

## Algebra

1. ►  $x, y$  are two real numbers in which their summation is  $\sqrt{5}$  and subtraction is  $\sqrt{3}$

a. Find the value of  $\sqrt{3}$ . 2

b. Prove that,  $xy(x^2 + y^2) = 2$  4

c. If  $a = 2x$ , then, find the value of  $a^3 - \frac{1}{a^3}$  4

2. ►  $\frac{4}{a}$  and  $\frac{1}{x} + \frac{1}{y}$  are two expressions.

a. If 1st expression = 2nd expression show that  $a = \frac{4xy}{x+y}$  2

b. Prove that,  $\frac{a+2x}{a-2x} + \frac{a+2y}{a-2y} = 2$  from obtained value 'a'. 4

c. If  $\frac{a+x}{a-x} + \frac{a+y}{a-y} = 2$ , then show that, 2<sup>nd</sup> expression  $\frac{2}{a}$  4

3. ► The 4<sup>th</sup> terms of geometric series is 2 and the 8<sup>th</sup> terms is 8.

a. Express the information by equation 2

b. What is the 3<sup>rd</sup> terms of the series. 4

c. Find the sum of first 10<sup>th</sup> terms of the series. 4

## Geometry

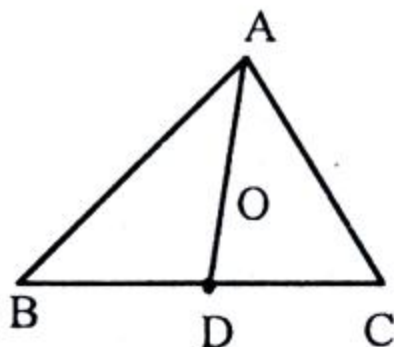
4. ► P is a point outside a circle ABC with centre O and two line segments PA and PB.

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

b. By joining A and B then produce chord AB prove that DP line is perpendicular to AB. 4

c. If another circle with a centre Q, insect at outside point M the circle with O, show that, O, M, Q are colinear. 4

5. ►



In the figure  $AB = 6\text{cm}$ ,  $AC = 4\text{cm}$ ,  $CD = 2\text{cm}$  and  $O$  is any point in  $OB$ . Line segment  $AD$  bisects  $\angle A$  of  $\triangle ABC$ .

- Are  $\triangle ABD$  and  $\triangle ACD$  similar angled or not write it with argument. 2
  - Find the length of  $BD$ . 4
  - Show that,  $\triangle AOB : \triangle AOC = 3 : 2$  4
6. ► In the triangle, the base adjacent two angles are respectively  $45^\circ$  and  $30^\circ$  and perimeter is  $8\text{cm}$ .
- Show the information in the figure. 2
  - Draw the triangle. [Sign of construction and description is must] 4
  - Draw an ex-circle of the triangle. [Sign of construction and is must] 4

## Trigonometry and Mensuration

7. ► From a helicopter above  $A$  point  $O$  between two kilometre posts, the angle of depression of the two points  $A$  and  $B$  are  $60^\circ$  and  $30^\circ$  respectively.
- Draw a rational figure with short discription. 2
  - Find the height of the helicopter from the ground. 4
  - Find the direct distance from the point  $A$  and  $B$  of helicopter. 4
8. ►  $ABCD$  is a parallelogram. The length of the adjacent sides are  $12\text{cm}$  and  $8\text{cm}$ . The length of the smaller diagonal is  $10\text{cm}$ .
- Draw the figure according to the above information. 2
  - Determine the length of the  $O$  the diagonal of the parallelogram. 4
  - Find the area of parallelogram  $ABCD$ . 4

## Statistics

9. ► The frequency distribution table of the marks obtained in Mathematics of 80 students of class  $X$  in a school.

Draw a table to	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
Frequency	2	5	16	12	13	20	5	4	2	1

- Draw a table to find the value of median and mode from the table. 2
- Find the median and mode. 4
- Draw an ogive curve from the table. 4

1. a.  $\frac{\sqrt{5} + \sqrt{3}}{2}$  c.  $(2x - \frac{1}{2x})(4x^2 + \frac{1}{4x^2} + 1)$   
 3. a.  $ar^3 = 2$ ;  $ar^7 = 8$  b.  $\sqrt{2}$  c. 31  
 5. b. 3 cm

7. b. 433.013m.(App.) c. 500m. 266.03 (App.)  
 8. b. 17.78 cm. c. 79.37 sq. cm.(App.)  
 9. b. 44.8462 (App.) 54.1818 (App.)

## Multiple Choice Questions

Time — 40 minutes Full marks— 40

Subject Code 

1	0	9
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[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 rational number?

- (a)  $\sqrt{12}$                       (b)  $\sqrt{16}$   
 (c)  $\sqrt{17}$                         (d)  $\sqrt{18}$

2. How many proper subsets of  $A = \{1, 2, 3\}$ ?

- (a) 3                      (b) 4                      (c) 5                      (d) 7

3. If  $P = \{1, 2, 3\}$ ,  $Q = \{2, 3, 4\}$  then—

- i.  $P - Q = \{1\}$   
 ii.  $P \cap Q = \{2, 3\}$   
 iii. 8 is a element of  $P(Q)$

Which one is correct?

- (a) i & ii                      (b) i & iii  
 (c) ii & iii                      (d) i, ii & iii

4. If  $x - 2$  is one of the factor of  $x^3 - x - 6$  then which one is the other factor?

- (a)  $x^2 + 2x + 3$                       (b)  $x^2 - 2x + 3$   
 (c)  $x^2 - 2x - 3$                       (d)  $x^2 + 2x - 3$

5. If  $2a - \frac{2}{a} = 3$  then, what is the value of  $a$ ?

- (a) -2                      (b) 0                      (c) 1                      (d) 2

6. Which one is the scientific form of 7750?

- (a)  $77 \times 10^3$                       (b)  $7.75 \times 10^3$   
 (c)  $0.77 \times 10^3$                       (d)  $7.775 \times 10^3$

7. If  $\log_{\sqrt{4}} x = 4$  then, what is the value of  $x$ ?

- (a)  $\frac{1}{2}$                       (b) 2                      (c) 4                      (d) 16

Answer to the question no (8 - 10) according to the information:

Tk.  $x$  is the profit of tk.  $x$  for one year at the rate of profit  $x\%$ .

8. What is the rate of profit?

- (a)  $\frac{x}{50}$                       (b)  $\frac{x}{2}$                       (c)  $\frac{x}{100}$                       (d)  $\frac{x}{10}$

9. Which one is equal to the value of capital?

- (a)  $100x$                       (b)  $x$   
 (c)  $x + x\%$                       (d)  $100 + x$

10. What is the value of  $x$ ?

- (a) 100                      (b)  $10x$   
 (c)  $100x$                       (d) 50

11. What is called to draw a geometric figure?

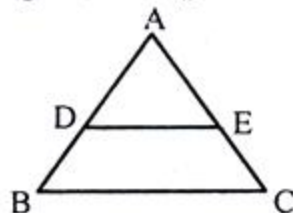
- (a) Theorem                      (b) Construction  
 (c) Corollary                      (d) Postulate

12.

If  $ST \parallel QR$  and  $\angle PST = 60^\circ$  in  $\Delta PQR$   $\angle Q = ?$

- (a)  $30^\circ$                       (b)  $50^\circ$   
 (c)  $60^\circ$                       (d)  $120^\circ$

13. In the figure, if  $BC \parallel DE$ .



i.  $\frac{AB}{AD} = \frac{AC}{AE}$

ii.  $\frac{AB}{BD} = \frac{AC}{CE}$

iii.  $\frac{AB}{BC} = \frac{AC}{DE}$

Which one is correct?

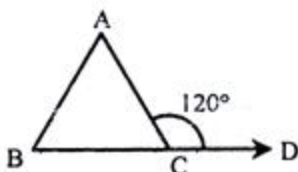
- (a) i & ii                      (b) i & iii  
 (c) ii & iii                      (d) i, ii & iii

14. In figure what is the value of  $\angle A$ ?



- (a)  $30^\circ$                       (b)  $60^\circ$                       (c)  $90^\circ$                       (d)  $180^\circ$

Answer to the question no. (15 and 16) according to the information:



15. Which one is correct?

- (a)  $\angle ACD = \angle ACB + \angle ABC$   
 (b)  $\angle ACD = \angle ABC + \angle BAC$   
 (c)  $\angle ACD = \angle BAC + \angle ACB$   
 (d)  $\angle ACD = \angle ABC$

16.  $\angle ABC + \angle BAC =$  what?

- (a)  $60^\circ$  (b)  $90^\circ$   
 (c)  $120^\circ$  (d)  $180^\circ$

17. In a circle.

- i. All diameters are equal  
 ii. The diameter is the largest chord  
 iii. Degree measurement is  $180^\circ$

Which one is correct?

- (a) i & ii (b) i & iii  
 (c) ii & iii (d) i, ii & iii

18. If  $\cos \theta = \frac{\sqrt{3}}{2}$  then,  $\theta =$  what?

- (a)  $30^\circ$  (b)  $45^\circ$  (c)  $60^\circ$  (d)  $180^\circ$

19. If  $\sin \theta = \frac{1}{2}$  then, which one is the value of  $\tan \theta$ ?

- (a)  $\frac{1}{\sqrt{2}}$  (b)  $\frac{1}{\sqrt{3}}$   
 (c)  $\sqrt{3}$  (d)  $\frac{\sqrt{3}}{2}$

20. What if the value of depression Angle, A length of wall and the length of shadow quality?

- (a)  $30^\circ$  (b)  $45^\circ$  (c)  $60^\circ$  (d)  $90^\circ$

21. What is the elevant angle of the sun on a ground point which is  $\sqrt{3}$  metre far

from the foot of a B metres high tree?

- (a)  $30^\circ$  (b)  $45^\circ$  (c)  $60^\circ$  (d)  $90^\circ$

22. If a, b, c is ordered proportional, which of the following is correct?

- (a)  $a^2 = bc$  (b)  $c^2 = ab$   
 (c)  $b^2 = ac$  (d)  $ab = bc = ca$

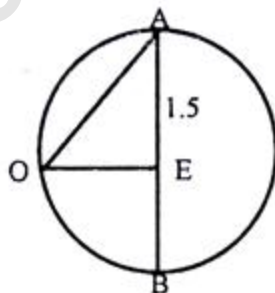
23. The length of a side of square is 80 metres. If the length of each side is increased 10% —

- i. length of every size is 88 m.  
 ii. area will increase 21%  
 iii. length of diagonal will increase  $10\sqrt{2}$  m.

Which one is correct?

- (a) i & ii (b) i & iii  
 (c) ii & iii (d) i, ii & iii

24.



If figure  $AB = 3$  cm.  $OE = 1$  cm.  $AE = \frac{1}{2}$  cm. then  $OA =$  what?

- (a) 1 (b) 1.5 (c) 1.8 (d) 2

25. If there is a unique solution of the system of equation  $a_1x + b_1y = 0$  and  $a_2x + b_2y = 0$ , which relation will be made?

- (a)  $\frac{a_1}{a_2} = \frac{b_1}{b_2}$  (b)  $\frac{a_1}{b_1} = \frac{a_2}{b_2}$   
 (c)  $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$  (d)  $\frac{a_1}{b_1} \neq \frac{a_2}{b_2}$

26. What is the power of any number with out zero?

- (a) 0 (b) 1  
 (c) infinites (d) finite

27. If two straight lines are what will be the number of their solution?

- (a) no solution (b) numerous  
(c) unique (d) 2

28. If the  $n^{\text{th}}$  terms of a series  $(2n + 1)$ , then what is the sum of 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> terms of the series.

- (a) 40 (b) 41 (c) 43 (d) 45

29. Which is the following common difference of series  $\log 3 + \log 9 + \log 27 + \dots$

- (a)  $\log 3$  (b)  $\log 9$   
(c)  $2 \log 3$  (d)  $3 \log 3$

30.  $3 + 9 + 27 + 81 + \dots$

- i. it is a geometric series  
ii. common terms of  $3^n$   
iii. the sum of  $n^{\text{th}}$  terms =  $\frac{a(1-r^n)}{1-r}$

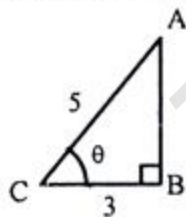
Which one is correct?

- (a) i & ii (b) i & iii  
(c) ii & iii (d) i, ii & iii

31. What is the number of symmetrical lines of a square?

- (a) 1 (b) 2 (c) 3 (d) 4

Answer to the question no (32 -34) according to the information:



32. Which one is the value of AB?

- (a) 3 (b) 4 (c) 5 (d) 8

33.  $\sec^2\theta + \tan^2\theta = ?$

- (a) 1 (b)  $\frac{41}{9}$  (c)  $\frac{9}{41}$  (d) 2

34.  $\sin^2\theta - \cos^2\theta = ?$

- (a)  $\frac{7}{25}$  (b)  $\frac{25}{7}$  (c)  $\frac{16}{25}$  (d)  $\frac{25}{16}$

35. The length of sides of adjacent right angle of a right angled triangle are 10 cm and 3 cm respectively, what is the area?

- (a) 60 (b) 30  
(c) 15 (d) 10

36. What is the value of every vertex of a regular octagon?

- (a)  $135^\circ$  (b)  $120^\circ$   
(c)  $90^\circ$  (d)  $45^\circ$

37. What is the ratio of perimeter of square and circle.

- (a)  $4 : \pi$  (b)  $\pi : 4$   
(c)  $2 : \pi$  (d)  $\pi : 2$

38. What is called the information of any 'matter' related?

- (a) Mensuration (b) Theory of number  
(c) Data (d) Statistics

39. To measure what, cumulative frequency table is needed?

- (a) Arithmetic mean  
(b) Weighted mean  
(c) Median  
(d) Mode

40. The characteristics of ogive line—

- i. it is possible to draw graph by cumulative frequency  
ii. in the graph, higher limit of class interval is set towards x axis and cumulative frequency is set towards y axis  
iii. class mid point is set

Which one is correct?

- (a) i & ii (b) i & iii  
(c) ii & iii (d) i, ii & iii

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