Rajshahi 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. ▶ $A = \{x : x \in \mathbb{N} \text{ and } x^2 - 8x + 15 = 0\}$
$B = \{1, 3\}$
$C = \{2, 3\}$
$D = \{a, b, c\}$

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

b. Prove that, $A \times (B \cap C) = (A \times B) \cap (A \times C)$. 4

c. Finding P(D), show that, the number of elements of P(D) supports 2^n. 4

2. ▶ If $a = \sqrt{6} + \sqrt{5}$

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

b. Find the value of $a^3 + \frac{1}{a^3}$ 4

c. Find the value of $a^6 + \frac{1}{a^6}$ 4

3. ▶ The 8^{th} term of geometric series is -27 and 11^{th} terms is $81\sqrt{3}$ of the series.

a. Express the equation above the information. 2

b. Find the 14^{th} terms of the series. 4

c. Find the sum of first 10^{th} terms of the series. 4

4. ▶ In ΔPQR, $\angle P = 90°$ and s is the mid point of QR.

a. Draw the figure according to the information. 2

b. Prove that, $QR^2 = PQ^2 + PR^2$. 4

c. Show that, the length of PS will be half of QR. 4

5. ▶ AB, CD, EF are three equal cords of a circle with a centre of O, M, N, P are respectively the middle points of the cords.

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

b. Prove that, OM = ON. 4

c. Prove that the three points M, N and P are concyclic. 4

6. ▶ The length of three sides of a triangle are respectively 3 cm, 4 cm and 5 cm.

a. Construct a triangle. 2

b. With the sign of construction and description draw an ex-circle of the triangle. 4

c. Draw a square which length is twice than that the radius of the ex-cricled triangle. 4

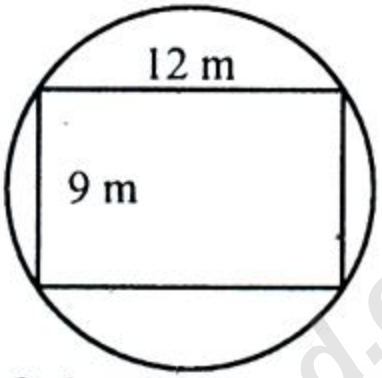
7. ▶ The angle of elevation of a tower at any point on the ground is 30°. If moved towards 20°, towards the tower, the angle of elevation becomes 60°.

a. According to the information draw a figure. 2

b. Find the height of the tower. 4

c. What is the distance between the point of vertex and the first point of the ground? 4

8. ▶



In the fig., if the cost of planting grass per sq. m is tk. 45 where those are not occupied by the rectangle in the circle.

a. Determine the area of the rectangle. 2

b. Determine the circumference of the circle. 4

c. In the not occupied part, what will be the cost to plant grass? Find it. 4

9. ▶The marks in mathematics of 40 students in class IX of a school are given below:

Numbers	31-40	41-50	51-60	61-70	71-80	81-90	91-100
Number of students	4	10	18	23	13	9	3

a. Write down the law of finding median with the introduction of variable. 2

b. Find the median with short-cut method. 4

c. Draw a frequency polygon from the table. 4

Answers

1. a. $A = \{3, 5\}$
2. a. $\sqrt{6} - \sqrt{5}$; b. $42\sqrt{6}$; c. 10582
3. a. $ar^7 = -27$, $ar^{10} = 81\sqrt{3}$
   b. -729;
   c. $\frac{-121\sqrt{3}(\sqrt{3}-1)}{3}$
7. b. 17.32 m. (App.)
   c. 34.64 m. (App.)
8. a. 108 sq. m.
   b. 47.124 m.
   c. Tk. 3092.18
9. b. 64.25

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. Which one is the simple fraction of $-0.\dot{4}5\dot{}$?

ⓐ $\frac{4}{9}$ ⓑ $\frac{9}{20}$

ⓒ $\frac{5}{11}$ ⓓ $\frac{9}{11}$

2. How many proper subset in M = {1, 2, 3}?

ⓐ 3 ⓑ 6

ⓒ 7 ⓓ 8

3. If p, q, r is real number and p < q—

i. $pr < qr$; when $r > 0$

ii. $pr > qr$; when $r < 0$

iii. $pq > qr$; when $r \geq 0$

Which one is correct?

ⓐ i & ii ⓑ i & iii

ⓒ ii & iii ⓓ i, ii & iii

4. If $f(a) = a^2 - 3a + 2$, then for which value of a will prove $f(a) = 0$.

ⓐ 0 ⓑ 2

ⓒ (1, – 2) ⓓ (1, 2)

5. If $m + n = 8$ and $mn = 15$, then find out value of $(m - n)^2$.

ⓐ 2 ⓑ 4

ⓒ 34 ⓓ 94

6. The factor of $a^3 - 3ab^2 + 2b^3$ is—

i. $a - b$ ii. $a + 2b$

iii. $a^2 + ab + 2b^2$

Which one is correct?

ⓐ i & ii ⓑ i & iii

ⓒ ii & iii ⓓ i, ii & iii

7. Which is the right solution set of $\sqrt{2x - 5} + 3 = 2$?

ⓐ {3} ⓑ {± 3}

ⓒ {– 3} ⓓ ∅

8. Which is following the identity?

ⓐ $x^2 - 5x + 6$

ⓑ $(a - 4)^2$

ⓒ $(x + a)(x + b) = x^2 + (a + b)x + ab$

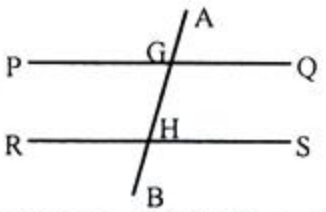
ⓓ $(a + b)^2 + (a - b)^2 = a^2 + b^2$

9. Which one is the general carecteristics logarithdm of 62.542?

ⓐ 0 ⓑ 1

ⓒ 2 ⓓ 3

10.



In this figure, PQ ∥ RS, and AB line intersect G at point and H, then—

i. ∠AGQ = similar∠GHS

ii. ∠QGH + ∠GHS = 180°

iii. ∠AGQ = ∠RHB

Which one is correct?

ⓐ i & ii ⓑ i & iii

ⓒ ii & iii ⓓ i, ii & iii

11. Which one is the value of x if $\log_x 9 = 2$?

ⓐ ± 2 ⓑ ± 3

ⓒ 3 ⓓ 18

Answer to the question no. (12 – 13) according to the information:

At the rate of simple profit 5% per annual 500 taka in 3 years will become.

12. What is the value of simple profit?

ⓐ 25 taka ⓑ 50 taka

ⓒ 75 taka ⓓ 100 taka

13. Which one is the compound profit?

ⓐ 41.81 taka ⓑ 51.25 taka

ⓒ 78.81 taka ⓓ 78.95 taka

14. Which is the complementary of Acute angle.

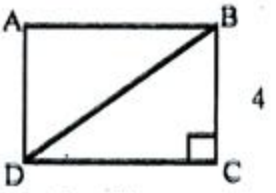
ⓐ Straight angle ⓑ Obtuse angle

ⓒ Right angle ⓓ Acute angle

15. In a right angle triangle's both acute angles summation is —?

ⓐ 45° ⓑ 80° ⓒ 90° ⓓ 180°

16.

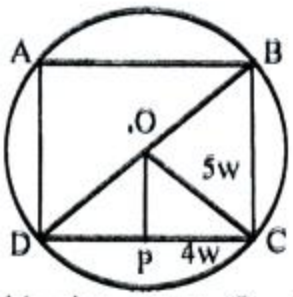


What is the diagonal length of square ABCD?

ⓐ $2\sqrt{3}$ ⓑ $4\sqrt{2}$
ⓒ $4\sqrt{3}$ ⓓ $8\sqrt{2}$

17. For drawing quadilateral how many data we have to know?
ⓐ 3 ⓑ 4
ⓒ 5 ⓓ 6

Answer to question no. (18 – 19) according to the figure:



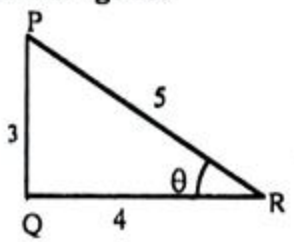
A circle with the centre O. ABCD is a quadrilateral.

18. Which one is the area of OPC triangle?
ⓐ 30 ⓑ 20
ⓒ 12 ⓓ 6

19. Which is the correct quadrilateral ABCD—
ⓐ $\angle ABC + \angle ADC = 180°$
ⓑ $\angle ABO + \angle BDC = 80°$
ⓒ $\angle ODP + \angle OCP = 180°$
ⓓ $\angle BAD + \angle BCD = 130°$

20. Which law is correct?
ⓐ $\tan^2\theta = 1 - \sec^2\theta$
ⓑ $\text{cosec}^2\theta - \tan^2\theta = 1$
ⓒ $\sin^2\theta - \cos^2\theta = 1$
ⓓ $\frac{1}{\text{cosec}^2\theta} + \frac{1}{\sec^2\theta} = 1$

Answer to the question nos. 21 and 22 according to the figure:

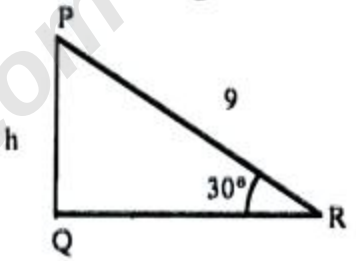


21. Which one is the value of $\cos\theta$?
ⓐ $\frac{3}{5}$ ⓑ $\frac{3}{4}$ ⓒ $\frac{4}{5}$ ⓓ $\frac{5}{4}$

22. Which one is the value of $\frac{\tan^2\theta + 1}{\sin^2\theta - 1}$?
ⓐ $\frac{-35}{8}$ ⓑ – 2.44
ⓒ – 1 ⓓ 1.56

23. Ratio of two numbers is 3: 2 and their H.C.F is 4. What is their L.C.M?
ⓐ 6 ⓑ 8 ⓒ 12 ⓓ 24

24. If A : B = 3 : 4, B : C = 5 : 4 then A : B : C = what?
ⓐ 15 : 20 : 16 ⓑ 16 : 15 : 20
ⓒ 20 : 16 : 15 ⓓ 20 : 15 : 16



25. What is the value of h according to the figure?
ⓐ 4.5 cm. ⓑ 6.3 cm.
ⓒ 7.8 cm. ⓓ 9.5 cm.

26. $-\frac{1}{3}x - y = 0$, $x - 3y = 0$, the system of equation is—
i. consistent
ii. undependable
iii. no solve
Which one is correct?
ⓐ i & ii ⓑ i & iii
ⓒ ii & iii ⓓ i, ii & iii

27. Which four value will fulfill the equation $x + 3y = 5$?
ⓐ (5, 0), (1, –2) ⓑ (2, 1), (5, 0)
ⓒ (2, 1), (0, –5) ⓓ (1, 5), (0, 2)

28. What is the common difference for the series log3 + log9 + log27 + ...
ⓐ 2log3 ⓑ log6

ⓒ $\log 3$ ⓓ $\log\frac{1}{3}$

29. Which one is the sum of cubes of first n natural numbers?

ⓐ $S_n = \frac{n^2(n+1)^2}{4}$

ⓑ $S_n = \frac{n^3(n+1)^3}{8}$

ⓒ $S_n = \frac{n(n+1)(2n+1)}{6}$

ⓓ $S_n = \frac{n}{2}\{2a + (n-1)d\}$

30. Condition of the ratio is—

i. $x : y = y : x$ then, $x = y$

ii. $x : y = m : n$ then, $(x + y) : y = (m + n) : n$

iii. $x : y = z : p$ then, $yz = xp$

Which one is correct?

ⓐ i & ii ⓑ i & iii

ⓒ ii & iii ⓓ i, ii & iii

31. If the geometry series is $3 + a + b + 81$ then what is the value of b?

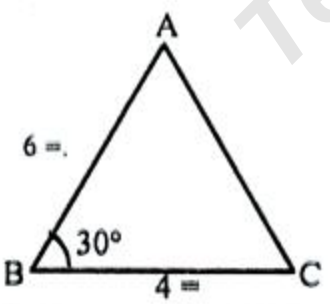
ⓐ 9 ⓑ 12 ⓒ 18 ⓓ 27

32. What is the half-dimension of symmetry among the four sides of a fan?

ⓐ 2 ⓑ 3

ⓒ 4 ⓓ 6

33.



What is the area of ΔABC?

ⓐ $6\sqrt{3}$ ⓑ 6

ⓒ 12 ⓓ 24

34. The lengths of two parallel sides of a trapezium are 18 c.m and 14 c.m respectively and their perpendicular distance is 8 c.m. Find the area of the trapezium.

ⓐ 128 ⓑ 64

ⓒ 32 ⓓ 16

35. For a cylinder—

(Where height = h and radius = r)

i. Curved surface area = $2\pi rh$

ii. Volume = $\pi r^2 h$

iii. Whole surface area = $(\pi r^2 + 2\pi rh)$

Which one is correct?

ⓐ i & ii ⓑ i & iii

ⓒ ii & iii ⓓ i, ii & iii

36. The length of a side of a series is $6\sqrt{3}$ m then, Find the value?

ⓐ 36 ⓑ 144

ⓒ 216 ⓓ 512

37. Find the mean of the numbers 35, 40, 42, 50, 56, 42, 50, 64, 42, 35, 40

ⓐ 41.09 ⓑ 45.09

ⓒ 49.09 ⓓ 50.09

Answer to the question nos (38 - 39) according to the data:

Class	21-30	31-40	41-50	51-60
Frequency	4	12	8	10

38. What is the higher limit of median class according to the table?

ⓐ 31 ⓑ 40

ⓒ 50 ⓓ 60

39. What is the mode according to the data (Approx)?

ⓐ 34.33 ⓑ 37.67

ⓒ 41.83 ⓓ 47.67

40. If $p^2 - 1 = \sqrt{5}p$, then $p^3 - \frac{1}{p^3} = ?$

ⓐ 0 ⓑ $2\sqrt{5}$

ⓒ $3\sqrt{5}$ ⓓ $8\sqrt{5}$

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	ⓓ