

Algebra

1. ► $A = \{x \in \mathbb{N} : x^2 - 5x + 6 = 0\}$, $B = \{3, 4\}$, $C = \{2, 4\}$.
 - a. Express A in tabular method. 2
 - b. Show that, $P(B \cap C) = P(B) \cap P(C)$. 4
 - c. Prove that, $A \times (B \cup C) = (A \times B) \cup (A \times C)$. 4
2. ► $x^4 - x^2 + 1 = 0$.
 - a. Find the value of $x + \frac{1}{x}$. 2
 - b. Show that, $\frac{x^6 + 1}{x^3} = 0$. 4
 - c. Prove that, $x^5 + \frac{1}{x^5} = -\sqrt{3}$ 4
3. ► $\log 3 + \log 9 + \log 27 + \dots$
 - a. What kind of series it is? 2
 - b. Find the 5th and 10th term of the series. 4
 - c. Determine the sum of first 12 terms. 4

Geometry

4. ► AB and CD be two equal chords of a circle with centre O. OP and OQ are the perpendiculars from O to the chords AB and CD respectively.
 - a. Using the information construct the figure. 2
 - b. Prove that P is the midpoint of AB. 4
 - c. Prove that, $OP = OQ$. 4
5. ► The bisectors of the angles $\angle B$ and $\angle C$ of a triangle ABC intersect at O.
 - a. Use the information to construct the figure with indication. 2
 - b. Prove that, $\angle BOC = 90^\circ + \frac{1}{2}\angle A$. 4
 - c. If the sides AB and AC are produced and the bisector of the exterior angles formed at B and C meet at P. Prove that, $\angle BPC = 90^\circ - \frac{1}{2}\angle A$. 4

6. ► The base $a = 4\text{cm}$, a base adjacent angle $x = 30^\circ$ of a triangle.

- a. Using the information construct the figure. 2
 b. Construct a triangle with description when the sum $S = 6$ cm of the other two sides. 4
 c. Construct a triangle with description when the difference $d = 2.5$ cm of the other two sides of a triangle. 4

Trigonometry and Mensuration

7. ► $p = 1 + \sin A$ and $q = 1 - \sin A$.

- a. Find the value of pq . 2
 b. Show that, $\sqrt{\frac{p}{q}} = \sec A + \tan A$. 4
 c. Prove that, $(\sec A - \tan A)^2 = \frac{p}{q}$ 4

8. ► The area of a rectangular region is 300 square meters. if the length is reduced by 13 metres then it becomes a square region.

- a. Write the law of the perimeter of a rectangular and length of the diagonal. 2
 b. Find the length and breadth of the rectangular region. 4
 c. Outside a square garden, there is a path 1 metre width around it. Find the area of the path. 4

Statistics

9. ► Frequency distribution table is:

Class interval	11-20	21-30	31-40	41-50	51-60	61-70	71-80
Frequency	6	10	12	15	8	5	4

- a. Determine the median class. 2
 b. Determine the mean by shortcut method. 4
 c. Draw the histogram with description. 4

1. a. $\{2, 3\}$

2. a. $\pm\sqrt{3}$

3. a. Parallel series; b. $5\log 3$, $10\log 3$; c. $78\log 3$

7. a. $\cos^2 A$

8. b. Length 25 meter, width 12 meter

c. 52 sq. m.

9. a. $(41 - 50)$; b. 42.17(app)

Multiple Choice Questions

Time — 40 minutes Full marks— 40

Subject Code

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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. How many surfaces are there in a rectangular solid?

- (a) 2 (b) 3
(c) 4 (d) 6

2. If $a^2 + \frac{1}{a^2} = 2$, then $a + \frac{1}{a} = \dots\dots\dots$?

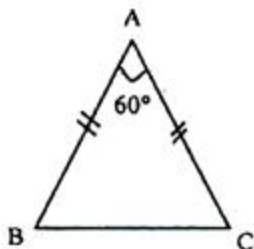
- (a) 0 (b) 1
(c) 2 (d) 4

3. Which is the mode of the numerical data; 8, 9, 7, 15, 10, 15, 11, 8, 10, 9, 8?

- (a) 8 (b) 9
(c) 10 (d) 15

4. The numbers used in data are called?

- (a) Event (b) Informations
(c) Data (d) Variable

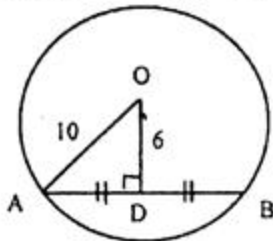


5. From the above figure of ΔABC —

- i. area of $\Delta ABC = \sqrt{3}$ sq. cm
ii. $\angle ABC = 65^\circ$
iii. $AB + BC + Ca = 6$ cm

Which one of the following is correct?

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



6. From the above figure, what is the length of AB?

- (a) 8 (b) 12
(c) 16 (d) 20

7. For how many independent data, it is possible to construct a quadrilateral?

- (a) 4 (b) 5
(c) 6 (d) 7

8. If $f(x) = x^2 + 5x + 6$ and $f(x) = 0$, then what is the value of x?

- (a) -2, -3 (b) 1, 5
(c) 1, 6 (d) 2, 3

9. For $f(x) = 6x^2 - x - 1$;

i. $f\left(\frac{1}{2}\right) = 0$

ii. $f(0) = 1$

iii. $(3x + 1)$ is a factor of $f(x)$

Which one of the following is correct?

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

10. If $P - \frac{1}{P} = 3$, then what is the value of

$p^2 + \frac{1}{p^2}$?

- (a) 5 (b) 7
(c) 11 (d) 13

11. Which is the lowest prime number?

- (a) 0 (b) 1
(c) 2 (d) 3

12. How many proper subsets of A are there, when $A = \{a, b, c\}$?

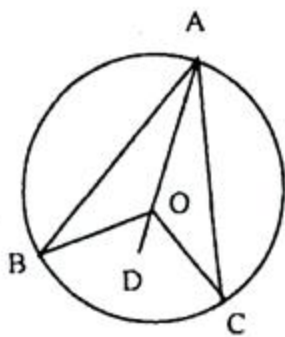
- (a) 3 (b) 6
(c) 7 (d) 8

13. If $f(x) = x^2 + 3x + 2$ then what is the value of $f(-1)$?

- (a) -2 (b) 0
(c) 1 (d) 6

14. If $a + b = 1$ $ab = 4$, then what is the value of $(a - b)^2$?

- (a) -15 (b) -7
(c) 9 (d) 17



15. From the above figure—

- $\angle BOD = 2 \angle BAD$
- $\angle COD = \angle OAC + \angle OCA$
- $\angle BAC = \frac{1}{2} \angle BOC$

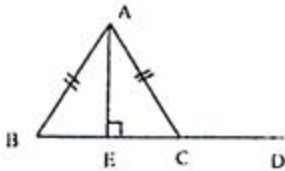
Which one of the following is correct?

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

16. The present age of father and his son is 40 years and 10 years respectively. After 5 years what will be ratio of their ages?

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

Observe the following figure and answer the question No. 17, 18 and 19):



17. What will be the area of a square whose perimeter is equal to the perimeter of $\triangle ABC$?

- (a) 4 sq. cm (b) 3 sq. cm
(c) 2.50 sq. cm (d) 2.25 sq. cm

18. What is the length of AE?

- (a) $\sqrt{2}$ cm (b) $\sqrt{3}$ cm
(c) $\sqrt{5}$ (d) $2\sqrt{3}$ cm

19. In the given (above) figure—

- $\angle BAC + \angle ABC = \angle ACD$
- $\angle ABC = \angle ACB = 60^\circ$
- $\angle ACD + \angle ACB = 180^\circ$

Which one of the following is correct?

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

20. If $\frac{x}{-14} = \frac{y}{-28} = \frac{1}{-14}$, then $(x, y) =$

What?

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

21. What is the all rational irrational number?

- (a) Natural number
(b) Prime number
(c) Integer (d) Real number

22. In the case of exponent—

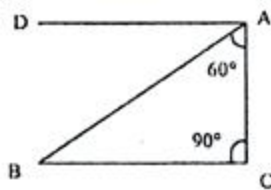
- $(ab)^m = a^m \cdot b^m$
- $a^0 = 1, (a \neq 0)$
- $\frac{a^m}{a^n} = a^m + a^n$

Which one of the following is correct?

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

23. If the number of data is n and n is odd, then the median will be the value of—

- (a) $\frac{n}{2}$ th term (b) $\frac{n-1}{2}$ th term
(c) $\frac{n+1}{2}$ th term (d) $\frac{n+2}{2}$ th term

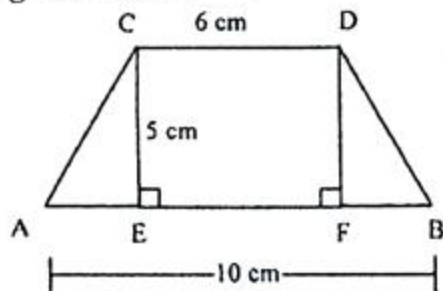


According to the figure answer the question No. 24.

24. What is the measurement of the angle of depression of the point B at the point A?

- (a) 90° (b) 60°
(c) 45° (d) 30°

Answer the question No. 25 and 26 from the figure given below :



25. What is the area of the region ABCD?
 (a) 30 sq. cm (b) 40 sq. cm
 (c) 50 sq. cm (d) 60 sq. cm
26. What is the perimeter of the region CDEF?
 (a) 10 cm (b) 11 cm
 (c) 12 cm (d) 22 cm
27. If $x - 3 = \frac{x-3}{x}$, then what is the value of x?
 (a) 1, 3 (b) 1
 (c) 3 (d) 2, 3
28. If the digit of tens place is twice the digit of unit place of a two digit number and if the digit of unit place is x, then what is the number?
 (a) 21x (b) 12x
 (c) 3x (d) 2x
29. In $\triangle ABC$, $\angle B = 90^\circ$, $AB = 3\text{cm}$, $BC = 4\text{cm}$. What is the value of $\sin C$?
 (a) $\frac{5}{3}$ (b) $\frac{4}{50}$
 (c) $\frac{3}{4}$ (d) $\frac{3}{5}$
30. If $A = 30^\circ$, then what is the value of $\tan A \cdot \tan 2A$?
 (a) 0 (b) $\frac{1}{3}$
 (c) 1 (d) 3
31. If the radius of a circle is 'r' then what is its circumference?
 (a) πr (b) $2\pi r$
 (c) πr^2 (d) $2\pi r^2$
32. In which quadrant, the point (3, -5) is situated?
 (a) 1st Quadrant (b) 2nd quadrant
 (c) 3rd Quadrant (d) 4th Quadrant
- Observe the series : 2 + 5 + 8 + 11 and answer the question No. 33, 34 and 35 :
33. What is the common difference of the series?
 (a) -3 (b) 3
 (c) 5 (d) 7
34. What is the value of the 10th of the series?
 (a) 29 (b) 31
 (c) 35 (d) 37
35. What is the sum of the first eight terms of the series?
 (a) 200 (b) 124
 (c) 100 (d) 92
36. In $\triangle ABC$, if $BC \parallel DE$, $AE = 4$ unit, $CE = 2$ unit and $BC = 7$ unit, then what is the value of DE ?
 (a) 3.43 (Approx) (b) 3.50
 (c) 4.67 (Approx) (d) 5.00
37. According to the aproperties of ratio and proportion—
 i. If $a : b = b : a$ then $a = b$
 ii. If $a : b = c : d$ then $ac = bd$
 iii. If $a : b = 5 : 3$ then $a : 5 = b : 3$
 Which one of the following is correct?
 (a) i & ii (b) i & iii
 (c) ii & iii (d) i, ii & iii
38. How many number of lines of symmetry are there in an equilateral triangle?
 (a) 1 (b) 2
 (c) 3 (d) 4
39. In $\triangle PQR$, $\angle Q = 90^\circ$, $PQ = 5$ cm, $QR = 12$ cm, then what is the value of PR ?
 (a) 7 cm (b) 13 cm
 (c) 17 cm (d) 25 cm
40. In an isosceles triangle, if the length of the base is x and length of each of the equal side is y then what is the area of the triangle?
 (a) $\frac{x}{4}\sqrt{4y^2 - x^2}$ (b) $\frac{4}{x}\sqrt{4y^2 - x^2}$
 (c) $\frac{x}{4}\sqrt{4x^2 - y^2}$ (d) $\frac{x}{4}\sqrt{x^2 - 4y^2}$

Ans.

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