

AGA KHAN UNIVERSITY EXAMINATION BOARD

HIGHER SECONDARY SCHOOL CERTIFICATE

CLASS XI EXAMINATION

APRIL/ MAY 2018

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.

Correct Way		Incorrect Ways	
1		1	
		2	
		3	
		4	

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

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

2. On simplification of $(1+i)^2$, the real part we get is

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

3. $\overline{\left(\frac{6+i}{5-i}\right)}$ is equal to

- A. $\frac{-6+i}{-5-i}$
- B. $\frac{-6-i}{-5+i}$
- C. $\frac{6-i}{5-i}$
- D. $\frac{6-i}{5+i}$

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

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

5. The determinant of the matrix $\begin{bmatrix} a & b & c \\ b & a & c \\ 2a & 2b & 2c \end{bmatrix}$ is

- A. 0
- B. 2
- C. abc
- D. $2abc$

6. For the matrix $\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$, which of the following options is TRUE?

- I. Square matrix
- II. Scalar matrix
- III. Null matrix

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

7. The matrix multiplication of $[2i \ 3i]$ and $\begin{bmatrix} 2 & 3 \\ 0 & 1 \end{bmatrix}$ will give

(Note: $i = \sqrt{-1}$)

- A. $\begin{bmatrix} 4i \\ 9i \end{bmatrix}$
- B. $\begin{bmatrix} 4i & 9i \\ 0 & 3i \end{bmatrix}$
- C. $[4i \ 9i]$
- D. not possible.

8. If $Y = \begin{bmatrix} 0 & x & 0 \\ 1 & 0 & 1 \\ 3 & 0 & 1 \end{bmatrix}$ and $|Y| = -2$, then value of x will be

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

9. For a geometric progression, the sum of the first two terms is 9. If the first term is 3, then the third term is

- A. 12
- B. 8
- C. 7
- D. 6

10. The sum of the infinite geometric series a, ab, ab^2, ab^3, \dots is equal to

(Note: $|b| < 1$)

- A. ∞
- B. $\frac{a}{1-b}$
- C. $\frac{a}{b-1}$
- D. $\frac{b}{1-a}$

11. The harmonic mean between two numbers $\frac{a}{2}$ and $\frac{b}{2}$ is

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

12. The sum of the arithmetic sequence $a, a+2b, a+4b, a+6b, a+8b, \dots$ to the 10th term is

- A. $2a+18b$
- B. $5a+90b$
- C. $10a+18b$
- D. $10a+90b$

13. The two geometric means between $\frac{1}{2}$ and 4 are

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

14. The possible number of arrangements of the letters of the word **SYSTEMATIC**, taken all at a time, is equal to

- A. $\frac{10!}{2!2!}$
- B. $\frac{2!}{10!}$
- C. $10!$
- D. $2!10!$

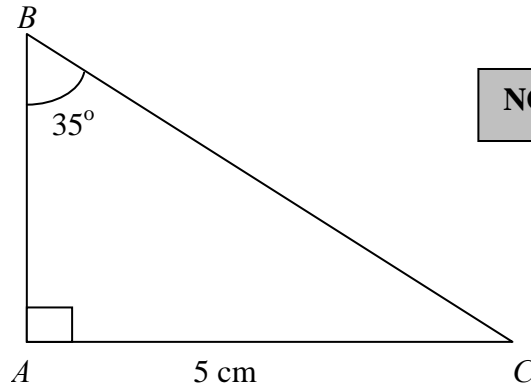
15. ${}^nC_{n-1}$ or $\binom{n}{n-1}$ is equal to
- A. 1
 - B. n
 - C. $\frac{n}{n-1}$
 - D. $\frac{1}{n-1}$
16. A bag contains 6 red, 5 yellow, 8 white, 6 black and 10 blue balls. Two balls are drawn at random with replacement from the bag. What is the probability that the first ball is red and the second ball is white?
- A. $\frac{6}{35} \times \frac{8}{34}$
 - B. $\frac{6}{35} \times \frac{8}{35}$
 - C. $\frac{6}{14} \times \frac{8}{14}$
 - D. $\frac{6}{14} \times \frac{8}{13}$
17. The number of ways, a teacher can select 6 students from a class of 30 students, to create a mathematics' club is
- A. 180
 - B. 593,775
 - C. 427,518,000
 - D. 729,000,000
18. The third term in the expansion of $(a - 2b)^6$ is
- A. $60a^4b^2$
 - B. $60a^3b^3$
 - C. $-60a^3b^3$
 - D. $-60a^4b^2$

19. The general term of the binomial expansion of $(3x + 7y)^{10}$ is
- A. $\binom{10}{r}(3x)^{r-10}(7y)^r$
- B. $\binom{10}{r}(3x)^r(7y)^{r-10}$
- C. $\binom{10}{r}(3x)^r(7y)^{10-r}$
- D. $\binom{10}{r}(3x)^{10-r}(7y)^r$
20. A quadratic equation has rational coefficients. If one of its root is $1 + \sqrt{2}$, then the sum of its roots will be
- A. 2
- B. -2
- C. $2 + 2\sqrt{2}$
- D. $2 - 2\sqrt{2}$
21. The solution set of the quadratic equation $2x^2 + \frac{1}{2} = 0$ is
- A. $\{-i, i\}$
- B. $\left\{0, \frac{i}{2}\right\}$
- C. $\left\{\frac{i}{4}, -\frac{i}{4}\right\}$
- D. $\left\{\frac{i}{2}, -\frac{i}{2}\right\}$
22. The nature of roots of the equation $x^2 - 2bx + b^2 = 0$, where $b \in \mathbb{Z}$, is
- A. real and equal.
- B. real and unequal.
- C. complex and equal.
- D. complex and unequal.
23. If 1, ω , and ω^2 are the cube roots of unity, then $\omega^2 \times \omega^3 + 1$ is equal to
- A. ω
- B. $-\omega$
- C. ω^2
- D. $-\omega^2$

24. For the quadratic equation $ax^2 + bx + c = 0$, if the sum of roots is equal to the product of roots, then
- A. $b + c = 0$
 - B. $b - c = 0$
 - C. $b - c = a^2$
 - D. $b + c = a^2$
25. One half degree i.e. $\left(\frac{1}{2}\right)^\circ$ is equal to
- A. 60 minutes.
 - B. 30 minutes.
 - C. 30 seconds.
 - D. 60 seconds.
26. The angle $27^\circ 30' 45''$ can be represented in decimal form as
- A. 27.3045
 - B. 27.5125
 - C. 27.5450
 - D. 27.7580
27. The terminal ray of angle 2360° lies in the
- A. I quadrant.
 - B. II quadrant.
 - C. III quadrant.
 - D. IV quadrant.
28. 7 radians converted into degree is equal to
- A. 0.122°
 - B. 21.99°
 - C. 1260°
 - D. 401.07°
29. If $\sin \alpha = a$ and $\cos \alpha = b$, then the value of $\sin 2\alpha$ will be equal to
- A. ab
 - B. $\frac{a}{b}$
 - C. $\frac{2a}{b}$
 - D. $2ab$

30. In the given right angled triangle ABC , the length of AB is equal to

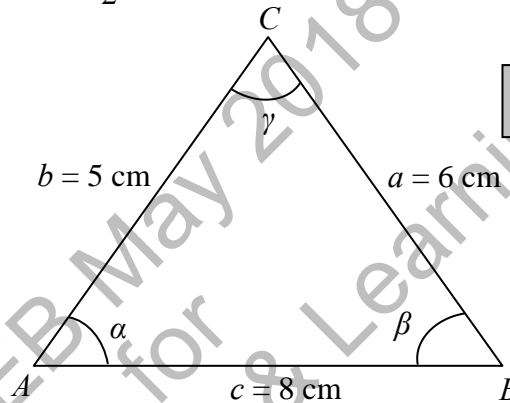
- A. 7.14 cm
- B. 4.10 cm
- C. 3.50 cm
- D. 2.87 cm



NOT TO SCALE

31. In the given triangle ABC , $\frac{\tan \frac{\alpha - \beta}{2}}{\tan \frac{\alpha + \beta}{2}}$ is equal to

- A. $\frac{1}{11}$
- B. $\frac{1}{7}$
- C. 11
- D. 7



NOT TO SCALE

32. The sides of a triangle ABC are 6 cm, 5 cm, 7 cm and its area is $6\sqrt{6} \text{ cm}^2$. The circum-radius of the circle associated to the triangle ABC is

- A. $\frac{210}{6\sqrt{6}} \text{ cm}$
- B. $\frac{840}{6\sqrt{6}} \text{ cm}$
- C. $\frac{210}{24\sqrt{6}} \text{ cm}$
- D. $\frac{6\sqrt{6}}{210} \text{ cm}$

33. The domain of the trigonometric function $\cot \theta$ is

- A. $-1 < x < 1$
- B. $-\infty < x < \infty$
- C. $-\infty < x < \infty$ where $x \neq n\pi$ and $n \in Z$
- D. $-\infty < x < \infty$ where $x \neq \frac{(2n+1)}{2}\pi$ and $n \in Z$

34. The period of $5\cos 5x$ is

- A. 10π
- B. 2π
- C. $\frac{2\pi}{5}$
- D. $\frac{\pi}{5}$

35. If $\tan x = -1$, where $x \in [0, \pi]$, then x will be

- A. 0
- B. $\frac{\pi}{4}$
- C. $\frac{\pi}{2}$
- D. $\frac{3\pi}{4}$

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