

Vinayak Kabra.

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SET-A

No. of Printed Pages : 5

No. of Printed Questions : 30

HALF YEARLY EXAMINATION, 2017-18

MATHEMATICS

Time : 3 Hrs.

Grade : X

M.M. : 80

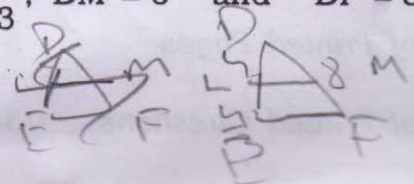
General Instructions :

- (1) All questions are compulsory.
- (2) The question paper consists of 30 questions divided into 4 Sections : A, B, C and D.
- (3) Section—A comprises of 6 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 8 questions of 4 marks each.
- (4) Use of calculators is not permitted.

SECTION—(A)

1. After how many places of decimal will the decimal expansion of $\frac{23457}{2^3 5^4}$ terminate ? 4
2. If α, β are the zeroes of $f(x) = px^2 - 2x + 3p$ and $\alpha + \beta = \alpha\beta$ then find the value of p .
3. For what values of k will the consecutive terms $2k + 1, 3k + 3$ and $5k - 1$ form an A.P. ? 9

4. L and M are respectively the points on the sides DE and DF of a $\triangle DEF$ such that $DL = 4$, $LE = \frac{4}{3}$, $DM = 6$ and $DF = 8$. Is $LM \parallel EF$? Give reason.
5. If $\sin \theta = \frac{1}{3}$, find $(9 \cot^2 \theta + 9)$.
6. A number is chosen from the numbers 1 to 50. What is the probability that the selected number is a multiple of 5?



SECTION—(B)

7. Find the HCF of 867 and 255, using Euclid's division algorithm.
8. Divide $3x^2 - x^3 - 3x + 5$ by $x - 1 - x^2$ and find its quotient and remainder.
9. Find whether the following pair of linear equations is consistent or inconsistent :

$$\frac{3}{2}x + \frac{5}{3}y + 7; \quad 9x - 10y = 14$$

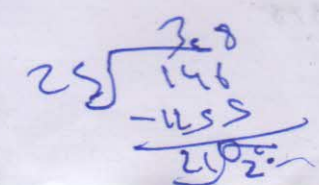
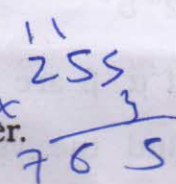
$$\frac{3}{2}x + \frac{5}{3}y = 7$$

$$9x - 10y = 14$$

10. The first and the last terms of an AP are 8 and 65 respectively. If the sum of all its terms is 730, find its common difference.
11. Hypotenuse of a right triangle is 25 cm and out of the remaining two sides, one is longer than the other by 5 cm. Find the lengths of the other two sides.
12. If $\operatorname{cosec} \theta = 3x$ and $\cot \theta = \frac{3}{x}$, then find the value of $(x^2 - \frac{1}{x})$.

SECTION—(C)

13. Prove that $\sqrt{2} + \frac{3}{\sqrt{2}}$ is an irrational number.
14. Find the zeroes of $a(x^2 + 1) - x(a^2 + 1)$ and verify the relationship between the zeroes (and the coefficients of the polynomial).



15. Solve the following pair of linear equations :

$$\frac{1}{3x+y} + \frac{1}{3x-y} = \frac{3}{4}; \quad \frac{1}{2(3x+y)} - \frac{1}{2(3x-y)} = \frac{-1}{8}$$

16. Jaspal Singh repays his total loan of ₹ 118000 by paying every month starting with the first instalment of ₹ 1000. If he increases the instalment by ₹ 100 every month, what amount will be paid by him in the 30th instalment? What amount of loan does he still have to pay, after the 30th instalment? What values are depicted?

17. Draw the graph of $x = 3$, $x = 5$ and $2x - y - 4 = 0$. Also find the area of the quadrilateral formed by the lines with the y -axis.

18. The sides AB , BC and median AD of a ΔABC are respectively proportional to the sides PQ , QR and the median PM of ΔPQR . Show that $\Delta ABC \sim \Delta PQR$.

19. Evaluate :

$$\frac{3 \sin 55^\circ}{7 \cos 35^\circ} - \frac{4 \cos 70^\circ \operatorname{cosec} 20^\circ}{7 (\tan 5^\circ \tan 25^\circ \tan 45^\circ \tan 65^\circ \tan 85^\circ)}$$



20. Two ships are approaching a light house from opposite directions. The angles of depression of the two ships from the top of the light house are 30° and 45° . If the distance between the two ships is 100m, find the height of the light house. (Use $\sqrt{3} = 1.732$)

21. A bag contains white, black and red balls only. A ball is drawn at random from the bag. The probability of getting a white ball is $\frac{3}{10}$ and that of a black ball is $\frac{2}{5}$. Find the probability of getting a red ball. If the bag contains 20 black balls, find the total number of balls in the bag.

22. The following table shows the ages of the patients admitted in a hospital during a month.

Age (In Years)	5-15	15-25	25-35	35-45	45-55	55-65
Number of Patients	6	11	21	23	14	5

Find the mode and the mean of the data given above.

SECTION—(D)

23. Use Euclid's division lemma to show that the cube of any positive integer is of the form $9m$, $9m+1$ or $9m+8$. *27a^3 + 27a^2 + 9a + 8*
24. Given that the zeroes of the cubic polynomial $x^3 - 6x^2 + 3x + 10$ are of the form $a-b$, a , $a+b$ for some real numbers a and b , find the values of a and b as well as the zeroes of the given polynomial. *27a^3*
25. Jamila sold a table and a chair for ₹ 1050, thereby making a profit of 10% on the table and 25% on the chair. If she had taken a profit of 25% on the table and 10% on the chair, she would have got ₹ 1065. Find the cost price of each.
26. Prove that ratio of areas of two similar triangles is equal to the ratio of the squares of their corresponding sides.
Using the above result, prove the following: Diagonals of a trapezium $ABCD$ with $AB \parallel DC$ intersect each other at the point O . If $AB = 2CD$, find the ratio of the areas of triangles AOB and COD .
27. In an equilateral ΔABC , D is a point on side BC such that $BD = \frac{1}{3} BC$. Prove that $9AD^2 = 7AB^2$.

28. Prove that :

$$\frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \sec \theta \operatorname{cosec} \theta$$

$$\frac{1}{\cos} \times \frac{1}{\sin}$$

More
50
55
60
65

$$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

29. A window of a house is h metres above the ground. From the window, the angles of elevation and depression of the top and the bottom of another house situated on the opposite side of the lane are found to be α and β respectively. Prove that the height of the other house is $h(1 + \tan \alpha \cot \beta)$ metres.

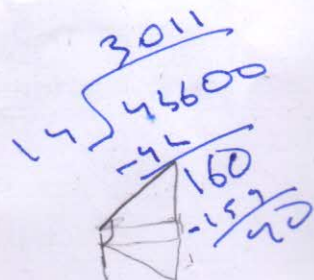
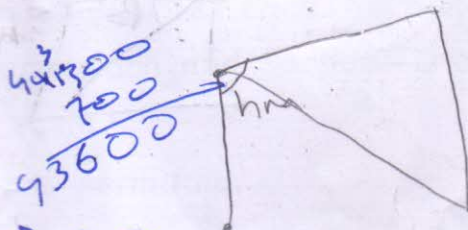
30. The following table gives production yield per hectare of wheat of 100 farms of a village :

Production Yield (in kg/hect)	50-55	55-60	60-65	65-70	70-75	75-80
No. of farms	2	8	12	24	38	16

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

$a = b + c$
 $\sin a(n-1) \theta$

832
 88600
 70
 $h(1 + \tan \alpha \cot \beta) m$



46
 2200
 2200
 105
 00



$9 - 75 + 9 + 10$
 $- 36$
 $27 + 10$

1065
 42600

$\frac{1}{1} = \frac{1}{1}$
 $\frac{1}{1} = \frac{1}{1}$
 $\frac{1}{1} = \frac{1}{1}$

$7 \sqrt{27500}$

$125 - 125 + 75$
 $0 + 8 = 8$