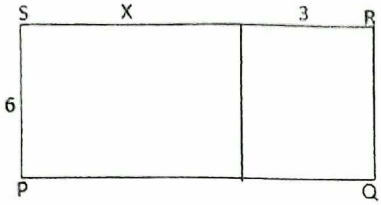
This paper consists of 60 multiple-choice questions with four options lettered A to D. Read and evaluate all four options and circle the letter of the correct or best answer.

1. The area of rectangle PQRS is given as 6(x + 3). Which one of the following properties can be applied to show the sum of the two areas in the rectangle? The



   A. Associative Property of Addition.
   B. Commutative Property of Addition.
   C. Distributive Property.
   D. Transitive Property.

2. Which one of the following is a unit rate?
   A. 10 miles in 2 hours
   B. 100 pages in 4 hours
   C. 3 gallons of gas for Gh¢10
   D. Gh¢25 for 5 items

3. A binary operation * is defined on a set R of real numbers by $m*n = m - n + mn^2$, evaluate 4*5.
   A. 9
   B. 88
   C. 99
   D. 98

4. The ratio of 1 hour to 300 seconds is
   A. 1 : 5
   B. 1 : 12
   C. 5 : 1
   D. 12 : 1

5. Evaluate $\frac{2^0 + 2^{-1}}{2^{-1} - 2^0}$.
   A. - 3
   B. -1
   C. 1
   D. 3

6. If a*b = $a^2 + b^2$, then the value of (4*5) * 3 is
   A. $(4^2 + 5^2) + 3^2$
   B. $(4 + 5)^2 + 3^2$
   C. $41^2 + 3^2$
   D. $(4 + 5 + 3)^2$

7. Solve for x in $4^x + 8 = 9(2^x)$
   A. (0,3)
   B. (2,0)
   C. (2,5)
   D. (3,5)

8. A train travels from station A to station B at an average speed of 50 km/h in 2hrs, and returns from station B to station A at an average speed of 60 km/h. What is the average, speed correct to the nearest whole number), of the train for the entire round trip?
   A. 54 m/h
   B. 55 km/h
   C. 56 km/h
   D. 57 km/h

9. A group of students are arranged in a straight line, such that the position of Beneditta is 11th from the left and 41st from right. How many students are there in the class?
   A. 50
   B. 51
   C. 52
   D. 54

10. The initial price of an article was GH¢X. The price is then increased by 10% in March and then decreased by 10% in April, to settle at Gh¢4158. What was the initial price of the article?
   A. Gh¢1500
   B. Gh¢3400
   C. Gh¢4200
   D. Gh¢5300

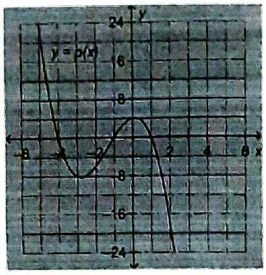
11. Which one of the following gives the **correct** factorisation of $x^2 + 6x - 27$?
   A. (x+9)(x-3)
   B. (x-9)(x+3)
   C. (x-9)(x-3)
   D. (x+9)(x+3)

12. Two different linear sequences have first terms as 12 and 8 their common differences are 2 and 3 respectively. Find the difference between the sum of their first 10 terms.
   A. 5
   B. 6
   C. 8
   D. 10

13. An insect population is growing in such a way that each new generation is 1.5 times as large as the previous generation. If there are 100 insects in the first generation, how many will there be in the fifth generation?
   A. 406
   B. 506
   C. 606
   D. 706

14. Which one of the following graphs represents $p(X) = (X - 1), (X + 1)(X - 4)$?

A.



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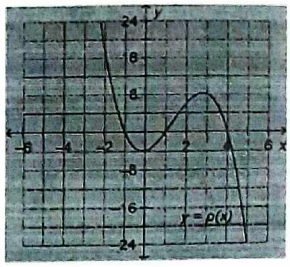

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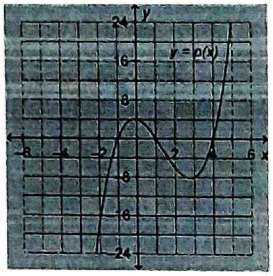
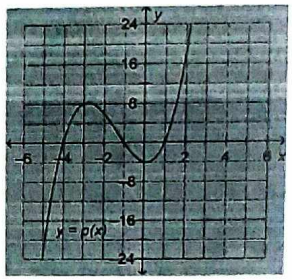


D.



15. When Dela is h meters above sea level, he can see d miles to the horizon, where $d = \sqrt{\frac{3h}{2}}$.

Make h the subject of relation.

A. $h = \frac{3d^2}{2}$

B. $h = \frac{2d^2}{3}$

C. $h = \sqrt{\frac{2d}{3}}$

D. $h = \sqrt{\frac{3d}{2}}$

16. A company paid Gh¢1.2million as rent for the first 15 years for their offices. Every year, the rent is increased by Gh¢1,800.00. What amount does the company have to pay, if they are to give only 10 years advance?

A. Gh¢53,600.00
B. Gh¢65,300.00
C. Gh¢80,180.00
D. Gh¢83,600.00

17. A shopkeeper has 3 varieties of pens A, B and C. Gloria purchased 1 pen of each variety for a total of Gh¢21. Christian purchased 4 pens of A variety, 3 pens of B variety and 2 pens of C variety for Gh¢60. Miriam also purchased 6 pens of A variety, 2 pens of B variety and 3 pens of C variety for Gh¢70. Represent this information in a system of matrix equations.

A. $\begin{bmatrix}1 & 1 & 2\\3 & 4 & 2\\6 & 2 & 3\end{bmatrix}\begin{bmatrix}A\\B\\C\end{bmatrix}=\begin{bmatrix}21\\60\\70\end{bmatrix}$

B. $\begin{bmatrix}1 & 1 & 1\\4 & 3 & 2\\6 & 2 & 3\end{bmatrix}\begin{bmatrix}A\\B\\C\end{bmatrix}=\begin{bmatrix}60\\21\\70\end{bmatrix}$

C. $\begin{bmatrix}3 & 2 & 1\\3 & 4 & 2\\3 & 6 & 2\end{bmatrix}\begin{bmatrix}A\\B\\C\end{bmatrix}=\begin{bmatrix}70\\21\\60\end{bmatrix}$

D. $\begin{bmatrix}4 & 1 & 3\\1 & 1 & 1\\6 & 2 & 3\end{bmatrix}\begin{bmatrix}A\\B\\C\end{bmatrix}=\begin{bmatrix}60\\21\\70\end{bmatrix}$

18. The volume V of a gas varies inversely with the pressure P. When the volume is 75 cm^3, the pressure is 30 N/cm^2. What is the volume when the pressure is 25N/cm^2?

A. 30 cm^3
B. 60 cm^3
C. 90 cm^3
D. 58 1/3 cm^3

19. Adutwumwaa went to the market with only 20 and 50 pesewa coins. The difference between the 50 pesewa coins and the 20 pesewa coins was GH¢2.60. If she could buy items worth GH¢7.40 after spending all the money she took to the market, find the number of 20 pesewa coins and 50 pesewa coins she took to the market.

A. 9 (20 pesewa coins) and 11 (50 pesewa coins)
B. 10 (20 pesewa coins) and 12 (50 pesewa coins)
C. 12 (20 pesewa coins) and 10 (50 pesewa coins)
D. 15 (20 pesewa coins) and 10 (50 pesewa coins)

20. A landlord increases his rent yearly by Gh¢2000.00. A company Director paid Gh¢8000.00 in the first year. What is the total rent to be paid by the Director after 12 years?

A. Gh¢30,000.00
B. Gh¢98,000.00
C. Gh¢108,000.00
D. Gh¢118,000.00

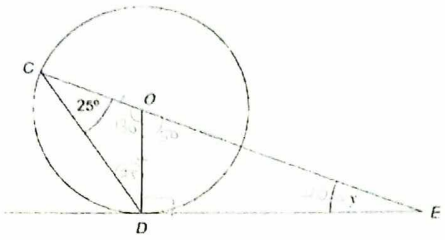
21. Which one of the following angles is an example of a reflex angle?

A. $\angle ABC = 130^0$
B. $\angle PQR = 150^0$
C. $\angle WXZ = 170^0$
D. $\angle STP = 190^0$

22. Mr. Atanga has a rectangular garden at his backyard. If the length of the garden is twice its width and its area is {9800\ m}^2, find the length of the garden.

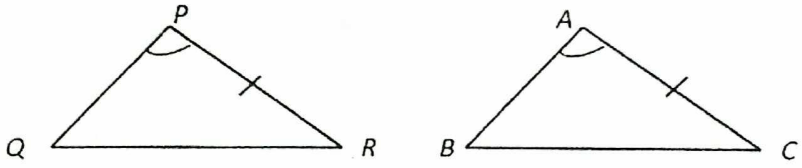
A. 70 m
B. $70\sqrt{2}$ m
C. 140 m
D. $140\sqrt{2}$ m

23. The diagram shows a circle with centre O. C and D are points on the circumference. COE is a straight line. DE is a tangent to the circle at D. What is the size of y?



A. 25
B. 65
C. 40
D. 130

24. Given that ∠A = ∠P and AC = PR. Which one of the following conditions is true for Δ PQR and Δ ABC to be congruent?



A. BC = QR
B. BC = QR
C. AB = PQ
D. AB = QR

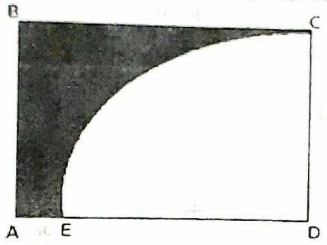
25. Two communities are located at the points $(-4,-3)$ and $B(-5,1)$ respectively. If the school is to be located at point $C(x,y)$, such that learners from both communities will walk an equal distance to the school, find the relation between point C and the two communities.

A. $2x+8y+1=0$
B. $2x+8y-1=0$
C. $2x-8y-1=0$
D. $2x-8y+1=0$

26. There are three points; A, B and C in a plane. Another point, P moves in the same plane such that its distance from AB and AC are equal the same. Which one of the following describes the movement of P?

A. A circle with centre A and radius AP
B. A line parallel to line BC
C. Bisection of angle BAC
D. Perpendicular bisector of line BC

27. In figure ABCD, the quarter circle with centre D has a radius of 4 units and rectangle ABCD has a perimeter of 20 units. What is the perimeter of the shaded region?



A. $20 - 8\pi$
B. $10 + 2\pi$
C. $12 + 2\pi$
D. $4 - 8\pi$

28. A right solid pyramid of vertical height 7.2m has a square base of length 15m. It is melted down completely and recast into cubes of dimension 3m. If no material is lost, estimate the number of cubes formed.
A. 15
B. 20
C. 25
D. 30

29. ABCD is a kite where A is the point $(-3, 5)$ and C is the point $(4, -9)$. If AC forms the shorter diagonal of the kite, find the equation of the diagonal BD.
A. $y + 2x + 1 = 0$
B. $y - 2x + 1 = 0$
C. $4y - 2x + 9 = 0$
D. $4y - 2x - 9 = 0$

30. A student took the dimensions of a triangle and realized that they were Pythagorean triples. Which of the following triangles is **not likely** to be the triangle? _____ triangle.
A. Equilateral
B. Isosceles
C. Obtuse angled
D. Scalene

31. Which one of the following expressions gives vector $\overrightarrow{AB}$?
A. -b+a
B. a – b
C. a + b
D. b - a

32. A District Chief Executive wants to construct a Science Resource Centre to serve three major Senior High Schools A, B and C in her District. The distance between school A and B is 8km and the distance from school A to C is 6km. If the distance between schools C and B is 10km, name the type of triangle that connects the three schools.
A. Equilateral
B. Scalene
C. Isosceles
D. Rectangle

33. An angle θ of the interval $180° < \theta < 270°$ falls in which quadrant?
    A. First
    B. Second
    C. Third
    D. Fourth

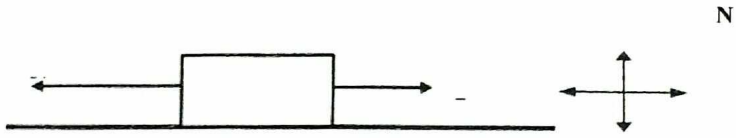
34. Given the forces $F_1 = (3i - 4j)N$, $F_2 = (2i + 6j)N$ and $F_3 = (-i + j)$, find the magnitude of the resultant force.
    A. 4N
    B. 5N
    C. 6N
    D. 7N

35. A ladder, 13m tall, leans against a vertical wall. If it is placed 5m away from the base of the wall, find how high up the wall the ladder reaches.
    A. 8m
    B. 10m
    C. 12m
    D. 13m

36. If the value of $\alpha + \beta = 900$, and $\alpha : \beta = 2 : 1$, then what is the ratio of cos α to cos β ?
    A. 1 : 3
    B. $\sqrt{3} : 1$
    C. $1 : \sqrt{3}$
    D. $: \sqrt{2} : 1$

37. Two forces of 200 N and 120 N are inclined at an angle of 60o. What will be their resultant force?
    A. 40N
    B. 180N
    C. 280N
    D. 340N

38. Two forces, F_1 and F_2, are applied on a crate lying on a frictionless, horizontal surface, as shown in the diagram below: if the magnitude of force F_1 is greater than that of force F_2, the create will



    A. accelerate towards the east.
    B. accelerate towards the west.
    C. move at a constant speed towards the east.
    D. move at a constant speed towards the west.

39. A rectangular field measures 40 meters in length and 30 meters in width. A player kicks a ball from one corner of the field to the opposite corner. What distance (in metres) does the ball travel?
   A. 50
   B. 60
   C. 70
   D. 80

40. Which one of the following triangles is used when applying Pythagoras theorem? _____ triangle.
   A. Acute
   B. Obtuse
   C. Right
   D. Scalene

41. What does it mean to write $\lim_{x \to 2^+} x + 3$?
   A. Equate the x+3 to the 2
   B. Limit as x approaches 2 from the left
   C. Limit as x approaches 2 from the right
   D. The 2 must be added to the 3 to get the limit

42. The cost function for producing x items by a firm is $C = 3x^2 + 2x - 3$. Find the marginal cost, when $x = 3$.
   A. 10
   B. 30
   C. 5
   D. 25

43. Find $\int 6x(x^2 + 6)dx$
   A. $\frac{3x^4}{2} + 18x^2 + c$
   B. $\frac{3x^4}{2} - 18x^2 + c$
   C. $\frac{3x^4}{2} + 18x^2$
   D. $\frac{3x^4}{2} - 18x^2$

44. If the profit function is given by P(x) = 41 + 24x – 18x2, find the maximum profit that a company can make.
   A. 25
   B. 43
   C. 62
   D. 49

45. A man wants to use an existing wall and 14m of fencing to enclose a rectangular area for his garden. Calculate the dimensions of the largest rectangular area that he can enclose.
   A. $x = \frac{7m}{2.}, y = 49m$
   B. $x = \frac{7m}{2.}, y = 7m$
   C. $x = 7m, y = 7m$
   D. $x = \frac{7m}{2.}, y = 7m$

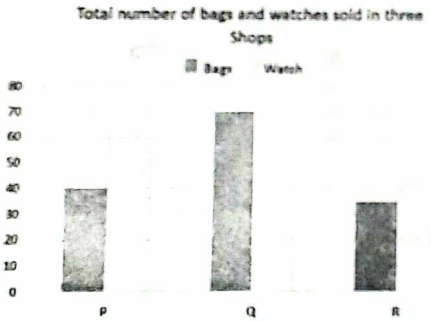
46. The speed $v\ ms^{-1}$ of a body moving in a straight line from a point O in the time t seconds is given by $v = 24t - 3t^2$. Calculate the distance from O at the end of 3 seconds.
A. 25m
B. 32m
C. 43m
D. 81m

47. The population of a fire-ant colony is growing according to the function $N(t) = 100\sqrt{t} + 1000$, where t is time measured in days. What is the rate of change of the population with respect to time when $t = 4$?
A. 200
B. 201
C. 300
D. 301

48. Which one of the following is **not** a type of data representation?
A. Linear regression
B. Pie charts
C. Scatterplots
D. Tables

49. Which one of the following is a common use for a frequency table in the data set?
A. Displaying the number of times each observation occurs
B. Finding the median number
C. The difference between the high and smallest value in a dataset
D. The number that appears most

50. The bar graph shows the total number of wrist watches and bags sold in three shops, P, Q and R.



If the cost price of one watch is GH¢800 and the one bag is GH¢500, find from the graph, the shop that generated the most income, assuming that all the items from all the shops were sold.
A. P
B. Q
C. R
D. P and Q both.

51. If half the range of the increasing series (11, A, 23, B, C, 68, 73) is equal to its median, what is the median of the series?
   A. 23
   B. 31
   C. 33
   D. 62

52. Given the set of data: 15, 19, 23, 26, 29, 31, 36, 41, 45, 51, what is the variance of the given data set, correct to the nearest whole number?
   A. 121
   B. 123
   C. 130
   D. 139

The events S and T are independent P (S and T)) $=\frac{1}{6}$, $P(S)=\frac{1}{4}$. Use this information to answer questions 53 and 54.

53. Calculate P(T).
   A. $\frac{2}{3}$
   B. $\frac{1}{3}$
   C. $\frac{3}{4}$
   D. $\frac{1}{4}$

54. Calculate P(S or T)
   A. $\frac{1}{4}$
   B. $\frac{2}{5}$
   C. $\frac{1}{5}$
   D. $\frac{3}{4}$

55. Given the set of data: 4, 7, 10, 12, 16, 19, 22, 26, 30, 36, what is the 70th percentile of the data?
   A. 10
   B. 19
   C. 26
   D. 30

56. Ama has five(5) different types fruits of which she wishes to use only two for drinks. How many kinds of drinks can she make?
   A. 10
   B. 11
   C. 12
   D. 14

57. The mean of binomial probability distribution is 857.6 and the probability is 64%. Which one of the following represents the number of values?
   A. 1040
   B. 1140
   C. 1240
   D. 1340

58. A group of 5 friends are going on a road trip and need to choose 3 out of the 5 to ride in one car. In how many ways can they choose the 3 friends?
   A. 5
   B. 10
   C. 15
   D. 20

59. A factory produces light bulbs, of which 5% are defective. If a sample of 20 bulbs is taken, what is the probability that none of them is defective?
   A. 0.3585
   B. 0.3589
   C. 0.3774
   D. 0.3776

60. The digits 0,1,2,3,4,5,6,7,8 are used to make 4-digit codes. How many of the codes will be greater than 4000 and are exactly divisible by 2?
   A. 1025
   B. 2024
   C. 2025
   D. 3025