Sylhet 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.]*

Algebra

1. ▶ $U = \{1, 2, 3, 4, 5, 6, 7\}$
$A = \{x : x \in \mathbb{N} \text{ and } x^2 - (a + b)x + ab = 0\}$
$B = \{x : x \in \mathbb{N}; x^2 > 15 \text{ and } x^3 < 225\}$
$C = \{x \in \mathbb{N} : 4 < x \leq 7\}$

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

b. Prove that, $(B \cup C)' = B' \cap C'$. 4

c. Find thae value of $A \times (B \cup C)$ and $A \times (B \cap C)$ 4

2. ▶ If $p^2 - 1 = 4p$—

a. Find the value of $\left(p + \frac{1}{p}\right)^2$ 2

b. Find the value of $\frac{p^3 + 5p}{p^4 + 4p^2 - 5} \times \sqrt[3]{64}$ 4

c. Show that, $p^4 = 322 - \frac{1}{p^4}$ 4

3. ▶ $6 + x + y + z + 96 + \ldots\ldots$ is a geometric series.

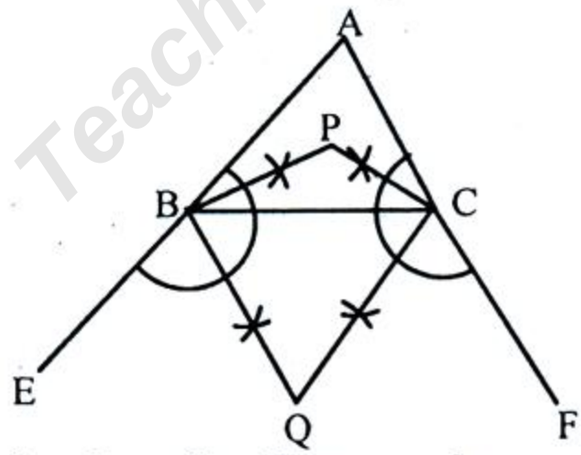
a. Write down two differences between arithmatic series and sequence. 2

b. Find the value of x, y and z 4

c. Write down the series of the extract. If the sum of 1^{st} n^{th} terms is 3066. What is the value of n? 4

Geometry

4. ▶

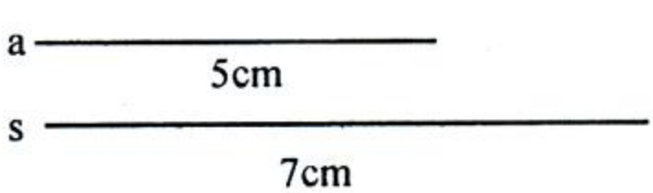


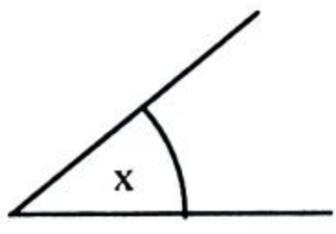
a. Write the defination of collinear and concyclic. 2

b. Prove that, $\angle BPC = 90° + \frac{1}{2}\angle A$. 4

c. Prove that, the four points B, P, C, Q are concyclic. 4

5. ▶





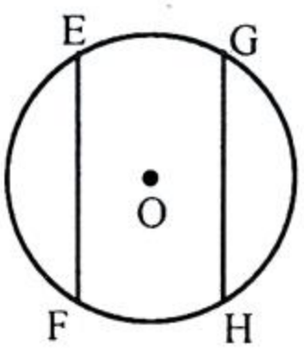
$\angle x = 45°$

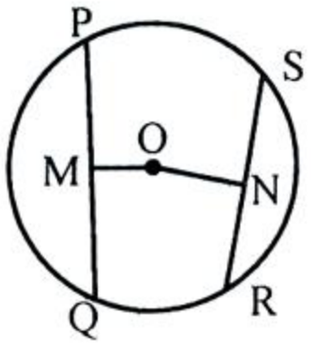
a. Write the two differences between square and rhombus. 2

b. According to the extract a triangle whose base is a, base adjacent angle ∠x and the sum of other two sides equal to s. 4

c. Construct a right angled triangle, which hypotenuse is a and the sum of other two sided equal to s. 4

6. ▶





Chord EF = Chord GH, Chord PQ > Chord SR and OM⊥PQ, ON ⊥ SR

a. Write the definition of the angle of circle and angle of centre with figure. 2

b. According to fig: 1; prove that, the distances of the both chords are equal from the centre. 4

c. According to fig: 2; prove that, OM < ON. 4

Trigonometry and Mensuration

7. ▶ An electric pole is broken by a storm such that the undetached broken part makes an angle of 60° with the standing part and touches the ground at a distance of 24 metres from it.

a. Draw a figure according to the extract and explain it. 2

b. Find the point of height where it was broken. 4

c. Find the length of the whole tree. 4

8. ▶ The perimeter of a square plot and a rectangular plot is equal. The length of the rectangular plot is equadruple its width. There is a path with 4m width all along its length in the square plot. The area of the path is 624 square.

a. By an indicating figure, write down the law to find the area of an isosceles triangle. 2

b. Determine the area of the square plot excluding the road. 4

c. What will be the cost to plant trees in the rectangular garden? 4

Statistics

9. ▶ The obtained marks of 70 students of a school in class X are given below:

Number	51-55	56-60	61-65	66-70	71-75	76-80	81-85
Frequency	5	10	20	15	10	7	3

a. What is central tendency? What are the measurements of central tendency? 2

b. Find the average in short-cut method. 4

c. Find the median from the table. 4

Answers

1. a. {a, b}; c. {(a, 4), (a, 5), (a, 6), (a, 7), (b, 4), (b, 5), (b, 6), (b, 7)}; {(a, 5), (a, 6), (b, 5), (b, 6)}
2. a. 20; b. 1
3. b. 12, 24, 48; c. n = 9
7. b. 13.86 metre (approx) c. 41.57 metre
8. b. 23,712 sq. metre c. 38, 93, 760 taka
9. b. 66.43 (approx); c. 66

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.]

Class	6-10	11-15	16-20	21-25
	4	10	15	20

Answer to the question no. (1 and 2) according to the data.

1. Which one of the law is correct for determining the mode?

ⓐ $L + \frac{f_1 + f_2}{f_1} \times h$

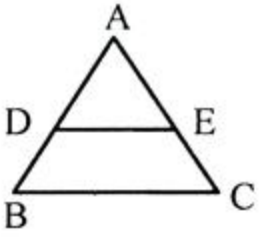
ⓑ $L + \frac{f_2}{f_1 + f_2} \times h$

ⓒ $L + \frac{f_1}{f_1 + f_2} \times h$ ⓓ $L + \frac{f_1}{f_1 + f_2}$

2. What is the value of f_1 and f_2, where L = 21 and h = 5.

ⓐ 5, 20 ⓑ 20, 5
ⓒ 5, 5 ⓓ 20, 15

3.



In the figure, if BC ∥ DE and AB = 8cm, BC = 6cm then, —

i. DE = 3cm
ii. AD = 4cm
iii. ΔABC and ΔADE

Which one is correct?

ⓐ i & ii ⓑ ii & iii
ⓒ i & iii ⓓ i, ii & iii

4. In a circle—

i. chord is the largest diameter
ii. All equal chords are equidistant from the centre
iii. Chords equidistant from the center are equal

Which one is correct?

ⓐ i & ii ⓑ i & iii
ⓒ ii & iii ⓓ i, ii & iii

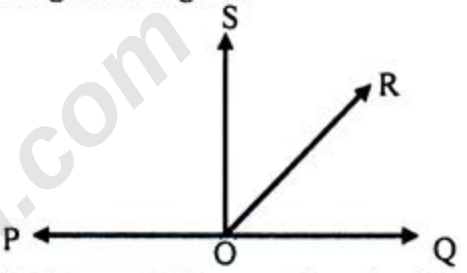
5. How many individual data are requires to draw a rectangle?

ⓐ 3 ⓑ 4
ⓒ 5 ⓓ 6

6. Where are the situation of two points (– 3, 1) and (3, – 1) are in which quardent of the graph paper?

ⓐ 2nd and 3rd ⓑ 2nd and 4th
ⓒ 1st and 4th ⓓ 3rd and 2nd

Answer to the question no. 7 and 8 according to the figure:



7. Which one is the equal angle of a right angle?

ⓐ ∠POS ⓑ ∠QOR
ⓒ ∠ROS ⓓ ∠POR

8. Which one is the complementary angle of ∠QOR?

ⓐ ∠QOS ⓑ ∠POR
ⓒ ∠ROS ⓓ ∠POS

9. 1 + 2 + 3 + 4 + ... + 100 = what?

ⓐ 4750 ⓑ 4950
ⓒ 5050 ⓓ 5150

10. If $\sec\theta + \tan\theta = \frac{5}{2}$, then $\sec\theta - \tan\theta$ = ?

ⓐ $\frac{2}{5}$ ⓑ $\frac{3}{5}$
ⓒ $\frac{5}{6}$ ⓓ $\frac{4}{5}$

11. What is considered an entity of zero dimension?

ⓐ line ⓑ surface
ⓒ point ⓓ line-sigment

12. If a, b, c are ordered proportional then which one is correct?
ⓐ $a^2 = bc$ ⓑ $b^2 = ac$
ⓒ $a = b = c$ ⓓ $ab = bc$

13. $3x - 5y = 7$
$6x - 10y = 15$
Solve of the system of the equation—
ⓐ numerous ⓑ unique
ⓒ two ⓓ no solve

14. How many symmetrical lines are in a square?
ⓐ 2 ⓑ 3
ⓒ 4 ⓓ 5

15. Which one is the detached variable?
ⓐ Age ⓑ Height
ⓒ Weight ⓓ Population

16. Ratio of two numbers is 3 : 4 and their L.C.M. is 180. Find the two numbers.
ⓐ 30, 45 ⓑ 45, 60
ⓒ 45, 75 ⓓ 45, 70

17. What is called like this kind of set $\{x \in \mathbb{N} : 9 < x < 10\}$?
ⓐ disjoint set ⓑ infinite set
ⓒ empty set ⓓ finite set

18. What is the value of $\log_3\left(\frac{1}{9}\right)$?
ⓐ 3 ⓑ – 3
ⓒ – 2 ⓓ 2

19. The length of three sides of a triangle are 5 cm, 6 cm and 7 cm respectively. Find the area of it.
ⓐ 15.7 sq. cm.
ⓑ 15sq. cm. (Approx)
ⓒ 14.7 sq. cm. (Approx)
ⓓ 13.7sq. cm. (Approx)

20. Forming 45° angle with ground 18 metres long ladder leans of the top of the wall, find the height of the wall.
ⓐ 11.528 m. (Approx)
ⓑ 12.627 m. (Approx)
ⓒ 12.728 m. (Approx)
ⓓ 13.728 m. (Approx)

21. If $P \cap Q = \{\}$ then, P and Q are mutually—
ⓐ subset
ⓑ disjoint set
ⓒ universal set
ⓓ inter section of set

22. Express $0.1\dot{3}$ into simple fruction. Which one is correct?
ⓐ $\frac{13}{90}$ ⓑ $\frac{4}{33}$
ⓒ $\frac{13}{99}$ ⓓ $\frac{2}{15}$

23. For real number—
i. square root of an irrational number is the form of any nutral number which is not perfect square.
ii. All positive numbers including zero are called non-negative number
iii. zero is.a natural number
Which one is correct?
ⓐ i & ii ⓑ i & iii
ⓒ ii & iii ⓓ i, ii & iii

24. The three sides of the right angled triangle are respectively—
i. 3cm, 4cm, 5cm
ii. 5cm, 12cm, 13cm
iii. 6cm, 8cm, 12cm
Which one is correct?
ⓐ i & ii ⓑ i & iii
ⓒ ii & iii ⓓ i, ii & iii

25. If $A = \{0, 1, 2, 3, 4\}$ and $B = \{-1, 0, 1, 2, 3\}$ then, Which one is the correct value of $A \cup B$?
ⓐ $\{-1, 0, 1, 2, 3, 4\}$
ⓑ $\{0, 1, 2, 3\}$
ⓒ $\{-1, 0, 1, 2, 3\}$
ⓓ $\{0, 1, 2, 3, 4\}$

26. If $x + \frac{1}{x} = 2$, then $x^3 + \frac{1}{x^3}$ = what?
ⓐ 2 ⓑ 3
ⓒ 4 ⓓ 5

27. If $a + b = 3$ and $ab = 2$, then what is the value of $a^2 - ab + b^2$?
ⓐ 3 ⓑ 5
ⓒ 9 ⓓ 13

28. If $f(x) = x^2 - 4x + 3$, then determine $f\left(-\frac{1}{2}\right)$?
ⓐ $\frac{29}{8}$ ⓑ $\frac{21}{4}$
ⓒ $\frac{5}{4}$ ⓓ $\frac{15}{4}$

29. If $x = 2 + \sqrt{3}$ then, what is the value of x^2?
ⓐ $7 - 4\sqrt{3}$ ⓑ $7 + 4\sqrt{3}$
ⓒ $7 - 2\sqrt{3}$ ⓓ $7 + 3\sqrt{3}$

30. Adding what with $25x^2 + 36y^2$, we get a perfect square?
ⓐ 30xy ⓑ 45xy
ⓒ 60xy ⓓ 70xy

Answer to the question nos. (31 – 33) according to the information:
$A = \{1, 2\}$, $B = \{2, 3\}$ ==C = $\{3, 4\}$

31. What is the element number of $A \cup B \cup C$?
ⓐ 4 ⓑ 5
ⓒ 6 ⓓ 7

32. What is the correct value of $P(A \cap B)$?
ⓐ $(2, \phi)$ ⓑ $\{\{2\}, \phi\}$
ⓒ $\{2\}$ ⓓ ϕ

33. Which one is indicated by $(A \cap B) \times C$?
ⓐ $\{\{2, 3\}, \{2, 4\}\}$
ⓑ $\{(1, 2), (2, 3)\}$
ⓒ $\{(2, 3), (2, 4)\}$
ⓓ $\{(1, 3), (1, 4)\}$

34. English c alphabet has symmetrical line —
i. A, B, C
ii. H, O, I
iii. M, N, P
Which one is correct?
ⓐ i & ii ⓑ i & iii
ⓒ ii & iii ⓓ i, ii & iii

35. What is the factor of $a^2 - 1 + 2b - b^2$?
ⓐ $(a + b + 1)(a - b + 1)$
ⓑ $(a + b + 1)(a + b - 1)$
ⓒ $(a + b + 1)(a + b + 2)$
ⓓ $(a + b - 1)(a - b + 1)$

36. Find the value of angle among the sides of a fan.
ⓐ 60° ⓑ 90°
ⓒ 108° ⓓ 120°

37. The edges of a surface are —
ⓐ point ⓑ line
ⓒ angle ⓓ triangle

38. $\log_a a = 1$ where —
i. $a > 0$
ii. $a \geq 0$
iii. $a \neq 1$
Which one is correct?
ⓐ i & ii ⓑ i & iii
ⓒ ii & iii ⓓ i, ii & iii

39. Which one is the solve of $\sqrt{2x - 3} + 5 = 2$?
ⓐ 6 ⓑ 4
ⓒ 2 ⓓ ϕ

40. What is the n-terms of a series?
ⓐ ar^{n-1}
ⓑ $a + (n - 1)d$
ⓒ $s_n = \frac{n}{2}\{2a + (n - 1)d\}$
ⓓ $s_n = \frac{a(1 - r^n)}{1 - r}$

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	ⓑ