

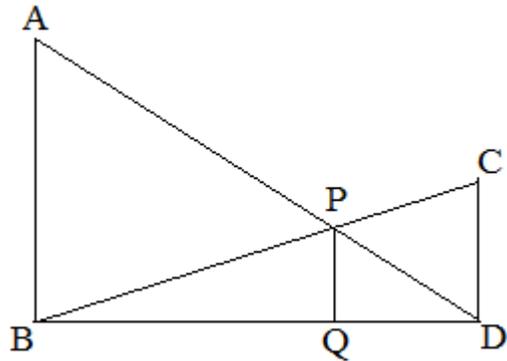
CBSE|CLASS X|MATHS WORKSHEET|HOTS AND VALUE BASED

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- 1) Find the largest positive integer that will divide 398, 436 and 542 leaving remainders 7, 11 and 15 respectively.
- 2) If α , β and γ be the zeroes of polynomial $6x^3 + 3x^2 - 5x + 1$, then find the value of $\alpha^{-1} + \beta^{-1} + \gamma^{-1}$
- 3) Given that the zeroes of the polynomial $x^3 - 6x^2 + 3x + 10$ are of the form a , $a + b$, $a + 2b$ for some real numbers a and b , find the values of a and b as well as the zeroes of the given polynomial.
- 4) Jamila sold a table and a chair for Rs.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 Rs.1065. Find the cost price of each.
- 5) The sum of a two digit number and the number formed by interchanging its digits is 110. If 10 is subtracted from the first number, the new number is 4 more than 5 times the sum of the digits in the first number. Find the first number.
- 6) 8 men and 12 boys can finish a piece of work in 10 days while 6 men and 8 boys can finish it in 14 days. Find the time taken by one man alone and that by one boy alone to finish the work.
- 7) A boat covers 25 km upstream and 44 km downstream in 9 hours. Also it covers 15 km upstream and 22 km downstream in 5 hours. Find the speed of the boat in still water and that of the stream.
- 8) Students of a class are made to stand in rows. If one student is extra in a row, there would be 2 rows less. If one student is less in a row, there would be 3 rows more. Find the number of students in the class.
- 9) The ages of two friends Ani and Biju differ by 3 years. Ani's father Dharam is twice as old as Ani and Biju is twice as old as his sister Cathy. The ages of Cathy and Dharam differ by 30 years. Find the ages of Ani and Biju.
- 10) A train covered a certain distance at a uniform speed. If the train would have been 10 km/h faster, it would have taken 2 hours less than the scheduled time. And, if the train were slower by 10 km/h it would have taken 3 hours more than the scheduled time. Find the distance covered by the train.

- 11) In the adjoining figure, $AB \parallel PQ \parallel CD$, $AB = x$ units, $CD = y$ units and $PQ = z$ units.

Prove that $\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$.



- 12) Prove that the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding (i) medians (ii) altitudes (iii) angle bisectors.
- 13) Two poles of height ‘a’ metres and ‘b’ metres are ‘p’ metres apart. Prove that the height of the point of intersection of the lines joining the top of each pole to the foot of the opposite pole is given by $\frac{ab}{a+b}$ metres.
- 14) ABC is a right triangle right angled at C. Let $BC = a$, $CA = b$, $AB = c$ and let ‘p’ be the length of perpendicular from C on AB. Prove that
- (i) $cp = ab$ (ii) $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$
- 15) In an equilateral triangle ABC, D is a point on the side BC such that $BD = \frac{1}{4} BC$. Prove that $16AD^2 = 13AB^2$.
- 16) ABC is a right triangle right angled at B. AD and CE are the two medians drawn from A and C respectively. If $AC = 5$ cm and $AD = \frac{3\sqrt{5}}{2}$, find the length of CE.
- 17) Prove that in any triangle, the sum of the squares of any two sides is equal to twice the square of half of the third side together with twice the square of the median which bisects the third side.
- 18) Prove that three times the sum of the squares of the sides of a triangle is equal to four times the sum of the squares of the medians of the triangle.

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- 19) If two sides and a median bisecting one of these sides of a triangle are respectively proportional to the two sides and the corresponding median of another triangle, then the triangles are similar.
- 20) If two sides and a median bisecting the third side of a triangle are respectively proportional to the corresponding sides and the median of another triangle, then the triangles are similar.
- 21) Through the mid-point M of the side CD of a parallelogram ABCD, the line BM is drawn intersecting AC in L and AD produced in E. Prove that $EL = 2BL$.
- 22) Prove that $\frac{1}{\operatorname{cosec}A + \cot A} - \frac{1}{\sin A} = \frac{1}{\sin A} - \frac{1}{\operatorname{cosec}A - \cot A}$.
- 23) If $\tan \theta + \sin \theta = m$ and $\tan \theta - \sin \theta = n$, show that $(m^2 - n^2) = 4\sqrt{mn}$.
- 24) Prove that $\sqrt{\frac{\sec \theta - 1}{\sec \theta + 1}} + \sqrt{\frac{\sec \theta + 1}{\sec \theta - 1}} = 2 \operatorname{cosec} \theta$.
- 25) Prove that $\frac{1}{\cos A + \sin A - 1} + \frac{1}{\cos A + \sin A + 1} = \operatorname{cosec} A + \sec A$.
- 26) If $A + B = 90^\circ$, prove that $\sqrt{\frac{\tan A \tan B + \tan A \cot B}{\sin A \sec B} - \frac{\sin^2 B}{\cos^2 A}} = \tan A$.
- 27) Prove that $2(\sin^6 \theta + \cos^6 \theta) - 3(\sin^4 \theta + \cos^4 \theta) + 1 = 0$.
- 28) If $\cot A + \tan A = x$ and $\sec A - \cos A = y$, prove that $(x^2 y)^{\frac{2}{3}} - (xy^2)^{\frac{2}{3}} = 1$
- 29) If $\sin \theta + \sin^2 \theta = 1$, find the value of $\cos^{12} \theta + 3\cos^{10} \theta + 3\cos^8 \theta + \cos^6 \theta + 2\cos^4 \theta + 2\cos^2 \theta - 2$.
- 30) The following distribution gives the daily income of 50 workers of a factory:

Daily income (in Rs)	100 – 120	120 – 140	140 – 160	160 – 180	180 – 200
No of workers	12	14	8	6	10

Draw less than ogive and more than ogive and hence find the median.

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- 31) Find the mean children per family from the data given below:

No of children	0	1	2	3	4	5
No of family	5	11	25	12	5	2

Which value is discussed here?

- 32) Some people of a society decorated their area with flags and tricolor ribbons on Republic Day. The following data shows the number of persons in different age group who participated in the decoration

Age in years	5 – 15	15 – 25	25 – 35	35 – 45	45 – 55	55 – 65
No of persons	6	11	21	23	14	5

Find the mode of the above data. What values do these persons possess?

- 33) The fraction of a people in a society using CNG in their vehicles becomes $\frac{9}{11}$, if 2 is added to both its numerator and denominator. If 3 is added to both its numerator and denominator, it becomes $\frac{5}{6}$. Find the fraction. What value is discussed here?

- 34) In a seminar on the topic “Liberty and Equality” conducted during the Social Science Exhibition by KVS, the number of students participated in Hindi, English and Sanskrit are 84, 108 and 60 respectively. Find the minimum number of rooms required if in each room the same number of participants are to be seated and all of them being from the same language.

Which values are discussed in the above problem?

- 35) There is a circular path around a sports field. Ram takes 12 minutes to drive one round of the field while Ravi takes 10 minutes for the same. Suppose they both start from the same point and at the same time and go in the same direction. After how many minutes will they meet again at the starting point? What is the value discussed in this problem?