

D.A.V. PUBLIC SCHOOLS

BIHAR ZONE

Mid Term Examination: 2019-2020

Class: X

Subject - MATHEMATICS

209

01

Time- 3 Hrs

F.M.- 80

General Instructions: -

1. All questions are compulsory.
2. This question paper consists of 40 question divided into four sections A,B,C, and D.
3. Section -A contains 20 questions of 1 Marks each. Section -B contains 6 questions of 2 Marks each. Section -C contains 8 questions of 3 Marks each. Section -D contains 6 questions of 4 Marks each.
4. There is no overall choice. Some Internal choice has been provided in questions of Section-B,C and D.
5. Use of Calculator is not permitted.

[Section A]

[Question Numbers 1 to 20 are of objective type and carry 1 Marks each]

Choose and write the correct option in each of the following questions: -

1. If n is a natural number \sqrt{n} is
 - (a) always a natural number
 - (c) always a rational number
 - (d) sometimes a natural number and sometimes an irrational number.
2. The product of Zeroes of $x^3 - 4x^2 + x - 6$ is
 - (a) 6
 - (b) -6
 - (c) 5
 - (d) 11
3. An irrational number between 2 and 2.5 is
 - (a) $\sqrt{11}$
 - (b) $\sqrt{5}$
 - (c) $\sqrt{22.5}$
 - (d) $\sqrt{12.5}$

P.T.O.

4. if $3^{x+y}=81$ and $(81)^{x-y}=3$, then the value of x and y
- (a) $17/8, 9/8$ (b) $17/8, 11/8$ (c) $17/8, 15/8$ (d) $11/8, 15/8$
5. Solution of $x+y=14$ and $x-y=4$ is
- (a) $x=5, y=9$ (b) $x=9, y=5$ (c) $x=-9, y=5$ (d) $x=9, y=-5$
6. For some integers q, every even integer is of the form: -
- a) q b) q+1 c) ~~2q~~ d) None of these
7. The pair of linear equation $3x+2y=5$, $6x+4y=10$ have
- a) one solution b) two solution c) no solution d) many solution
8. Sides of two similar triangle are in the ratio 3:7. Area of these triangles are in the ratio
- a) 9:35 b) 9:49 c) 49:9 d) 9:42
9. If $\tan x=3\cot x$, then x is equal to
- a) 15° b) 30° c) 45° d) 60°
10. if $\sin \alpha = \frac{1}{2}$ and $\cos \beta = \frac{1}{2}$ then $\alpha + \beta$ is
- a) 90° b) 0° c) 45° d) 60°
11. Find the product of $\tan 1^\circ \cdot \tan 2^\circ \cdot \tan 3^\circ \dots \dots \dots \tan 89^\circ$
12. Write a number which when divide by 61 gives 27 as quotient and 32 as remainder.
13. Is the number $(3-\sqrt{7})(3+\sqrt{7})$ rational or irrational.
14. The length of the diagonals of a rhombus are 30 cm. and 40 cm. Find the side of the rhombus.
15. If ΔABC and ΔDEF are two triangles such that $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF} = \frac{4}{7}$ then the value of $\frac{\text{Area}(\Delta ABC)}{\text{Area}(\Delta DEF)} = \dots$
16. The graph of equations $x = a$ and $y = b$ represents lines which are (Parallel /intersecting).
17. Write the fundamental theorem of Arithmetic.
18. Write SAS similarity criterion.
19. Find two numbers whose sum and difference are 10 & 2 respectively?
20. The diagonal of a rectangle produces by itself the same area as produced by its both sides (i.e. length and breadth)'. This statement was given by which Mathematician.

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[Section : B]

21. If an equilateral triangle is inscribed in a circle of radius 6 cm then find its side.
22. If the system of equations $4x+y=3$ and $(2k-1)x+(k-1)y=2k+1$ is inconsistent, then find k.

Or,

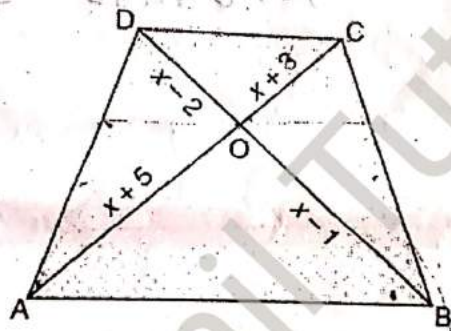
Solve for x and y, given $x \neq 0, y \neq 0$

$$\frac{2}{x} + \frac{2}{3y} = \frac{1}{6}; \frac{3}{x} + \frac{2}{y} = 0$$

hence, find 'a' for which $y=ax-4$

23. PQR is an isosceles triangle with $QP=QR$. If $PR^2=2QR^2$, Prove that ΔPQR is right angled.

Or,

in the given figure if $AB \parallel DC$, find the value of x

24. Find the H.C.F. of 1260 and 7344 using Euclid's algorithm?
25. Find the zeros of the polynomial $p(x) = 6x^2-3-7x$ and verify the relationship between zeros and coefficient.
26. A class teacher has the following absentee record of 40 students of a class for the whole term, find the mean number of days a student was absent.

Number of days	0-6	6-10	10-14	14-20	20-28	28-38	38-40
Number of Students	11	10	7	4	4	3	1

P.T.O.

OR

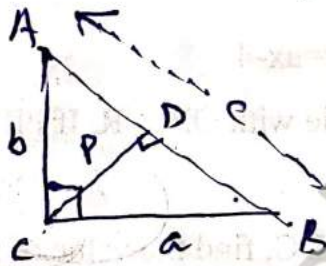
Show that $(x^2+1)^2-x^2=0$ has no real roots.

Section - C

[Question number 27 to 37 carry 3 marks each]

27. $\triangle ABC$ is a right triangle in which $\angle C = 90^\circ$ and $CD \perp AB$ if $BC=a$, $CA=b$, $AB=c$ and $CD=p$, then prove that

(i) $cp=ab$ (ii) $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$



$$\triangle ABC \sim \triangle BCD$$

$$\Rightarrow \frac{c}{a} = \frac{b}{p}$$

$$\Rightarrow cp^2 = ab^2$$

$$\Rightarrow c^2 p^2 = a^2 b^2$$

$$\text{Put } c^2 = a^2 + b^2 \Rightarrow (a^2 + b^2)p^2 = a^2 b^2$$

$$\frac{a^2 + b^2}{a^2 b^2} = \frac{1}{p^2}$$

$$\frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{p^2}$$

28. Solve for x and y

$$\frac{1}{2(2x+3y)} + \frac{12}{7(3x-2y)} = \frac{1}{2}$$

$$\frac{7}{2x+3y} + \frac{4}{3x-2y} = 2$$

Where $2x+3y \neq 0$ and $3x-2y \neq 0$

29. If the median of the distribution given below is 28.5, find x and y

Class interval	Frequency
0-10	5
10-20	X
20-30	20
30-40	15
40-50	Y
50-60	5
Total	60

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Class-X (Mathematics)

OR

Done

Find two consecutive odd natural numbers, sum of whose square is 130.

30. In ΔPQR , right angled at Q, $PR+QR=25$ cm and $PQ = 5$ cm Determine.

sineP, cosP and tan P.

Done

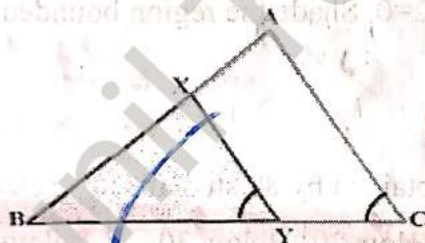
Or,

Evaluate: -

$$\frac{2\cos^2 90^\circ + 4\cos^2 45^\circ + \tan^2 60^\circ + 3\operatorname{cosec}^2 60^\circ + 1}{3\sec^2 60^\circ - \frac{7}{2}\sec^2 45^\circ + 2\operatorname{cosec} 30^\circ} - 1$$

31. In the adjoining figure the line segment xy is parallel to side AC of ΔABC and it divides the triangle into two parts of equal, areas. Find the ratio $\frac{AX}{AB}$

Done



32. A fraction becomes $\frac{1}{3}$ when 1 is subtracted from the numerator and it becomes $\frac{1}{4}$ when 8 is added to its denominator. Find the fraction.

Done

Or,

The sum of digits of a two digit number is 11. The number obtained by interchanging the digits of the given number exceeds that number by 63. Find the number.

33. Prove that $5-2\sqrt{3}$ is irrational. Done

34. On dividing x^3-3x^2+x+2 by a polynomial $g(x)$, the quotient and remainder were $(x-2)$ and $-2x+4$, respectively. Find $g(x)$.

Done

P.T.O.

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Class-X (Mathematics)

SECTION - D

[Question numbers 35 to 40 carry 4 marks each]

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

Production yield in kg/ha	50-55	55-60	60-65	65-70	70-75	75-80
Numbers of farmer	2	8	12	24	38	16

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

OR

Solve for x

$$\frac{1}{x+1} + \frac{2}{x+2} = \frac{4}{x+4} \quad x \neq -1, -2, -4.$$

36. Draw the graph of $2x+y=6$ and $2x-y+2=0$. Shade the region bounded by these lines and the x-axis.

Also find the area of this region.

37. The following table gives the marks obtained by 80 students in a selection

Marks	Below 10	Below 20	Below 30	Below 40	Below 50	Below 60
Numbers of Students	3	12	27	57	75	80

Find the median of marks.

OR

Find the root of the equation $5x^2 - 6x - 2 = 0$ by the method of completing the square.

38. Prove that: -

$$\frac{\cos A}{1 - \tan A} + \frac{\sin A}{1 - \cot A} \equiv \cos A + \sin A$$

Or,

P.T.O.

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Prove that: -

$$(\sin A + \operatorname{cosec} A)^2 + (\cos A + \operatorname{sec} A)^2 = 7 + \tan^2 A + \cot^2 A$$

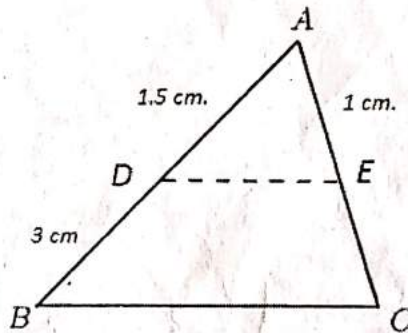
39. Prove that the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides. Let $\triangle ABC \sim \triangle DEF$ and their areas be respectively 64 cm^2 and 121 cm^2 . If

Done
EF = 15.4 cm find BC.

Or,

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

In the figure $DE \parallel BC$, Find EC



40. D and E are points on sides CA and CB respectively of a triangle ABC right angled at C.

Prove that $AE^2 + BD^2 = AB^2 + DE^2$

Handwritten work for question 40. On the left, a coordinate system is drawn with a vertical y-axis and a horizontal x-axis. The y-axis has tick marks at 1, 2, 3, 4 and -1, -2. The x-axis has tick marks at -3, -2, -1, 1, 2, 3. To the right of the coordinate system, there are several handwritten annotations: a circled '3', a circled '6' with '*****' next to it, a circled '25', a circled '65', a circled '95%' with a checkmark above it, and a circled '5%' at the bottom right.