

Namsata Goll
X-E

ST. GEORGE'S SCHOOL, ALAKNANDA
MID-TERM EXAMINATION (SA-1) 2015-16
SUBJECT: MATHEMATICS
CLASS: X

18.

DATE: 21.9.15

MM: 90

MAX. TIME: 3 HOURS

NO. OF PAGES: 3

General Instructions:

- All questions are compulsory.
- The question paper consists of 31 questions divided into sections A, B, C and D. Section A comprises of 4 questions of 1 mark each, section B comprises of 6 questions of 2 marks each, Section C comprises of 10 questions of 3 marks each and section D comprises of 11 questions of 4 marks each.
- There is no overall choice.
- Use of calculators is not permitted.

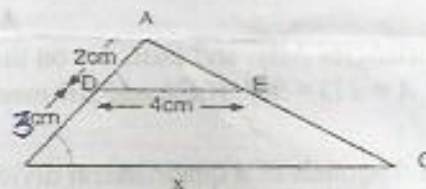
SECTION- A

1. Given that $\tan \theta = \frac{1}{\sqrt{3}}$, find the value of $\frac{\operatorname{cosec}^2 \theta - \sec^2 \theta}{\operatorname{cosec}^2 \theta + \sec^2 \theta}$

2. In fig. 1, if $DE \parallel BC$, then find x.

3. Find the quadratic equation whose zeroes are 3 and -1.

4. For a given data with 70 observations, the 'less than ogive' and 'more than ogive' intersect at (20.5, 35). Find the median of the data.

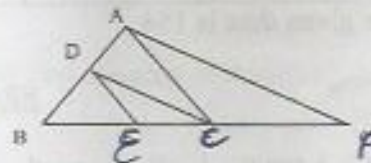


SECTION- B

5. If α, β are zeros of the polynomial $3x^2 + 5x + 2$, find the value of $\frac{1}{\alpha} + \frac{1}{\beta}$

6. Is there any natural number n for which 4^n ends with digit 0? Give reason in support of your answer.

7. In Fig. 2, $DE \parallel AC$ and $\frac{BE}{EC} = \frac{BC}{CP}$. Prove that $DC \parallel AP$.



8. After how many decimal places will the decimal expansion of the number $\frac{53}{2^3 \cdot 5^3}$ terminate?

9. Find the mean of first five prime numbers.
10. For what value of p will the following system of equations have no solution?

$$(2p - 1)x + (p - 1)y = 2p + 1; \quad y + 3x - 1 = 0$$

SECTION-C

11. Prove that $\sqrt{3}$ is irrational.
12. Find the zeros of the quadratic polynomial $5x^2 - 4 - 8x$ and verify the relationship between the zeros and the coefficients of the polynomial.
13. Taxi charges in a city consist of fixed charges and the remaining depends upon the distance travelled in kilometers. If a person travels 70 km, he pays Rs. 500 and for travelling 100 km, he pays Rs. 680. Express the above statements with the help of linear equations and hence find the fixed charges and the rate per kilometer. A man who travelled 80 km pays Rs. 600. The taxi driver returns him the excess money saying that was not the correct amount. Find the amount returned by the taxi driver.
14. Find the value of $\sin 45^\circ$ geometrically.
15. Evaluate: $\frac{\sec 29^\circ + 2\cot 8^\circ \cot 17^\circ \cot 45^\circ \cot 73^\circ \cot 82^\circ - 3(\sin^2 38^\circ + \sin^2 52^\circ)}{\operatorname{cosec} 61^\circ}$
16. Prove that: $(1 + \cot \theta - \operatorname{cosec} \theta)(1 + \tan \theta + \sec \theta) = 2$.
17. Two triangles ABC and DBC are on the same base BC and on the same side of BC in which $\angle A = \angle D = 90^\circ$. If CA and BD meet each other at E, show that $AE \cdot EC = BE \cdot ED$.
18. If the diagonals of a quadrilateral divide each other proportionally, prove that it is a trapezium.
19. The arithmetic mean of the following frequency distribution is 25. Determine the value of p .

Class interval	0-10	10-20	20-30	30-40	40-50
Frequency	5	18	15	p	6

20. Find the missing frequency (f) for the following distribution,

Class interval	120-130	130-140	140-150	150-160	160-170	170-180
Frequency	2	8	12	f	8	7

, if the mode of the given data is 154.

SECTION-D

21. Prove that: $\frac{\sec \theta + \tan \theta - 1}{\tan \theta - \sec \theta + 1} = \frac{\cos \theta}{1 - \sin \theta}$
22. If $\sec \theta + \tan \theta = p$, prove that $\sin \theta = \frac{p^2 - 1}{p^2 + 1}$

23. Evaluate: $\frac{\sec\theta \operatorname{cosec}(90^\circ - \theta) - \tan\theta \cot(90^\circ - \theta) + \sin^2 55^\circ + \sin^2 35^\circ}{\tan 10^\circ \tan 20^\circ \tan 60^\circ \tan 70^\circ \tan 80^\circ}$

24. The following table gives the production yield per hectare of wheat of 100 farms of a village:

Production yield(kg/hectare)	50-55	55-60	60-65	65-70	70-75	75-80
Number of farms	2	8	12	24	38	16

Change the above distribution to more than type distribution and draw its ogive.

25. The following table shows the data of the amount donated by 100 people in a blind school.

Amount donated (in Rs.)	Number of persons
0-100	2 ✓
100-200	5 ✓
200-300	x
300-400	12 ✓
400-500	17 ✓
500-600	20
600-700	y
700-800	9
800-900	7
900-1000	4

Handwritten calculations for question 25:

$$\begin{array}{r} 29 \\ 7 \\ 19 \\ 17 \\ \hline 36 \\ 19 \\ 11 \\ \hline 65 \\ 11 \\ \hline 76 \end{array}$$

$$\begin{array}{r} 19 \\ 17 \\ \hline 36 \\ 20 \\ \hline 56 \\ 19 \\ \hline 75 \end{array}$$

If the median of the above data is 525, find the value of x and y. What values are depicted here?

26. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, prove that the other two sides are divided in the same ratio.

27. If the polynomial $f(x) = x^4 - 6x^3 + 16x^2 - 25x + 10$ is divided by another polynomial $x^2 - 2x + k$, the remainder comes out to be $x + a$. Find k and a.

28. Find other zeros of polynomial $p(x) = 2x^4 + 7x^3 - 19x^2 - 14x + 30$ if two of its zeros are $\sqrt{2}$ and $-\sqrt{2}$.

29. Solve $2x + y = 6$ and $2x - y + 2 = 0$ graphically. Also find the area of the triangular region bounded by these lines and the x-axis.

30. Show that any positive odd integer is of the form $4q + 1$ or $4q + 3$ where q is a positive integer.

31. In an equilateral triangle ABC, D is a point on side BC such that $BD = \frac{1}{3} BC$.
Prove that $9 AD^2 = 7 AB^2$