MATHS WORKSHEET

Class X

Chapter - 1, 2, 3, 6, 8, 14

Q1 → (i) Show that any positive odd integer is of the form $8q+1$, or $8q+3$ or $8q+5$ or $8q+7$, where q is some integer.

(ii) Show that the square of any positive odd integer is of the form $8m+1$ for some integer m.

Q2 → Find the greatest integer which on dividing 398, 436 and 542 leaves the remainders 7, 11 and 15 respectively.

Q3 → Using Fundamental Theorem of Arithmetic, find the HCF of 26, 51 and 91.

Q4 → The HCF and LCM of two numbers are 9 and 360 respectively. If one number is 45, write the other number

Q5 → Prove that $3+5\sqrt{2}$ is irrational.

Q6 → Check whether $\frac{51}{1500}$ has a terminating decimal expansion or a non-terminating repeating decimal expansion.

Q7 → The decimal expansion of rational number $\frac{43}{2^4 \cdot 5^3}$, will terminate after how many places of decimals?

Q8 → Write the polynomial, the product and sum of whose zeroes are $-\frac{13}{5}$ and $-\frac{3}{5}$.

Q9 → If one zero of polynomial $p(x) = 3x^2 - 8x + 2k + 1$ is seven times the other, then find the zeroes and value of k.

Q10 → Find the zeroes of quadratic polynomial $5x^2 - 4 - 8x$ and verify the relationship between the zeroes and their coefficients.

Q11 → For what value of p, (-4) is a zero of polynomial $x^2 - 2x - (7p + 3)$?

Q12 → If α, β, γ are zeroes of cubic polynomial $6x^3 + 3x^2 - 5x + 1$, then find the value of $\alpha^{-1} + \beta^{-1} + \gamma^{-1}$.

Q13 → Verify that $1/2$, 1, -2 are zeroes of cubic polynomial $2x^3 + x^2 - 5x + 2$. Also verify the relationship between the zeroes and coefficients.

Q14 → Write a quadratic polynomial whose zeroes are $2 + \sqrt{3}$ and $2 - \sqrt{3}$.

Q15 → Give examples of polynomials $p(x)$, $g(x)$, $q(x)$ and $r(x)$, which satisfy the Division Algorithm and

(i) $\deg p(x) = \deg q(x)$

(ii) $\deg q(x) = \deg r(x)$

(iii) $\deg r(x) = 0$.

Q16 → If the polynomial $x^4 - 3x^2 + 5x + 3$ is divisible by $x^2 - 2$, the remainder is $ax + b$. What will be the quotient? Also find the values of 'a' and 'b'.

Q17 → Find the value of 'a' so that the point $(3, a)$ lies on the line represented by $2x - 3y = 5$.

Q18 → Solve the following system of equations graphically:

$$2(x - 1) = y \quad \text{and} \quad x + 3y = 15$$

Also, find the coordinates of the points where the lines meet the axis of y.

Q19 → Graphically, solve the following system of equations:

$$4x - 3y + 4 = 0 \quad \text{and} \quad 4x + 3y - 20 = 0$$

Find the area of region bounded by these lines and the x - axis.

Q20 → Determine the value of 'k' so that the following pair of linear equation is inconsistent:

$$kx + 3y = k - 2$$
$$12x + ky = k$$

Q21 → Find the values of 'a' and 'b' for which the following pair of linear equations has an infinite number of solutions:

$$2x + 3y = 7$$
$$(a-b)x + (a+b)y = 3a + b - 2$$

Q22 → Using cross-multiplication method, solve the following pair of equations:

$$\frac{ax}{b} - \frac{by}{a} = a + b$$
$$ax - by = 2ab$$

Q23 → Solve the following pair of linear equations for x and y:

$$47x + 31y = 63$$
$$31x + 47y = 15$$

Q24 → Solve the following pair of linear equations by cross-multiplication method:

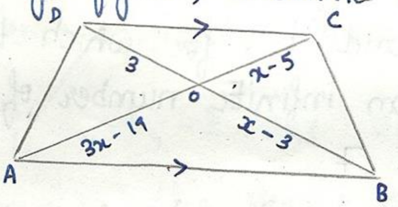
$$\frac{b^2}{a}x - \frac{a^2}{b}y = ab(a+b)$$
$$b^2x - a^2y = 2a^2b^2$$

Q25 → A man sold a table and a chair together for ₹850 at a loss of 10% on the table and a gain of 10% on the chair. By selling them together for ₹950, he would have made a gain of 10% on the table and a loss of 10% on the chair. Find the cost price of each.

Q26 → A man walks a certain distance with a certain speed. If he walks 1/2 km an hour faster, he takes 1 hour less. But if he walks 1 km an hour slower, he takes 3 hours more. Find the distance covered by the man and his original rate of walking.

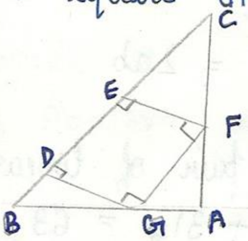
Q27 → The diagonals of a quadrilateral ABCD intersects each other at point O such that $\frac{AO}{BO} = \frac{CO}{DO}$. Show that ABCD is a trapezium.

Q28 → In the adjoining figure, determine the value of x.

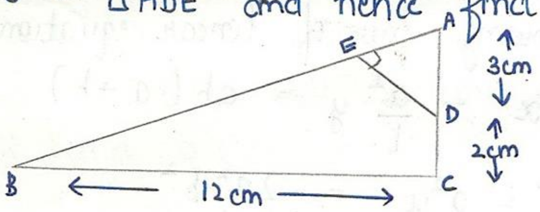


Q29 → In a ΔABC if $DE \parallel BC$ and $BD = CE$. Prove that ΔABC is isosceles.

Q30 → In the figure, DEFG is a square and $\angle BAC = 90^\circ$. Show that $DE^2 = BD \times EC$.

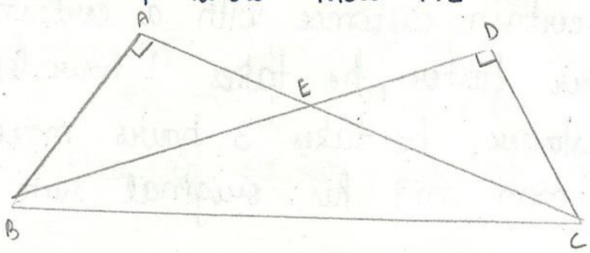


Q31 → In the figure, ΔABC is right angled at C and $DE \perp AB$. Prove that $\Delta ABC \sim \Delta ADE$ and hence find length of AE and DE.

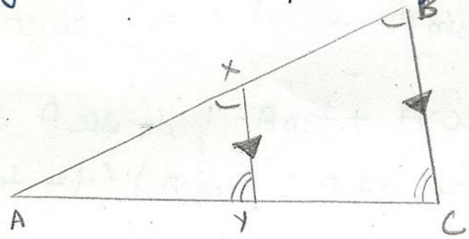


Q32 → Sides AB and AC and median AD of a ΔABC are proportional to the sides PQ and PR and median PM of a ΔPQR. Prove that $\Delta ABC \sim \Delta PQR$. If you are the only student who could work out this proof and other ask you to share with them, will you give your notes to them for copying or will you explain the proof to them?

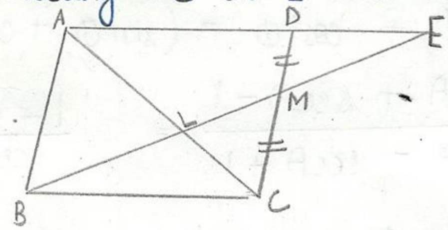
Q33 → Two triangles ABC and DBC are on the same base BC and on same side of BC in which $\angle A = \angle D = 90^\circ$. If CA and BD meet each other at E, show that $AE \cdot EC = BE \cdot ED$.



Q34 → In figure, the line segment XY is parallel to the side BC of ΔABC and it divides the triangle into two parts of equal areas. Prove that $\dfrac{BX}{AB} = \dfrac{\sqrt{2}-1}{\sqrt{2}}$



Q35 → In the figure, M is mid-point of side CD of a parallelogram ABCD. The line BM is drawn intersecting AC at L and AD produced at E. Prove that $EL = 2BL$



Q36 → In ΔABC, if AD is the median, show that
$$AB^2 + AC^2 = 2(AD^2 + BD^2)$$

Q37 → A triangle ABC is right-angled at B. Side BC is trisected at points D and E. Prove that $8AE^2 = 3AC^2 + 5AD^2$.

Q38 → ABC is a triangle, right-angled at C. If p is the length of perpendicular from C to AB and $AB = c$, $BC = a$ and $CA = b$. Show that (i) $pc = ab$ and (ii) $\dfrac{1}{p^2} = \dfrac{1}{a^2} + \dfrac{1}{b^2}$.

Q39 → Prove that the area of an equilateral triangle on the hypotenuse of a right-angled triangle is equal to the sum of areas of equilateral triangles on the other two sides.

Q40 → If $\operatorname{cosec} A = \sqrt{2}$, find the value of $\dfrac{1}{\tan A} + \dfrac{\sin A}{1+\cos A}$

Q41 → If $3\cot\phi = 4$, find the value of $\dfrac{5\sin\phi - 3\cos\phi}{5\sin\phi + 3\cos\phi}$.

Q42 → Evaluate: $\dfrac{11}{7}\dfrac{\sin 70°}{\cos 20°} - \dfrac{4}{7}\dfrac{\cos 53°\operatorname{cosec} 37°}{\tan 15°\tan 35°\tan 35°\tan 75°}$

Q43 → Without using trigonometrical tables, evaluate:

(i) $\dfrac{\cos 58°}{\sin 32°} + \dfrac{\sin 22°}{\cos 68°} - \dfrac{\cos 38°\operatorname{cosec} 52°}{\tan 18°\tan 35°\tan 60°\tan 72°\tan 55°}$

(ii) $\frac{2}{3}\operatorname{cosec}^2 58^\circ - \frac{2}{3}\cot 58^\circ \tan 32^\circ - \frac{5}{3}\tan 13^\circ \tan 37^\circ \tan 45^\circ \tan 53^\circ \tan 77^\circ$

Q44 → If $\sin\phi + \sin^2\phi = 1$, then prove $\cos^2\phi + \cos^4\phi = 1$

Q45 → (i) $(\sec A + \tan A - 1)(\sec A - \tan A + 1) - 2\tan A = 0$

(ii) $(1 + \cot A - \operatorname{cosec} A)(1 + \tan A + \sec A) = 2$

(iii) $\sec^2\phi - \dfrac{\sin^2\phi - 2\sin^4\phi}{2\cos^4\phi - \cos^2\phi} = 1$

(iv) $\sin^3\phi + \cos^3\phi = (\sin\phi + \cos\phi)(1 - \sin\phi\cos\phi)$

(v) $\dfrac{\tan A + \sec A - 1}{\tan A - \sec A + 1} = \dfrac{1 + \sin A}{\cos A}$

Q46 → If $\tan\phi + \sin\phi = m$ and $\tan\phi - \sin\phi = n$, then show that $m^2 - n^2 = 4\sqrt{mn}$.

Q47 → Evaluate: $\dfrac{\cos^2 20^\circ + \cos^2 70^\circ}{\sec^2 50^\circ - \cot^2 40^\circ} + 2\operatorname{cosec}^2 58^\circ - 2\cot 58^\circ \tan 32^\circ - 4\tan 13^\circ \tan 37^\circ \tan 45^\circ \tan 53^\circ \tan 77^\circ$.

Q48 → The mean of following frequency distribution is 57.6 and the sum of observations is 50. Find missing frequencies f_1 and f_2.

Class	0-20	20-40	40-60	60-80	80-100	100-120
frequency	7	f_1	12	f_2	8	5

Q49 → The mean of following frequency distribution is 50. Find missing frequency f_1

Class	0-20	20-40	40-60	60-80	80-100
frequency	6	8	6	f	5

Q50 → The following table gives the life of 50 bulbs:

Life time (in hours)	0-100	100-200	200-300	300-400	400-500
No. of bulbs	5	12	14	6	13

Calculate the modal life of the bulbs.

→ If the median of distribution given below is 28.5. Find values of x and y.

Class Interval	0-10	10-20	20-30	30-40	40-50	50-60	Total
Frequency	5	x	20	15	y	5	60

Q52 → Form an ordinary frequency table from the following cumulative frequency distribution and calculate the mean.

(i)

Class	Frequency
Below 100	0
Below 150	24
Below 200	64
Below 250	97
Below 300	125
Below 350	155
Below 400	177
Below 450	197
Below 500	200

(ii)

Marks	No. of Students
Above 0	80
Above 10	76
Above 20	71
Above 30	65
Above 40	57
Above 50	43
Above 60	28
Above 70	15
Above 80	10
Above 90	8
Above 100	0

Q53 → Which measures of central tendency is given by the x- coordinate of point of intersection of the "more than ogive" and "less than ogive"?

Q54 → The frequency distribution given below shows the marks in mathematics obtained by 100 students in a class:

Marks	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99
No. of students	8	10	25	31	11	12	2	1

Draw the ogives (both less than and more than) for this distribution and use it to determine the median.

Q55 → The following are the marks obtained by 50 students in statistics:

Marks	No. of students
10 marks or less	4
20 marks or less	10
30 marks or less	30
40 marks or less	40
50 marks or less	47
60 marks or less	50

Draw a less than ogive and find out the median. Also, calculate the median by the direct formula.