sqrt{2}}$, $\frac{\pi}{4}$ D. $2\sqrt{2}$, $\frac{2\pi}{3}$
17. The line through the points $(m, -9)$ and $(7, m)$ has slope m , then the x-intercept of this line is
 A. -18 B. -6 C. 6 D. 18
18. Which of the following is NOT true about the parabola $y^2 + 6y - 8x - 31 = 0$?
 A. Focus is at $(-1, -5)$ C. $y + 5 = 0$ is the axis of symmetry
 B. $x + 5 = 0$ is the directrix D. the vertex is at $(3, -5)$
19. Which of the following is NOT true about the ellipse with foci $(-1, 0)$ and $(1, 0)$ and eccentricity $\frac{1}{3}$?
 A. Its major axis is 6 units C. its equation is $\frac{x^2}{9} + \frac{y^2}{8} = 1$
 B. Its latus rectum is $\frac{8}{3}$ D. Its vertices are $(-3, 0)$ and $(3, 0)$
20. Which of the following is NOT true about the hyperbola whose general equation is $25x^2 - 4y^2 - 8y - 150x + 121 = 0$?
 A. Its center at $(3, -1)$ C. Its vertices are $(1, -1)$ and $(5, -1)$
 B. The asymptote is $2y - 5x + 17 = 0$ D. Eccentricity equal to $\frac{\sqrt{26}}{2}$
21. Let p and q be propositions with truth value True and False respectively. Then which of the following is correct?
 A. $\neg p \Rightarrow q$ is False C. $(p \Rightarrow q) \wedge p$ is True
 B. $(p \vee \neg q) \Rightarrow q$ is True D. $p \vee (q \wedge \neg q)$ is True

22. Which of the following propositions is a tautology?

A. $(p \Rightarrow q) \wedge (\neg p \vee q)$

C. $(p \Rightarrow q) \Rightarrow (\neg p \wedge q)$

B. $(p \Rightarrow q) \vee (\neg p \vee q)$

D. $(p \Rightarrow q) \Leftrightarrow (\neg p \vee q)$

23. If mean of the following frequency table is 50. and the total number of frequencies are 120, then the missing frequencies are

Class	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100
Frequency	17	f_1	32	f_2	19

A. 28, 24

B. 24, 36

C. 38, 28

D. None of these

24. Which of the following is the constant term of $\left(2x + \frac{1}{x}\right)^6$?

A. 8

B. 130

C. 160

D. 30

25. A family has two children. What is the probability that both the children are boys given that at least one of them is boy?

A. $\frac{1}{4}$

B. $\frac{3}{4}$

C. $\frac{1}{3}$

D. $\frac{2}{3}$

26. If $\begin{pmatrix} 3 & -2 & a \\ 4 & -1 & 2 \end{pmatrix} \begin{pmatrix} -1 & 3 \\ 2 & b \\ 3 & -2 \end{pmatrix} = \begin{pmatrix} 5 & -11 \\ 0 & 2 \end{pmatrix}$, then the value of a and b respectively are

A. 4 and 6

B. 6 and -4

C. -4 and 7

D. 4 and -2

27. If $A = \begin{pmatrix} 0 & x & 0 \\ 1 & -1 & 1 \\ 0 & y & -1 \end{pmatrix}$ and $A^{-1} = \begin{pmatrix} 1 & 1 & 1 \\ 3 & 0 & 0 \\ 2 & 0 & -1 \end{pmatrix}$, then what is the value of x and y ?

A. $x = 3$ & $y = -2$

B. $x = \frac{2}{3}$ & $y = \frac{1}{3}$

C. $x = -3$ & $y = 2$

D. $x = \frac{1}{3}$ & $y = \frac{2}{3}$

28. If $\begin{cases} 2x - 5y + 7z = 6 \\ x - 3y = 3 - 4z \\ 3x + ay + 11z = b \end{cases}$ is given then for what values of A and B does the equation has one solution?

A. $a = -8$ & $b = 9$

C. $a \neq -8$ and b are any real numbers

B. $a \neq -8$ & $b \neq 9$

D. $a = -8$ & $b = -9$

29. Which of the following is **NOT** true?

A. $\frac{d}{dx}(\log_5^{3x}) = \frac{3}{3x(\ln 5)}$

C. $\frac{d}{dx}(\cos(\sin x)) = -\sin(\sin x) \cos x$

B. $\frac{d}{dx}(\cos x^5) = -5x^4 \sin x^5$

D. $\frac{d}{dx}(3^{\sin x}) = 3^{\sin x} (\ln 3)$

30. The $\lim_{x \rightarrow \infty} \left(\frac{x+1}{x+2} \right)^{2x+1}$ is equal to

A. e

B. e^{-2}

C. e^{-2}

D. 1

31. Let $f(x) = \begin{cases} ax - b, & x \leq 1 \\ 3x, & 1 < x < 2 \\ bx^2 - a, & x \geq 2 \end{cases}$, if f is continuous function then (a, b) is equal to
 A. (1,2) B. (1,3) C. (3,6) D. (6,3)
32. The $\lim_{x \rightarrow 0} \frac{3^x - 1}{\sqrt{1+x} - 1}$ is equal to
 A. 1 B. $\log_e 3$ C. $\log_e 9$ D. $3\ln 2$
33. The equation of the line that is tangent to the graph of $y = \sqrt{x} - \frac{1}{\sqrt{x}}$ at $x = 1$ is
 A. $y = x - 1$ B. $2y = x - 1$ C. $y = x$ D. none
34. If $f'(x) = xf(x)$ and $f(3) = -5$, then $f''(3) =$ ____
 A. 27 B. 15 C. 4 D. -50
35. If $x = 2n^2 + 8$ and $y = \sqrt{n^3}$, then $\frac{dy}{dx}$ at $n = 1$ is
 A. 6 B. 2 C. $\frac{3}{4}$ D. $\frac{3}{8}$
36. What is the value of $a + b$ if $f(x) = \begin{cases} 2ax^2 - x, & \text{for } x > 3 \\ x^3 + bx, & \text{for } x \leq 3 \end{cases}$ is differentiable at $x = 3$?
 A. 3 B. 8 C. 24 D. 11
37. If $f(x) = x(m - \ln x)$ such that m is a constant, the curve of the function has a critical point at $x = e$, then $m =$ ____
 A. 1 B. 0 C. e D. 2
38. Let f, g and h be differentiable functions such that $f(x) = g(x) + c$, for some $c \in \mathbb{R}$. If $f'(x) = e^{-x} - 2$ and $\frac{d}{dx}(f(x) + g(x) - h(x)) = e^{-x}$, then $h'(x) =$ ____.
 A. $2 - g'(x)$ B. $e^{-x} - 2 + g'(x)$ C. $e^{-x} - 4$ D. $2e^{-x} + 2$
39. Let f be a function given by $f(x) = x^3 - 12x + 3$ on $[-3, 3]$, then which of the following is **not** true?
 A. The maximum value of $f(x)$ on $[-3, 3]$ is 19
 B. The minimum value of $f(x)$ on $[-3, 3]$ is -13.
 C. The inflection point of the graph of $f(x)$ is at $(0, 3)$.
 D. The graph of $f(x)$ is concave up ward on the interval $(-\infty, 0)$.
40. A cone whose height is always equal to its diameter is increasing in volume at the rate of $40 \text{ cm}^3/\text{sec}$. At what rate is the radius increasing when its circular base area is 1 m^2
 A. 1 cm/sec B. 2 cm/sec C. 0.001 cm/sec D. 0.002 cm/sec
41. $\int \frac{\cot x}{\sqrt{\sin x}} dx$ is equal to
 A. $-\frac{2}{\sqrt{\sin x}} + c$ B. $\frac{2}{\sqrt{\sin x}} + c$ C. $2\sqrt{\sin x} + c$ D. $\frac{1}{2\sqrt{\sin x}} + c$

42. $\int_{-1}^1 \frac{7x+3}{(7x^2+6x+8)^2} dx$ is equal to
 A. $\frac{4}{63}$ B. $\frac{2}{63}$ C. 1 D. $\frac{5}{36}$
43. The area of the region bounded by the curves $f(x) = 12 - x^2$ and $g(x) = 2x^2$ is
 A. 36 B. 16 C. 32 D. 72
44. The mean deviation of the data 3,10,10,4,7,10,5 from the mean is
 A. 2 B. 2.57 C. 3 D. 3.75
45. If you buy gold ring for 750 Birr and sell it for 1200 Birr. Find the mark-up percent with respect to selling price.
 A. 45.6% B. 50% C. 37.5% D. 60%
46. Find the maximum value of the objective function $z = 3x + 2y$, subject to the following constraints $\begin{cases} x \geq 0 \\ y \geq 0 \\ x + 2y \leq 4 \\ x - y \leq 1 \end{cases}$?
 A. 4 B. 8 C. 12 D. 0
47. Tigist bought a house from Sun Shine Real estate by paying 20% of the purchase price, which is Birr 550,000. Find the mortgage amount
 A. 539,000 Birr B. 440,000 Birr C. 110,000 Birr D. 450,000 Birr
48. A washing machine that costs birr 3100 has service life of 10 years. If it's monthly straight line depreciation is Birr 18. What is its salvage value?
 A. Birr 292 B. Birr 310 C. Birr 940 D. Birr 980
49. If the compound interest for the 3rd and 4th year on a certain principal is Birr 125 and Birr 135 respectively, what is the rate of interest (in %)?
 A. 9 B. 10 C. 8 D. 12
50. A loss of 19% gets converted into a profit of 17% when the selling price is increased by Birr 162. The cost price of the article is
 A. Birr 450 B. Birr 600 C. Birr 360 D. Birr 540
51. There is a ratio of 5:4 between two numbers. If 40 percent of the first is 12, then 50% of the second number is
 A. 12 B. 24 C. 18 D. 20
52. On selling an article for Birr 1800, a shopkeeper gains 14.28%. find the cost price of the article?
 A. Birr 1425 B. Birr 1650 C. Birr 1575 D. Birr 1720
53. If the difference of compound interest and the simple interest on a sum of money for 3 years is Birr 186. Find the sum of money, if the rate of interest in both case be 10%?
 A. Birr 5500 B. Birr 7200 C. Birr 6500 D. Birr 6000

54. Find the amount to be invested today at 4% interest, compounded quarterly, to be 10,000 after 6 years?
(Assume that $(1.01)^{24} = 1.3$)
- A. Birr 7692 B. Birr 6785 C. Birr 8775 D. Birr 7869
55. If a loan of Birr 49,000 with 12% annual interest compounded monthly amortized over 10 years, how much is the monthly payment?(give that $(1.01)^{120} = 3.3, (1.01)^{-120} = 0.3$)
- A. Birr 680 B. Birr 777 C. Birr 700 D. Birr 750
56. A washing machine that costs Birr 3100 has a service- life of 10 years. If its monthly straight line depreciation is Birr 18, what is its salvage value (in Birr)?
- A. 292 B. 310 C. 940 D. 980
57. Consider the following frequency distribution of a grouped data

Class interval	5 – 15	15 – 25	25 – 35	35 – 45
Frequency	10	20	15	5

- Which of the following is NOT true about the distribution above?
- A. The mode of the data is 21.67 C. the median of the data is 22.5
B. The mean of the data is 23 D. it is negatively skewed
58. If the mean, mode and standard deviation of a frequency distribution are 41, 45 and 8 respectively, then the Pearson's coefficient of skewness is:
- A. $-\frac{1}{2}$ B. $\frac{1}{2}$ C. 1 D. -1
59. If Standard deviation is 4, number of items is 10 & the sum of items is 160, then the coefficient of variation is
- A. 16% B. 25% C. 20% D. 35%
60. A manufacture's average cost function is given by $A(x) = 56 + \frac{48}{x}$ where $x > 0$ is quantity. The marginal cost when $x = 4$ is
- A. -1.5 B. 59 C. 53 D. 227