AGA KHAN UNIVERSITY EXAMINATION BOARD

HIGHER SECONDARY SCHOOL CERTIFICATE

CLASS XI EXAMINATION

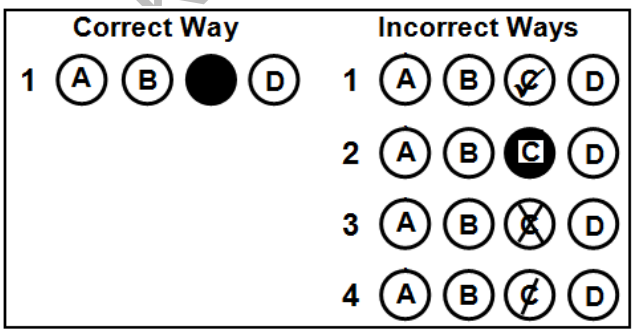
APRIL/ MAY 2017

Mathematics Paper I

Time: 45 minutes Marks: 35

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 35 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. You may use a scientific calculator if you wish.

1. $(1-2i)\times(1+2i)$ is equal to

   A. -3
   B. 5
   C. $1-4i$
   D. $1+4i$

2. If $Z = a - ib$ and $|Z| = 2$, then the relationship between a and b is

   A. $a^2 - b^2 = 4$
   B. $a^2 + b^2 = 4$
   C. $a + b = 2$
   D. $a - b = 2$

3. If $z = a + ib$, then $z + \bar{z}$ is equal to

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

4. Which of the following options is CORRECT for the matrix $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$?

   I. A is square matrix.
   II. A is a diagonal matrix.
   III. A is an identity matrix.

   A. I only
   B. I and III
   C. II and III
   D. I, II and III

5. For matrix $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$, the determinant of the matrix A is

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

6. If the determinant of $A = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$ is x, then the determinant of $B = \begin{bmatrix} 3a & 3b & 3c \\ 3d & 3e & 3f \\ 3g & 3h & 3i \end{bmatrix}$ will be

A. x
B. $3x$
C. $9x$
D. $27x$

7. The minor of element in the third row and the second column of matrix $\begin{bmatrix} 2 & 2 & 3 \\ 1 & 2 & 3 \\ 1 & 5 & 7 \end{bmatrix}$ is

A. -8
B. -3
C. 3
D. 8

8. Which of the following matrix multiplications is/ are possible when $G = \begin{bmatrix} 0 \end{bmatrix}$ and $H = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$?

I. G^2
II. HG
III. GH

A. I only
B. III only
C. I and II
D. II and III

9. If three geometric means are inserted between a and b to obtain a geometric progression, then in this progression, b is the

A. second term.
B. third term.
C. fourth term.
D. fifth term.

10. The 5^{th} term of an arithmetic sequence is 17 and the first term is 7, then the common difference is

A. $\frac{5}{8}$
B. $\frac{5}{4}$
C. $\frac{5}{2}$
D. 2

11. The arithmetic mean between 3 and b is $\frac{13}{2}$. The value of b is

A. 5
B. 10
C. 15
D. 16

12. For the geometric sequence $5, -\frac{10}{3}, \frac{20}{9}, -\frac{40}{27}, ...,$ the common ratio is

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

13. If $a, a+d, a+2d, \ldots, a+(n-1)d$ are the terms of an arithmetic progression and a_n is the n^{th} term, the sum to the n^{th} terms of the progression will be

A. $\frac{n}{2}[a+a_n]$
B. $\frac{n}{2}[a-a_n]$
C. $\frac{n}{2}[a-(n-1)d]$
D. $\frac{n}{2}[a+(n-1)]d$

14. A chess club has 10 members. The club has to select a team of 3 members to participate in a competition. The possible number of teams is

A. 30
B. 120
C. 720
D. 1000

15. If 3 coins are tossed and a fair die is rolled simultaneosly, then the number of possible outcomes is

(**Note:** Singular: die, Plural: dice)

A. 18
B. 36
C. 48
D. 54

16. If a coin is tossed and a fair die is rolled simultaneosly and the coin shows a head and the die shows 5, then which of the following options is TRUE for the events?

(**Note:** Singular: die, Plural: dice)

I. Dependent events
II. Independent events
III. Mutually exclusive events

A. I only
B. II only
C. I and III
D. II and III

17. If a coin is tossed and two fair dice are rolled simultaneously and the coin showed a tail or head and both the dice have sum of 10 on their faces, then the probability of the event is

A. $\frac{3}{72}$
B. $\frac{4}{72}$
C. $\frac{5}{72}$
D. $\frac{6}{72}$

18. By principle of mathematical induction, to prove that $1^3 + 2^3 + 3^3 + ... + K^3 = \frac{K^2(K+1)^2}{4}$ for $(K+1)^{th}$ term, the term that should be added to both side is

A. $K^3 + 1$
B. $(K+1)^3$
C. $\frac{(K+1)^2(K+2)^2}{4}$
D. $\frac{(K+1)^3(K+2)^3}{4}$

19. On expansion of $(1+x)^{-2}$ we get

A. $1 - 2x + 3x^2 - 4x^3 + ...$
B. $1 + 2x - 3x^2 + 4x^3 - ...$
C. $1 - 2x - 3x^2 - 4x^3 + ...$
D. $1 + 2x + 3x^2 + 4x^3 - ...$

20. The solution set of the quadratic equation $2x^2 + x = 0$ is

A. $\left\{\frac{1}{2}\right\}$

B. $\left\{-\frac{1}{2}\right\}$

C. $\left\{0, \frac{1}{2}\right\}$

D. $\left\{0, -\frac{1}{2}\right\}$

21. The nature of the roots of the eqaution $2x^2 + 2x + 3 = 0$ is

A. real and equal.
B. real and unequal.
C. complex and equal.
D. complex and unequal.

22. The solution set of the eqaution $\sqrt{x - \frac{1}{4}} = x$ is

A. $\left\{0, \frac{1}{2}\right\}$

B. $\left\{\frac{1}{2}\right\}$

C. $\left\{0, -\frac{1}{2}\right\}$

D. $\left\{\frac{1}{2}, -\frac{1}{2}\right\}$

23. If $\alpha + \beta = -3$ and $\alpha\beta = 2$, then $\frac{1}{\alpha} + \frac{1}{\beta}$ is equal to

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

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

C. $-\frac{3}{2}$

D. $-\frac{1}{6}$

24. If one root of a quadratic equation is $a-\sqrt{b}$, then the product of roots of the equation will be

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

25. In decimal form, the angle $45^o12'$ is equal to

A. 45.012
B. 45.12
C. 45.20
D. 45.25

26. The angle $\frac{23\pi}{6}$ rad is equal to

A. 12.0367^o
B. 345^o
C. 690^o
D. 1035^o

27. $\frac{\tan^2\theta+\tan^4\theta}{\sec^2\theta}$ is equal to

A. 1
B. $\tan^2\theta$
C. $\sec^2\theta$
D. $\cos^2\theta$

28. If $\sin\alpha=a$ and $\cos\alpha=b$, then the value of $\sin 2\alpha$ is equal to

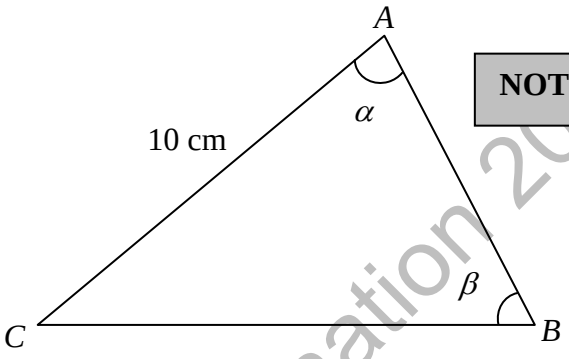
A. ab
B. $\frac{a}{b}$
C. $\frac{2a}{b}$
D. $2ab$

29. If an arc subtends an angle of 0.60 radians at the centre of a circle and its length is $60\,\text{mm}$, then the radius of the circle is

A. $36\,\text{mm}$
B. $3.6\,\text{mm}$
C. $10\,\text{mm}$
D. $100\,\text{mm}$

30. For triangle *ABC*, If $b = 10\,\text{cm}$, $\sin\alpha = 0.39$ and $\sin\beta = 0.99$, then a is approximately equal to

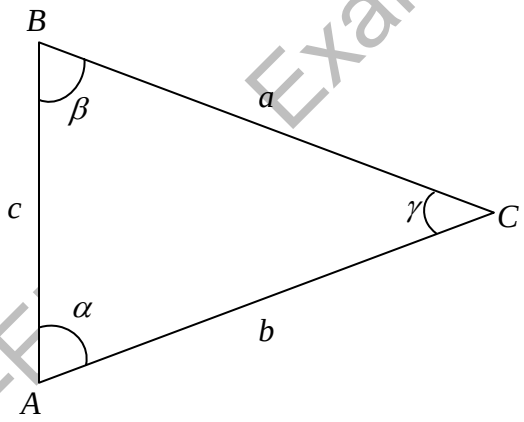
A. 3.94 cm
B. 3.86 cm
C. 4.86 cm
D. 25.38 cm



NOT TO SCALE

31. For triangle *ABC*, the correct formula of the area of the given traingle is

A. $\frac{1}{2}bc\sin\beta$
B. $\frac{1}{2}bc\cos\beta$
C. $\frac{1}{2}bc\sin\alpha$
D. $\frac{1}{2}bc\cos\alpha$



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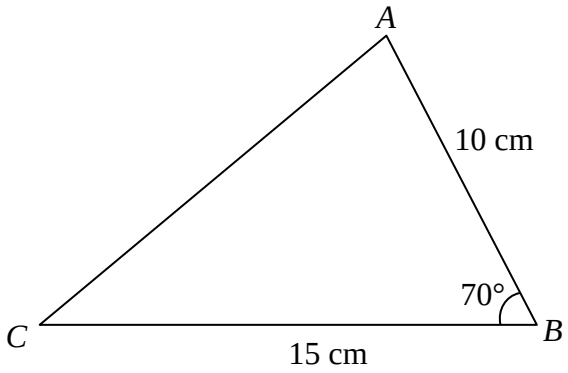
32. In the given triangle *ABC*, the length of *AC* to two decimal places is

A. 14.91 cm
B. 14.57 cm
C. 14.23 cm
D. 14.09 cm



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33. The range of the trigonometric function $\frac{3}{2}\cos(\pi + 2\theta)$, where $0 \le \theta \le 2\pi$, is

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

34. The period of trigonometric functions $\cot\frac{x}{9}$ is

A. $\frac{\pi}{9}$
B. π
C. 2π
D. 9π

35. The value of $a \times \cos^{-1}\left(-\frac{1}{2}\right)$ is equal to

A. $\frac{2\pi}{3}$
B. $-\frac{2\pi}{3}$
C. $\frac{2a\pi}{3}$
D. $-\frac{2a\pi}{3}$

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