AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX

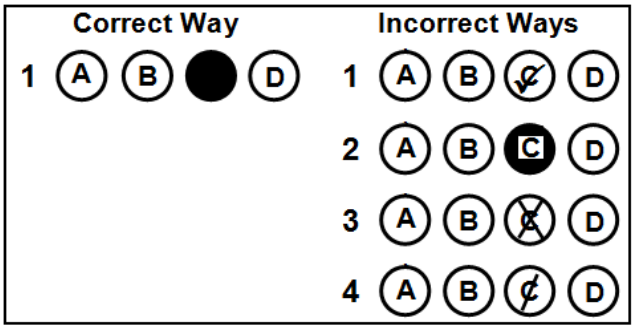
MODEL EXAMINATION PAPER 2023 AND ONWARDS

General Mathematics Paper I

Time: 1 hour 20 minutes Marks: 45

INSTRUCTIONS

1. Read each question carefully.
2. Answer the questions on the separate answer sheet provided. DO NOT write your answers on the question paper.
3. There are 100 answer numbers on the answer sheet. Use answer numbers 1 to 45 only.
4. In each question, there are four choices A, B, C, D. Choose ONE. On the answer grid, black out the circle for your choice with a pencil as shown below.



Candidate's Signature

5. If you want to change your answer, ERASE the first answer completely with a rubber, before blacking out a new circle.
6. DO NOT write anything in the answer grid. The computer only records what is in the circles.
7. A formulae list is provided on page 2. You may refer to it during the paper, if you wish.
8. You may use a simple calculator if you wish.

Aga Khan University Examination Board

List of Formulae

General Mathematics IX

NOTE:

- The symbols have their usual meanings.
- The same formulae list will be provided in annual and re-sit examinations.

Business Mathematics

$$\text{Loss }\% = \left(\frac{\text{Loss}}{CP} \times 100\right) \qquad \text{Profit }\% = \left(\frac{\text{Profit}}{CP} \times 100\right) \qquad SP = CP \times \left(\frac{100 + \text{profit}\,\%}{100}\right)$$

$$SP = CP \times \left(\frac{100 - \text{loss}\%}{100}\right) \qquad \text{Discount }\% = \frac{\text{Discount}}{MP} \times 100$$

Sets and Functions

$$(A \cup B)^c = A^c \cap B^c \qquad (A \cap B)^c = A^c \cup B^c$$

Exponents and Logarithms

$$a^m \times a^n = a^{m+n} \qquad a^m \div a^n = a^{m-n} \qquad \frac{a^m}{b^m} = \left(\frac{a}{b}\right)^m$$

$$\left(a^m\right)^n = a^{mn} \qquad (a \times b)^m = a^m \times b^m \qquad a^{\frac{m}{n}} = \sqrt[n]{a^m}$$

$$\log_a (m)^n = n \log_a m \qquad \log_a (m \times n) = \log_a m + \log_a n \qquad \log_a \left(\frac{m}{n}\right) = \log_a m - \log_a n$$

$$\log_a n = \log_b n \times \log_a b \qquad \log_a b = n \Leftrightarrow a^n = b$$

Algebraic Formulae

$$(a-b)^2 = a^2 - 2ab + b^2 \qquad (a+b)^2 = a^2 + 2ab + b^2$$

$$a^2 - b^2 = (a+b)(a-b) \qquad 2\left(a^2 + b^2\right) = (a+b)^2 + (a-b)^2$$

$$(a+b+c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca \qquad 4ab = (a+b)^2 - (a-b)^2$$

Conversion Graphs

$$1 \text{ mile} = \frac{8}{5} \text{km} \qquad 1 \text{ Hectare} = 2.471 \text{ Acres} \qquad {}^\circ F = \frac{9}{5} \times {}^\circ\text{C} + 32$$

Matrices and Determinants

$$A^{-1} = \frac{1}{|A|} AdjA$$

1. In decimal number, 5.7% is equal to

   A. 0.0057
   B. 0.057
   C. 5.7
   D. 570

2. Flowers are distributed between two friends Asma and Khalida in the ratio 5:7. If Asma gets 35 flowers, then the number of flowers Khalida will get is

   A. 25
   B. 35
   C. 49
   D. 63

3. The distance between two towns *X* and *Y* is 75 km. A family has covered a distance of 20 km from town *X*. The percentage of remaining distance to town *Y* is

   A. 26.67
   B. 55.00
   C. 73.33
   D. 136.36

4. Sara bought a dress online for Rs 2,900 and was charged an additional 5% for delivery. The total cost of the dress including the delivery charges will be

   A. Rs 3,040
   B. Rs 3,045
   C. Rs 3,140
   D. Rs 3,145

5. Zahida paid *Zakat* of Rs 13,500 on annual savings. Her annual saving was

   (**Note:** The rate of *Zakat* is 2.5%.)

   A. Rs 54,000
   B. Rs 54,500
   C. Rs 540,000
   D. Rs 545,000

6. The annual earnings of a man from agricultural farm *X* and *Y* are Rs 425,000 and Rs 275,000 respectively. The amount of *Ushr* for the year is

   (**Note**: The rate of *Ushr* is 10% of the earning.)

   A. Rs 15,000
   B. Rs 30,000
   C. Rs 70,000
   D. Rs 140,000

7. Mr Habib owns a property of worth Rs 8,250,000. He left two sons and two daughters as his legal heirs; where the share of the son is two times that of the daughter. The share of each daughter will be

   A. Rs 1,175,000
   B. Rs 1,375,000
   C. Rs 2,062,500
   D. Rs 2,750,000

8. A chocolate box contains 250 chocolates. If 70% of these chocolates is consumed, then the remaining chocolates will be

   A. 75
   B. 150
   C. 175
   D. 220

9. Shazim purchased a house for Rs 2,500,000. After 2 years, he sold it at a profit of 30%. The selling price of the house is

   A. Rs 3,250,000
   B. Rs 8,333,333.3
   C. Rs 10,833,333.3
   D. Rs 750,000

10. Komal bought a used mobile phone for Rs 5,000 and spent Rs 225 in repairs. After using it for 10 days, he sold it for Rs 2,000. He suffered a loss of

    A. Rs 2,775
    B. Rs 3,000
    C. Rs 3,225
    D. Rs 5,225

11. Ahmed and Bilal are two partners in a business. As per the agreement, the profit sharing ratio should be in accordance with the amount invested by each partner. Ahmed invested Rs 120,000 and Bilal invested Rs 45,000. If they earned a profit of Rs 22,000, then the share of Bilal will be

    A. Rs 6,000
    B. Rs 8,000
    C. Rs 16,000
    D. Rs 18,000

12. If the cost price of an item is Rs 955 and it is sold at a price of Rs 845, then the loss will be

    A. 10%.
    B. 11.5%.
    C. 13.01%.
    D. 15%.

13. The marked price of a sofa set is Rs 35,000. If the discount offered is 10% and sales tax of 5% is levied on the discounted price, then the total cost of the sofa set will be

A. Rs 33,075
B. Rs 33,750
C. Rs 29,925
D. Rs 29,750

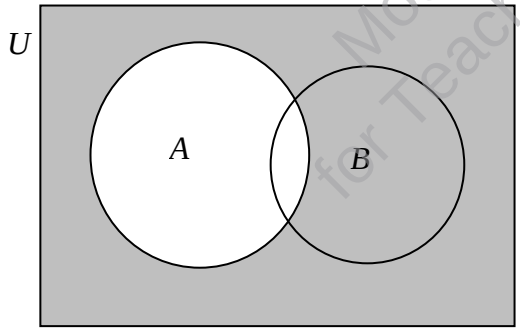
14. The domain of the binary relation $R = \{(d, 11), (e, 22), (f, 33)\}$ is

A. $\{d, 11\}$.
B. $\{d, e, f\}$.
C. $\{11, 22, 33\}$.
D. $\{d, e, f, 11, 22, 33\}$.

15. For the given sets $A = \{1, 2, 3\}$ and $B = \{2, 5\}$, $(A \cup B) - B$ is equal to

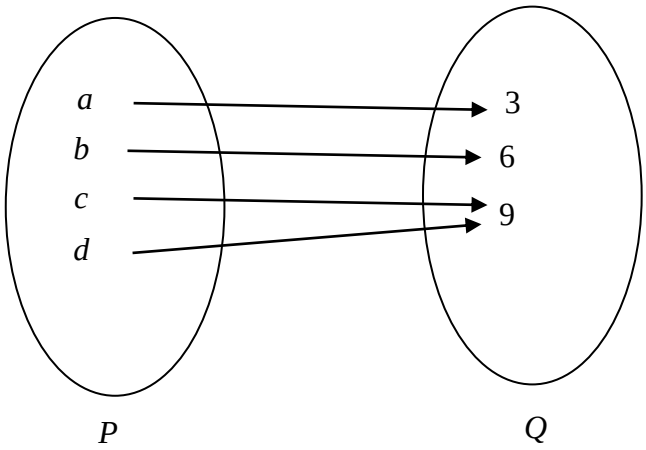
A. $\{\ \}$.
B. $\{2\}$.
C. $\{5\}$.
D. $\{1, 3\}$.

16. The shaded portion in the given Venn diagram represents



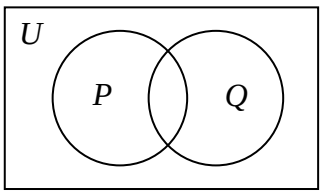
A. A^C.
B. B^C.
C. $A \cup B^C$.
D. $A^C \cup B$.

17. In the given diagram, the domain of the binary relation from set P to set Q is



A. $\{c, d\}$.
B. $\{a, b, c\}$.
C. $\{a, b, d\}$.
D. $\{a, b, c, d\}$.

18. For the given Venn diagram, $P \cup (Q \cap P)$ is equal to



A. P.
B. Q.
C. $P - Q$.
D. $Q - P$.

19. $\sqrt[3]{\frac{81}{3}}$ is equal to

A. $3^{\frac{1}{3}}$
B. $9^{\frac{1}{3}}$
C. 3
D. 9

20. For $8.9 \times 10^b = 0.00089$, the value of b is

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

21. The value of $a \log_a a^2 - \log_a a$ is equal to

A. 1
B. 2
C. $2a$
D. a

22. The exponent in the equation $(x+y)^w = z$ is

A. 1
B. z
C. w
D. $x + y$

23. The exponential form of $\log_3 5 = 2x$ is

A. $(2x)^3 = 5$
B. $(2x)^5 = 3$
C. $5^{2x} = 3$
D. $3^{2x} = 5$

24. On evaluating, the value of $\log_m\left(\frac{\sqrt{m}}{m}\right)$ is equal to

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

25. $\left(a^{-1} \times b\right)^{-1}$ is equal to

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

26. The value of algebraic expression, $\frac{xy^2 - x^2y}{xy}$ at $x = -1$ and $y = -1$ is

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

27. $x^2 - \left(\frac{1}{2}\right)^2$ is equal to

A. $\left(x-\frac{1}{2}\right)\left(x-\frac{1}{2}\right)$.

B. $\left(x+\frac{1}{2}\right)\left(x-\frac{1}{2}\right)$.

C. $\left(x+\frac{1}{4}\right)\left(x-\frac{1}{4}\right)$.

D. $\left(x-\frac{1}{4}\right)\left(x-\frac{1}{4}\right)$.

28. The rational expression $\frac{9x^2-4}{(3x+2)(9x-4)}$, in its lowest term is

A. $\frac{x}{3x+2}$.

B. $\frac{3x-2}{9x-4}$.

C. $\frac{9x-4}{3x+2}$.

D. $\frac{3x+2}{9x-4}$.

29. On simplification, $\frac{x^0 \times y}{xy}$ is equal to

A. 0

B. $\frac{1}{x}$

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

D. 1

30. If $2(a+b)=1$ and $3(a-b)=2$, then the value of $6(a^2-b^2)$ is equal to

A. 1
B. 2
C. 6
D. 12

31. The simplest form of $\sqrt{9}-\sqrt{2}-1$ is equal to

A. $\sqrt{7}-1$
B. $\sqrt{7}+1$
C. $2+\sqrt{2}$
D. $2-\sqrt{2}$

32. On factorisation of $3x+6x^2+9x^3$, we get

A. $3x(1+2x+3x^2)$.
B. $3x(1+3x+6x^2)$.
C. $3x(1+2x^2+3x^2)$.
D. $3x(3x+6x^2)$.

33. The factorised form of $pq+4p+3q+12$ will be

A. $(p+3)(q+4).$
B. $(p+4)(q+3).$
C. $(p+4)(q+4).$
D. $(p+3)(q+3).$

34. If $2x^2+3x-5$ is divided by $x+1$, then the remainder is

A. -10
B. -6
C. -4
D. 0

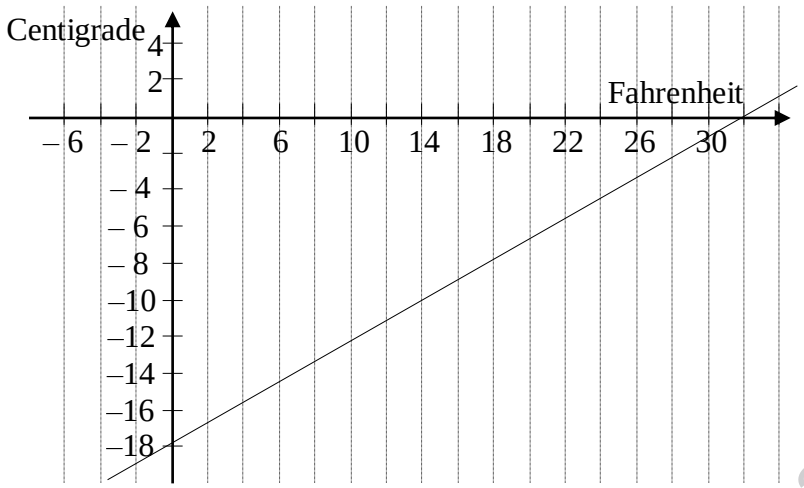
35. On complete factorisation of $x^2-x+\frac{1}{4}$, we get

A. $\left(x-\frac{1}{2}\right)\left(x+\frac{1}{2}\right).$
B. $\left(x-\frac{1}{2}\right)\left(x-\frac{1}{2}\right).$
C. $2\left(x-\frac{1}{2}\right)\left(x+\frac{1}{2}\right).$
D. $2\left(x-\frac{1}{2}\right)\left(x+\frac{1}{2}\right).$

36. If ax^2-2x+3 is divided by $x+1$ and the remainder is 2, then the value of a will be

A. –3
B. –1
C. 1
D. 3

37. The given graph shows the conversion of temperature from Fahrenheit to Centigrade scale.



From the given graph, 14° Fahrenheit in Centigrade will be

A. 4°C.
B. 8°C.
C. −10°C.
D. −14°C.

38. The point (− 8, 5) lies in the

A. I quadrant.
B. II quadrant.
C. III quadrant.
D. IV quadrant.

39. Which of the following points lie on the line $y = 2x$?

A. (1, 1).
B. (1, 2).
C. (2, 1).
D. (2, 2).

40. If $A = \begin{bmatrix} 3 & 4 \\ a & 8 \end{bmatrix}$ and $|A| = 0$, then a is equal to

A. -7
B. -6
C. 6
D. 7

41. Which of the following is/ are symmetric matrix/ matrices?

$$X = \begin{bmatrix} a & 0 & 0 \\ 0 & b & 0 \\ 0 & 0 & c \end{bmatrix}.$$

$$Y = \begin{bmatrix} 0 & 0 & a \\ 0 & b & 0 \\ c & 0 & 0 \end{bmatrix}.$$

$$Z = \begin{bmatrix} 0 & 0 & a \\ 0 & a & 0 \\ a & 0 & 0 \end{bmatrix}.$$

A. X only
B. Y only
C. X and Z
D. Y and Z

42. If the determinant of $\begin{bmatrix} 5 & a \\ 6 & a \end{bmatrix}$ is $a - 2$, then the value of a will be

A. $-\frac{1}{5}$
B. 0
C. 1
D. 2

43. The matrix $A = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$ is a

A. scalar matrix.
B. square matrix.
C. identity matrix.
D. diagonal matrix.

44. Let $A^t = \begin{bmatrix} -\frac{1}{2} & 3 \\ a & -4 \end{bmatrix}$ and $A^t + B = O$, where O is the null matrix of order 2. The matrix B is

A. $\begin{bmatrix} -\frac{1}{2} & a \\ 3 & -4 \end{bmatrix}$.

B. $\begin{bmatrix} \frac{1}{2} & -3 \\ -a & 4 \end{bmatrix}$.

C. $\begin{bmatrix} -\frac{1}{2} & 3 \\ a & -4 \end{bmatrix}$.

D. $\begin{bmatrix} \frac{1}{2} & -a \\ -3 & 4 \end{bmatrix}$.

45. Using Crammer's rule, the value of x, for $2x - 3y = 3$ and $3x + 2y = 11$ is expressed as

A. $x = \dfrac{\begin{vmatrix} 3 & -3 \\ 11 & 2 \end{vmatrix}}{\begin{vmatrix} 2 & -3 \\ 3 & 2 \end{vmatrix}}$.

B. $x = \dfrac{\begin{vmatrix} -3 & -3 \\ 2 & 11 \end{vmatrix}}{\begin{vmatrix} 2 & -3 \\ 3 & 2 \end{vmatrix}}$.

C. $x = \dfrac{\begin{vmatrix} 2 & -3 \\ 3 & 2 \end{vmatrix}}{\begin{vmatrix} 3 & -3 \\ 11 & 2 \end{vmatrix}}$.

D. $x = \dfrac{\begin{vmatrix} 3 & -3 \\ 11 & 2 \end{vmatrix}}{\begin{vmatrix} 3 & -3 \\ 2 & 2 \end{vmatrix}}$.

END OF PAPER

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