Comilla Board 2015

Mathematics Subject Code 1 0 9

Time — 2 Hours 10 Minutes **(Creative)** Full marks — 60

[N.B. - The figure in the right margin indicate full marks. Answer six questions in total, taking two from Algebra part, two from Geometry part, one from Trigonometry and Mensuration part and one from Statistics part.]

1. ▶ $U = \{x : x \in \mathbb{N} \text{ and } x \leq 7\}$

$A = \{x : x \in \mathbb{N} \text{ and } x^2 > 8 \text{ and } x^3 < 220\}$

$B = \{x : x \in \mathbb{N}, x \text{ is even number and } x < 8\}$

$C = \{x : x \in \mathbb{N} \text{ and } x \text{ is fctor of } 6\}$

a. Express set 'A' in tabular method. 2

b. Find the value of $P(A' \cap B')$ 4

c. If $D = B - C$; find the value of $(B \cup C) \times D$ 4

2. ▶ $x^2 - \sqrt{5}x + 1 = 0$ is a algebric equation.

a. Find the value of $x + \frac{1}{x}$ 2

b. Find the value of $x^4 - \frac{1}{x^4}$ 4

c. Prove that, $x^5 + \frac{1}{x^5} = 5\sqrt{5}$. 4

3. ▶ $215 + 213 + 211 + \ldots\ldots\ldots + 175 = S_1$ and $24 + 96 + 384 + \ldots\ldots$ the sum of first 5^{th} terms of series $= S_2$.

a. Find the 10^{th} term of S_1 2

b. Find the value of S_1 4

c. Find the ratio of S_1 and S_2 4

4. ▶ The bisectors of the angles $\angle Q$ and $\angle R$ of a triangle ΔPQR intersect at point O.

a. Draw the figure according to the information. 2

b. Prove that, $2\angle QOR = 180° - \angle QPR$. 4

c. If PQR is an equilateral triangle, prove that PO = QO = RO. 4

5. ▶ The perimeter of a square, P = 12 cm and $\angle x = 50°$; $\angle y = 70°$.

a. Find the area of the square. 2

b. Construct the square. [Sign and description of the construction is must] 4

c. $\frac{P}{2}, \frac{P}{3}$ are two parallel sides of a trapezium and there are two triangle $\angle x$ and $\angle y$ adjacent to $\frac{P}{2}$, construct the trapezium. 4

6. ▶ PM and PN chord do not pass-through the centre of the circle with a centre of O.

a. Draw the figure according to the above information. 2

b. Prove that $\angle MPN = \frac{1}{2}\angle MON$. 4

c. If PMQN is a quadrilateral inscribed in the circle, prove that, $\angle MQN + \angle MPN = 180°$. 4

7. ▶ $\frac{\cos A + \sin A}{\cos A - \sin A} = \frac{\sqrt{3}+1}{\sqrt{3}-1}$, $\angle B = 60°$.

a. Find the value of $\text{cosec}^2 B + \cot^2 B$ 2

b. Find the value of A. 4

c. Solve: $4\sin^2\theta - (2 + 2\sqrt{3})\sin\theta + \sqrt{3} = 0$
Show that, $\theta = 2A$ or $\theta = A$ 4

8. ▶ In Natore Uttara Ganavabon the length of a rectangular garden is 60m and breath is 40m. There is a pond inside of the garden with round border of equal width. The area of the pond is $\frac{1}{3}$ of the garden.

a. Find the length of the diagonal of the garden. 2

b. Determine the perimeter of the pond. 4

c. How many tallies will be required to cover the region of square with square tallies of 30 cm each if the perimeter of the square is equal to the perimeter of the pond? 4

9. ▶ Frequency distribution table of the marks obtained in mathemetics of 70 students of class X are proved.

Class interval	50-54	55-59	60-64	65-69	70-74
Frequency	7	12	18	24	9

a. Write down the law of mode and explain it. 2

b. Find the mean from the table. 4

c. Draw an ogive curve of the data. 4

Answers

1. a. A = {3, 4, 5, 6};
b. {{1}, {7}, {1, 7}, ϕ};
c. {(1, 4), (2, 4), (3, 4), (4, 4), (6, 4)}
2. a. $\sqrt{5}$ b. $\pm 3\sqrt{5}$
3. a. .197; b. 4095; c. 1365 : 2728
5. a. 9 sq. cm.
7. a. $\frac{5}{3}$; b. A = 30°
8. a. 72.11 m. (App.) b. 120 m. c. 10,000
9. b. 63.14 (App.)

Multiple Choice Questions

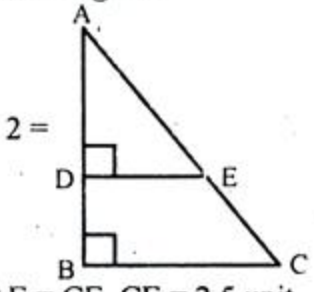
Time — 40 minutes Full marks— 40 Subject Code | 1 | 0 | 9 |

[NB. Answer all the questions. Each question carries one mark. Block fully, with a ball-point pen, the circle of the letter that stands for the correct/best answer in the "Answer sheet" for multiple choice questions Examination. Candidates are asked not to leave any mark or spot on the question paper.]

1. The digit of tens place of a two digit number is trice of the digit of units place. If the digit of units place is x, what is the number?

ⓐ 31x ⓑ 13x
ⓒ 4x ⓓ $3x^2$

Answer to the question nos (2 – 3) according to the figure:



AD = BD, AE = CE, CE = 2.5 unit.

2. BC = What unit?

ⓐ 3 ⓑ 4
ⓒ 5 ⓓ 6

3. DE = What unit?

ⓐ 3 ⓑ 2.5
ⓒ 2 ⓓ 1.5

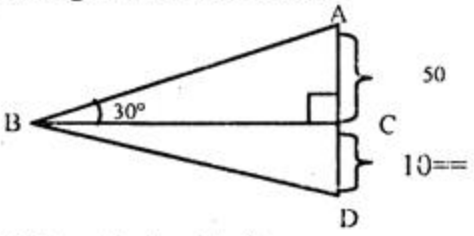
4. How many datas are required to draw a quadrilateral?

ⓐ 3 ⓑ 4
ⓒ 5 ⓓ 6

5. In a mixture, the ratio of water and syrup is 2 : 3, what is the percentage of water?

ⓐ 20 ⓑ 30
ⓒ 40 ⓓ 50

Answer to the question nos. (6 – 7) according to the information:



6. AB = what meter?

ⓐ 25 ⓑ $25\sqrt{3}$
ⓒ 100 ⓓ $100\sqrt{3}$

7. BD = what meter?

ⓐ 76.60 (Approx) ⓑ 86.02 (Approx)
ⓒ 87.18 (Approx) ⓓ 186.60 (Approx)

8. If we increase each of the sides of a square 20%, then what is the percentage of reduced area?

ⓐ 36 ⓑ 44 ⓒ 72 ⓓ 80

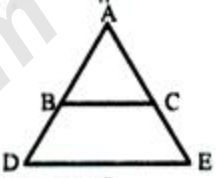
9.

x	0	–1	2
y	–1	–3	3

Which table is correct?

ⓐ $y = 5x - 1$ ⓑ $y = 4x - 1$
ⓒ $y = 3x - 1$ ⓓ $y = 2x - 1$

10. In the figure BC||DE

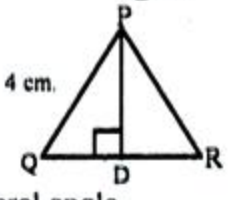


Which is correct?

ⓐ AB : BC = AD : DE
ⓑ AD : DB = AE : EC
ⓒ BC : DE = AD : AE
ⓓ AD : DE = AE : CD

11. How many symmetric lines do hare? a hexagon.

ⓐ 3 ⓑ 4
ⓒ 5 ⓓ 6



PQR is equilateral angle

12. QD = what unit?

ⓐ 1 ⓑ $\sqrt{2}$ ⓒ 2 ⓓ 4

13. What is the height of this angle?

ⓐ $2\sqrt{3}$ ⓑ $\frac{4}{\sqrt{3}}$
ⓒ $\sqrt{3}$ ⓓ $\frac{2}{\sqrt{3}}$

14. The temperatures of 10 days of an area in summer are 20°, 22°, 17°, 34°, 20°, 35°, 21°, 24°, 25°, 27°
ⓐ 17° ⓑ 20° ⓒ 22° ⓓ 24°

15. If the datas are inserted into a table then which is the indicator?
ⓐ Class range
ⓑ Midpoint of class
ⓒ Number of class
ⓓ Frequency of class

16.

Weight	45	50	55	60	65	70
Frequency	2	6	8	16	12	6

What is the median?
ⓐ 50 ⓑ 55 ⓒ 60 ⓓ 65

17. Which one is empty set?
ⓐ $\{x \in N : x$ prime number & $23 < x < 29\}$
ⓑ $\{x : x$ odd natural number & $23 \leq x < 29\}$
ⓒ $\{x \in N : 23 < x < 29\}$
ⓓ $\{x \in Z : 23 < x < 29\}$

18. If the number of $5.7\dot{8}$ to express simple fraction which is correct?
ⓐ $5\frac{78}{90}$ ⓑ $5\frac{78}{9}$
ⓒ $5\frac{71}{90}$ ⓓ $5\frac{71}{9}$

19. If $A = \{2, 3, 5\}$ and $R = \{(x, y) : x \in A, y \in A$ and $y = x - 1\}$ then to express tabular method R which is correct?
ⓐ $\{(2, 3)\}$ ⓑ $\{(3, 2)\}$
ⓒ $\{(3, 3)\}$ ⓓ $\{(5, 5)\}$

20. i. $(a + b)^2 = a^2 + 2ab + b^2$
ii. $(a + b)^2 = (a - b)^2 + 4ab$
iii. $(a + b)^4 - (a - b)^4 = 8ab(a^2 + b^2)$
Which one is correct?
ⓐ i ⓑ i & ii
ⓒ i & iii ⓓ i, ii & iii

21. If the level of $f(x)$ is positive, then in which condition, the remainder will of $f\left(-\frac{b}{a}\right)$ if we divide f(x) by (ax + b)?
ⓐ $a \neq 0$ ⓑ $a = 0$
ⓒ $a > 0$ ⓓ $a < 0$

Answer the question nos. (22 – 23) according to the equation:
$\left(x + \frac{1}{x}\right)^2 = 7 = x > 0$

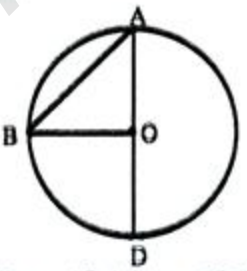
22. $x^3 + \frac{1}{x^3}$ = what?
ⓐ 0 ⓑ $3\sqrt{7}$
ⓒ $4\sqrt{7}$ ⓓ $7\sqrt{7}$

23. $x^3 - \frac{1}{x^3}$ = what?
ⓐ $3\sqrt{3}$ ⓑ $3\sqrt{7}$
ⓒ $6\sqrt{3}$ ⓓ $7\sqrt{7}$

24. If $\log_a 200 = 2$, then what is the value of a?
ⓐ $10\sqrt{2}$ ⓑ $5\sqrt[3]{2}$
ⓒ $5\sqrt{3}$ ⓓ $10\sqrt{5}$

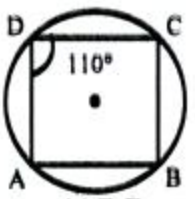
25. When a certain triangle can not be draw. If given that—
i. three side
ii. three angle
iii. two side & their angle
Which one is correct?
ⓐ i ⓑ ii
ⓒ iii ⓓ i & iii

26. If figure—



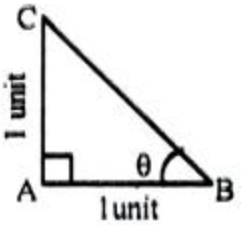
i. $\angle BOD = \angle OAB + \angle OBA$
ii. $\angle BAD = \frac{1}{2}\angle BOD$
iii. $\angle OAB = \angle OBA$
Which one is correct?
ⓐ i & ii ⓑ i & iii
ⓒ ii & iii ⓓ i, ii & iii

27.



In the figure, $\angle ABC$ = what degree?
ⓐ 70° ⓑ 80°
ⓒ 90° ⓓ 110°

28.



$\cos\theta$ = what?

ⓐ 1 ⓑ $\frac{1}{\sqrt{2}}$ ⓒ $\sqrt{2}$ ⓓ 2

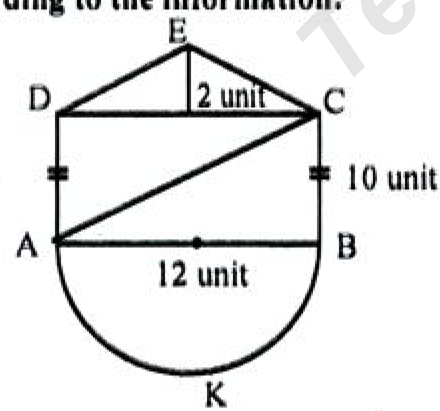
29. i. $\sin^2\theta = 1 + \cos^2\theta$
ii. $\sec^2\theta = 1 + \tan^2\theta$
iii. $\operatorname{cosec}^2\theta = 1 + \cot^2\theta$
Which one is correct?
ⓐ i & ii ⓑ i & iii
ⓒ ii & iii ⓓ i, ii & iii

30. In which condition, $a_1x + b_1y = c_1$, $a_2x + b_2y = c_2$ system of conditions are consistent and mutually independent?
ⓐ $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ ⓑ $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$
ⓒ $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ ⓓ $\frac{a_1}{b_1} = \frac{a_2}{b_2}$

31. $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}$ ....what is the common term of the sequence?
ⓐ $\frac{1}{n}$ ⓑ $\frac{n-1}{n+1}$
ⓒ $\frac{1}{2^n}$ ⓓ $\frac{n}{n+1}$

32. $\frac{1}{\sqrt{2}} - 1 + \sqrt{2} -$ .... what is 8^{th} term of this series?
ⓐ – 16 ⓑ –8
ⓒ 8 ⓓ 32

Answer to the question nos. (33 – 35) according to the information:



33. AC = What unit?
ⓐ 13.52 (Approx) ⓑ 14.12 (Approx)
ⓒ 15.01 (Approx) ⓓ 15.62 (Approx)

34. What is square unit of the area of triangle CDE?
ⓐ 12 ⓑ 20
ⓒ 24 ⓓ 120

35. What is the circumferrence of the half circle AKB?
ⓐ 18 ⓑ 18.85 (Approx)
ⓒ 37.7 (Approx) ⓓ 96

36. Which one is rational number?
ⓐ $\sqrt{11}$ ⓑ $\frac{\sqrt{6}}{3}$ ⓒ $\frac{\sqrt{8}}{\sqrt{7}}$ ⓓ $\frac{\sqrt{27}}{\sqrt{48}}$

37. $(a + b - c)^2$ = what?
ⓐ $a^2 + b^2 + c^2 - 2ab - 2bc - 2ca$
ⓑ $a^2 + b^2 + c^2 + 2ab - 2bc - 2ca$
ⓒ $a^2 + b^2 - c^2 + 2ab - 2bc + 2ca$
ⓓ $a^2 + b^2 - c^2 + 2ab - 2bc - 2ca$

38. Under which condition $a^0 = 1$?
ⓐ $a = 0$ ⓑ $a \neq 0$
ⓒ $a > 1$ ⓓ $a < 1$

39. $a \times 10^n$ is a form of scientific number where—
ⓐ $1 < a < 10$ ⓑ $1 < a \leq 10$
ⓒ $1 \leq a \leq 10$ ⓓ $1 \leq a < 10$

40. What is the solution set of $\frac{z-2}{z-1} = 2 - \frac{1}{z-1}$
ⓐ {1} ⓑ {0}
ⓒ { } ⓓ {2}

Ans.																																								
	1	ⓐ	2	ⓐ	3	ⓓ	4	ⓒ	5	ⓒ	6	ⓒ	7	ⓒ	8	ⓑ	9	ⓓ	10	ⓑ	11	ⓓ	12	ⓒ	13	ⓐ	14	ⓑ	15	ⓓ	16	ⓒ	17	ⓐ	18	ⓒ	19	ⓑ	20	ⓓ
	21	ⓐ	22	ⓒ	23	ⓒ	24	ⓐ	25	ⓑ	26	ⓓ	27	ⓐ	28	ⓑ	29	ⓒ	30	ⓐ	31	ⓓ	32	ⓑ	33	ⓓ	34	ⓐ	35	ⓑ	36	ⓓ	37	ⓑ	38	ⓑ	39	ⓓ	40	ⓒ