AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS X

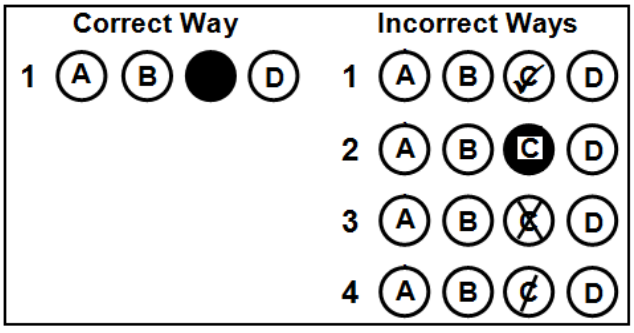
MODEL EXAMINATION PAPER 2023 AND ONWARDS

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 X

NOTE:

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

Financial Mathematics

$$I = PT \times \frac{R}{100}$$

Basic Statistics

$$\overline{X} = \frac{\sum x}{n} \qquad \overline{X} = \frac{\sum fx}{n} \text{ or } \overline{X} = \frac{\sum fx}{\sum f}$$

$$\text{Median} = l + \frac{1}{f}\left(\frac{n}{2} - c\right) \times h \qquad \text{Mode} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$$

$$\sigma^2 = \frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2 \qquad \sigma = \sqrt{\frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2}$$

Quadratic Equation

$$ax^2 + bx + c = 0,\ a \neq 0 \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \qquad \text{Disc} = b^2 - 4ac$$

Sequence and Series

$$a_n = a + (n-1)d \qquad AM = \frac{a+b}{2} \qquad a_n = ar^{n-1} \qquad GM = \pm\sqrt{ab}$$

Area and Volumes

$$\text{Area of a circle} = \pi r^2 \qquad \text{Area of a triangle} = \sqrt{s(s-a)(s-b)(s-c)}$$

$$\text{Volume of a cube} = l^3 \qquad \text{Volume of a cuboid} = l \times b \times h \qquad \text{Volume of a sphere} = \frac{4}{3} \times \pi r^3$$

$$\text{Volume of a cone} = \frac{1}{3} \times \pi r^2 \times h \qquad \text{Volume of a cylinder} = \pi r^2 \times h$$

Introduction to Coordinate Geometry

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \qquad \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Algebraic Formulae

$$(a-b)^2 = a^2 - 2ab + b^2 \qquad (a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3 \qquad a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

$$a^2 - b^2 = (a+b)(a-b) \qquad (a+b)^2 = a^2 + 2ab + b^2 \qquad a^3 + b^3 = (a+b)(a^2 - ab + b^2)$$

$$(a+b+c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca \qquad (a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$$

1. All of the given are negotiable instruments EXCEPT

   A. cheques.
   B. debit cards.
   C. demand draft.
   D. promissory notes.

2. On a certain day, the given table shows the conversion rate of Rs 100 into the other currencies.

US $	Chinese Yuan	Turkish Lira
0.6	3.92	5.07

   Using the given information, in Chinese Yuan, $500 will be equal to

   A. 19.60
   B. 76.50
   C. 1,960.00
   D. 3,266.66

3. Siraj invested an amount of Rs 50,000 at a simple interest rate of 6% per annum. If he invested the amount for 8 years, then the interest he earned at the end of this period will be

   A. Rs 3,000
   B. Rs 24,000
   C. Rs 74,000
   D. Rs 104,166.7

4. Sara is planning to buy a new car on installments. The details of the plan are given in the table.

Total Price in Installments (Rs)	2,794,000
Down Payment (Rs)	40% of the total price
The Installment Period	5 years
Processing Charges at the Beginning of the Plan (Rs)	5,000

   The initial amount Sara will pay at the beginning of the plan is

   A. Rs 1,117,600
   B. Rs 1,122,600
   C. Rs 1,681,400
   D. Rs 1,671,400

5. Aslam and Sonia are working for the same company. Aslam pays Rs 4,000, whereas, Sonia pays Rs 6,000 as their monthly income tax. Suppose that the same income tax rate is levied on both. If Sonia's monthly taxable income is Rs 120,000, then Aslam's taxable income (in nearest rupee) will be

   A. Rs 20,000
   B. Rs 30,000
   C. Rs 80,000
   D. Rs 180,000

6. Saleem works in a superstore. The given table shows his monthly salary breakup.

Fixed Salary	Commission on Sales	House Rent	Medical Allowance
Rs 15,500	3%	Rs 5,000	Rs 2,000

   In August, Saleem made a record sale of Rs 5,000,000. His total earning for August will be

   A. Rs 22,500
   B. Rs 23,175
   C. Rs 150,000
   D. Rs 172,500

7. Aruba is working in a private company. The company pays a monthly basic salary of Rs 85,000 and 10% of the basic salary as house rent allowance.

   If there are deductions such as Rs 2,500 for income tax, Rs 1,000 for gratuity fund and Rs 500 for health insurance, then her net income will be

   A. Rs 81,000
   B. Rs 82,500
   C. Rs 89,500
   D. Rs 91,000

8. The mean of the ages of five friends is 16 years. If three of them are of the same age and the other two are of 14 and 18 years, then the age of each friends having the same age is

   A. 12 years.
   B. 16 years.
   C. 18 years.
   D. 20 years.

9. For the data set 4, 0, 4 and 0, the variance is

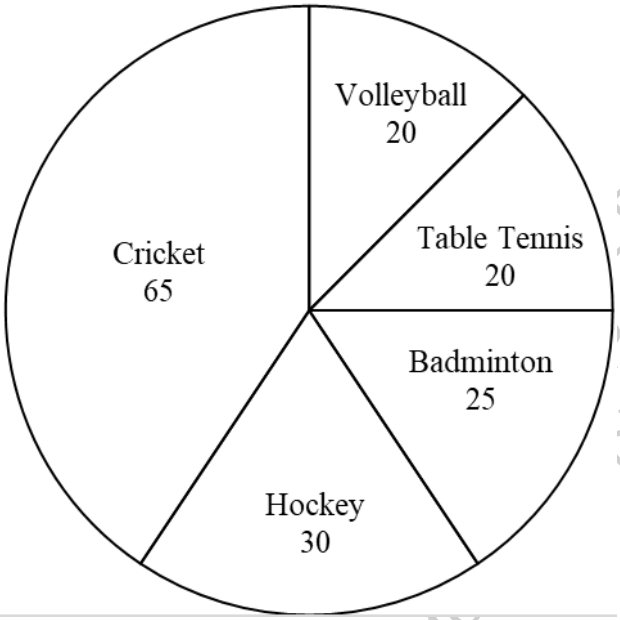
   A. 0
   B. 1
   C. 2
   D. 4

10. For the data set 10, 4, 1, 6, 10, 0, -1 and 5, the range is

A. 5
B. 9
C. 10
D. 11

Use the given information to answer Q.11 and Q.12.

A survey is conducted to obtain data about the favourite sport of students of class X. The result of the survey is represented by the given pie-chart.



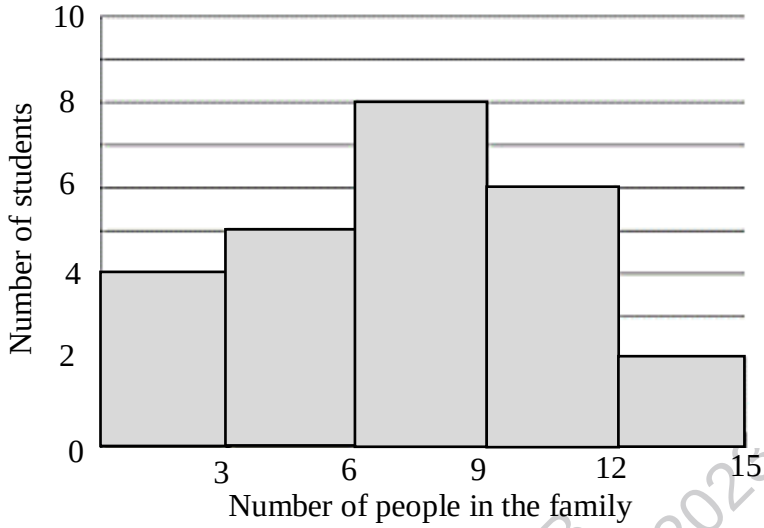
11. The percentage of the students who like table tennis or badminton is

A. 12.5%.
B. 28.1%.
C. 39.1%.
D. 45.0%.

12. The angle of the sector representing cricket is

A. 234.0°
B. 146.25°
C. 65.0°
D. 42.63°

13. The given histogram compares the number of people in families of students in a classroom.



From the histogram, how many students have 9 or less members in their family?

A. 8
B 15
C. 17
D. 18

14. The simplest form of the expression $\frac{(x+y)^2}{x-y}+\frac{(x-y)^2}{y-x}$ will be

A. $\frac{2(x^2+y^2)}{y-x}$.

B. $\frac{2(x^2+y^2)}{x-y}$.

C. $\frac{4xy}{x-y}$.

D. $\frac{4xy}{y-x}$.

15. The highest common factor (HCF) of the algebraic expressions $3x^2-3$, $x+1$ and $3x+3$ is

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

16. The least common multiple (LCM) of the algebraic expressions $(x+2)^2$, x^2-4 and $(x-2)^2$ is

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

17. If the highest common factor (HCF) and the least common multiple (LCM) of two expressions are $x-1$ and x^2-1 respectively, then the product of the expressions will be

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

18. The positive square root of the expression $(x-1)(x^2-1)(x+1)$ is

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

19. The solution of the equation $\frac{x-1}{4}=\frac{1}{2}$ equals

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

20. If seven is added to three times a number, then the result is -5. The number will be

A. -12
B. -4
C. $\frac{2}{3}$
D. 4

21. For the equation $|x+1|=-1$, the values of x

A. are 0 and -2
B. are 0 and 2
C. are 1 and 2
D. do not exist

22. Sharjeel had Rs 2,550. He bought three T-shirts and was left with an amount of Rs 750. If the price of all the T-shirts is the same, then the price of each T-shirt will be

A. 600
B. 750
C. 850
D. 1,100

23. The solution set of $5-x<0$, where $x \in R$, will be

A. $\{x|x \in R,\ x<5\}$.
B. $\{x|x \in R, x>5\}$.
C. $\{x|x \in R, x>-5\}$.
D. $\{x|x \in R, x<-5\}$.

24. For the equation $\frac{3\sqrt{x+1}}{2}=3$, the value of x will be

A. 1
B. 2
C. 3
D. 11

25. Which of the following equations is a quadratic equation in variable x?

A. $bx^2+c=0$
B. $ax+b^2x+c=0$
C. $a^2x+bx+c=0$
D. $a^2+bx+c=0$

26. The solution set of the quadratic equation $(3x+2)\times(5x-2)=0$ is

A. $\left\{\frac{2}{3},-\frac{2}{5}\right\}$.

B. $\left\{-\frac{2}{3},\frac{2}{5}\right\}$.

C. $\left\{-\frac{3}{2},\frac{5}{2}\right\}$.

D. $\left\{\frac{3}{2},-\frac{5}{2}\right\}$.

27. The solution set of the equation $x^2-bx+c=0$ is

A. $\left\{\frac{b\pm\sqrt{b^2+4c}}{2}\right\}$.

B. $\left\{\frac{b\pm\sqrt{b^2-4c}}{2}\right\}$.

C. $\left\{\frac{-b\pm\sqrt{b^2+4c}}{2}\right\}$.

D. $\left\{\frac{-b\pm\sqrt{b^2-4c}}{2}\right\}$.

28. The product of one less than a natural number and one more than the same number is 24. The number is

A. −5
B. −4
C. 5
D. 6

29. The common difference of the sequence 62, 49, 36, 23, 10, … is

A. −13
B. −3
C. 3
D. 13

30. If the 3rd term of the sequence is 7 and the 6th term is 16, then the common difference of the sequence will be

A. −3
B. 3
C. 6
D. $\frac{23}{7}$

31. If the arithmetic mean between a and $2a$ is 6, then the value of a will be

A. 2
B. 4
C. 6
D. 12

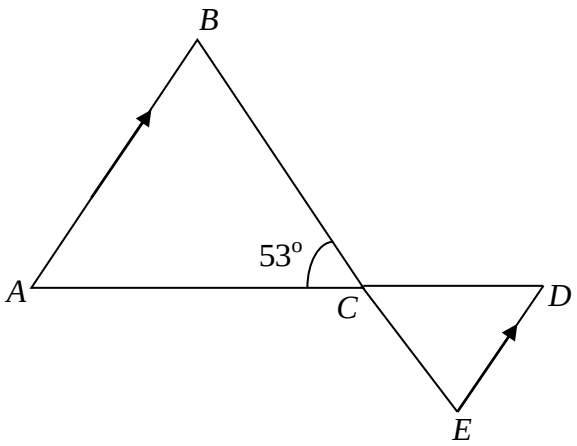
32. In a geometric progression, if $r = \frac{1}{3}$ and $a_5 = \frac{2}{9}$, then the 3rd term will be

A. $\frac{2}{729}$
B. $\frac{2}{81}$
C. 2
D. 3

33. Which of the following sequences examplifies a geometric sequence?

A. $1,1,1,\ldots\ldots$
B. $2,5,10,\ldots\ldots$
C. $\frac{1}{3},3,27,\ldots\ldots$
D. $20,18,16,\ldots\ldots$

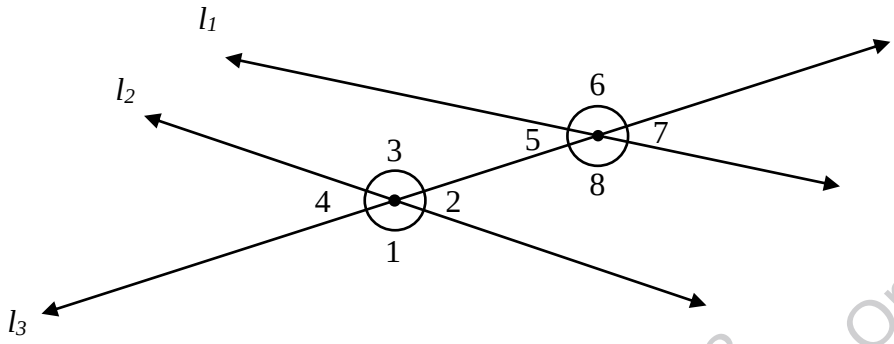
34. For the given diagram, the value of $\angle DCE + \angle ACB$ is



A. 37°
B. 106°
C. 127°
D. 79.5°

Use the given diagram to answer Q.35 and Q.36.

In the given diagram, a transversal l_3 intersects the two lines l_1 and l_2.



35. With reference to the given information in the given diagram, all the interior angles are

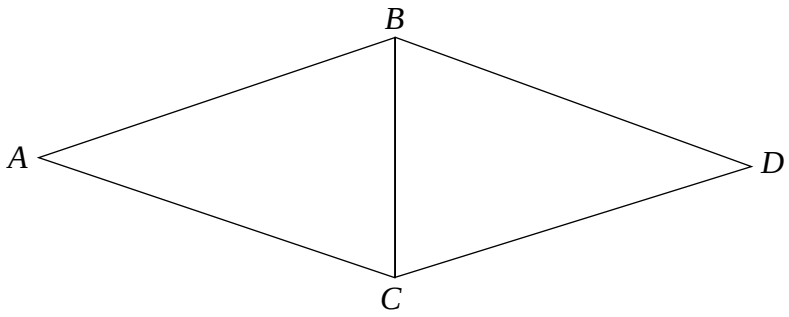
A. 1, 2, 3 and 4
B. 2, 3, 6 and 7
C. 2, 3, 5 and 8
D. 1, 4, 6 and 7

36. If the angle $\angle 5 = x°$, then $\angle 2$ will be equal to

A. x°
B. $(90 - x)^\circ$
C. $(90 + x)^\circ$
D. $(180 - x)^\circ$

37. The given diagram shows two triangles *ABC* and *DBC*, such that

$\angle ABC = \angle ACB = \angle DBC = \angle DCB$ and $AB = AC = BD = CD$.



NOT TO SCALE

If $\angle BAC = 40^o$, then $\angle BCD$ equals

A. 140^o
B. 80^o
C. 70^o
D. 40^o

38. A triangle has base $\frac{b}{4}$ units and height $4h$ units. The area of the triangle, in square units, is expressed as

A. bh.
B. $2bh$.
C. $\frac{1}{2}bh$.
D. $\frac{1}{4}bh$.

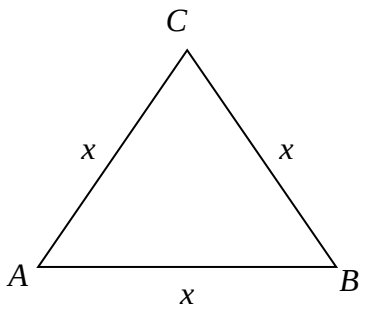
39. The area of a circle is $\frac{1}{4}\pi d^2$, where d is the diameter of the circle. The radius of the circle will be

A. $\frac{d}{2}$ units.
B. $\frac{d}{4}$ units.
C. $2d$ units.
D. $4d$ units.

40. If the base area and height of a right circular cylinder are $\frac{\pi x}{3}$ square units and $\frac{x}{3}$ units respectively, then its volume, in cubic units, will be expressed as

A. $\frac{\pi}{9}x^2$
B. $\frac{\pi}{27}x^2$
C. $\frac{\pi}{9}x^3$
D. $\frac{\pi}{27}x^3$

41. Consider the given triangle *ABC*.



NOT TO SCALE

For the given triangle, the area will be

A. $\frac{3}{4}x$

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

C. $\frac{3}{4}x^2$

D. $\frac{\sqrt{3}}{4}x^2$

42. If the base and the perpendicular of a right angled triangle are $9\sqrt{2}$ cm and $12\sqrt{2}$ cm respectively, then its hypotenuse will be

A. $13\sqrt{2}$ cm.

B. $14\sqrt{2}$ cm.

C. $15\sqrt{2}$ cm.

D. $16\sqrt{2}$ cm.

43. The distance between the two points $(2a,1)$ and $(a,0)$, in terms of *a*, is equal to

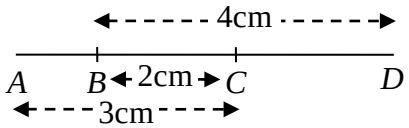
A. $\sqrt{a^2-1}$.

B. $\sqrt{a^2+1}$.

C. $\sqrt{(2a-1)^2+a^2}$.

D. $\sqrt{(2a-1)^2-a^2}$.

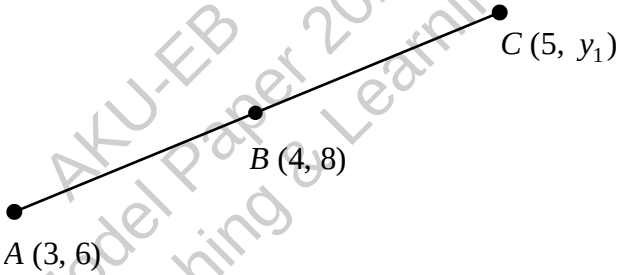
44. In the given figure *A*, *B*, *C* and *D* are collinear points. If $m\overline{AC} = 3cm$, $m\overline{BD} = 4cm$ and $m\overline{BC} = 2cm$, then $m\overline{AD}$ is



NOT TO SCALE

A. 5 cm.
B. 6 cm.
C. 7 cm.
D. 8 cm.

45. In the given diagram, if *B* is the midpoint of line-segment *AC*, then the *y*-coordinate (y_1) of the point *C* is



A. 2
B. 7
C. 10
D. 13

END OF PAPER

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Please use this page for rough work