

Tender Heart High School, Sector-33B, Chd.

Class : 10th

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Subject : Mathematics

Teacher : Ms. Reena

Topic : Remainder and Factor Theorem

Q1 Find the value of 'a' if the division of $ax^3 + 9x^2 + 4x - 10$ by $(x+3)$ leaves a remainder of 5. [Ans. $a=2$]

Q2 When the polynomial $2x^3 - kx^2 + (5k-3)x - 8$ is divided by $(x-2)$, the remainder is 14. Find the value of 'k'. [Ans. $k=2$]

Q3 The polynomials $3x^3 - ax^2 + 5x - 13$ and $(a+1)x^2 - 7x + 5$ leave the same remainder when divided by $(x-3)$. Find the value of 'a'. [Ans. $a=5$]

Q4 When $f(x) = x^3 + ax^2 - bx - 8$ is divided by $(x-2)$, the remainder is zero and when divided by $(x+1)$, the remainder is -30. Find the values of 'a' and 'b'. [Ans. $a=-7$
 $b=-14$]

Q5 Given that $(x+2)$ and $(x-3)$ are factors of $x^3 + ax + b$, calculate the values of 'a' and 'b'. [Ans. $a=-7$
 $b=-6$]

Q6 Polynomial $x^3 - ax^2 + bx - 6$ leaves remainder -8 when divided by $(x-1)$ and $(x-2)$ is a factor of it. Find the values of 'a' and 'b'. [Ans. $a=-2$
 $b=-5$]

Class 10th Remainder and Factor Theorem

Q7 Show that $(2x+7)$ is a factor of $2x^3+5x^2-11x-14$. Hence, factorise the given expression completely, using the factor theorem. [Ans. $(2x+7)(x-2)(x+1)$]

Q8 Find the values of 'a' and 'b' so that the polynomial $x^3+ax^2+bx-45$ has $(x-1)$ and $(x+5)$ as its factors.

For the values of 'a' and 'b', as obtained above, factorise the given polynomial completely. [Ans. $a=13, b=31, (x-1)(x+9)(x+5)$]

Q9 If $(x+1)$ and $(x-2)$ are factors of $x^3+(a+1)x^2-(b-2)x-6$, find the values of 'a' and 'b'. And then, factorise the given expression completely. [Ans. $a=1, b=7; (x+1)(x-2)(x+3)$]

Q10 If $(x-2)$ is a factor of x^2+ax+b and $a+b=1$, find the values of a and b. [Ans. $a=-5$ and $b=6$]

Q11 Factorise $x^3+6x^2+11x+6$ completely using factor theorem. [Ans. $(x+1)(x+2)(x+3)$]

Q12 Find the value of 'm', if mx^3+2x^2-3 and x^2-mx+4 leave the same remainder when each is divided by $(x-2)$.

[Ans. $\frac{3}{10}$]

Topic: Proportion (Class 10th)

Q1 If $a, 2, 10$ and b are in continued proportion; find the values of 'a' and 'b'

$$\left[\begin{array}{l} \text{Ans } a = 0.4 \\ b = 50 \end{array} \right]$$

Q2 If $p:q::q:r$ prove that $p:r = p^2:q^2$

Q3 If $a+c = mb$ and $\frac{1}{b} + \frac{1}{d} = \frac{m}{c}$, prove that a, b, c and d are in proportion.

Q4 If $7x - 15y = 4x + y$, find the value of $x:y$. Hence, use componendo and dividendo to find the values of:-

(i) $\frac{9x+5y}{9x-5y}$

(ii) $\frac{3x^2+2y^2}{3x^2-2y^2}$

$$[\text{Ans: } 16:3 \text{ (i) } 53:43 \text{ (ii) } 131:125]$$

Q5 What least number must be subtracted from each of the numbers 7, 17, 47 so that the remainders are in continued proportion?

(Ans. 2)

Q6 If $\frac{4m+3n}{4m-3n} = \frac{7}{4}$, use properties of proportion

to find (i) $m:n$ (ii) $\frac{2m^2-11n^2}{2m^2+11n^2}$

$$[\text{Ans. (i) } 11:4 \text{ (ii) } 13:19]$$

Q7 If a, b, c, d are in proportion, prove that:-

$$\frac{a-b}{c-d} = \sqrt{\frac{3a^2+8b^2}{3c^2+8d^2}}$$

Class 10th (Proportion)

Ms. Reena

Q8 Using the properties of proportion, solve for x

$$\frac{(1+x+x^2)}{(1-x+x^2)} = \frac{49(1+x)}{63(1-x)} \quad \left[\text{Ans. } x = \frac{1}{2} \right]$$

Q9 If $x = \frac{8ab}{a+b}$, find the value of

$$\frac{x+4a}{x-4a} + \frac{x+4b}{x-4b} \quad \left[\text{Ans. } 2 \right]$$

Q10 If $a:b = c:d$, show that
 $a+b : c+d = \sqrt{a^2+b^2} : \sqrt{c^2+d^2}$

Q11 If a, b, c and d are in continued proportion, prove that

$$\sqrt{(a+b+c)(b+c+d)} = \sqrt{ab} + \sqrt{bc} + \sqrt{cd}$$

Q12 If $\frac{x}{a} = \frac{y}{b} = \frac{z}{c}$, then prove that

$$\frac{ax-by}{(a+b)(x-y)} = 1$$

Q13 What number should be added to 6, 15, 20 and 43 to make the numbers proportional?

[Ans. 3]

Q14 If $\frac{\sqrt{36x+1} + 6\sqrt{x}}{\sqrt{36x+1} - 6\sqrt{x}} = 9$, find the value of x

[Ans. $\frac{4}{81}$]

Q15 Solve $\frac{1-px}{1+px} \sqrt{\frac{1+2x}{1-2x}} = 1$

[Ans. $\frac{1}{p} \sqrt{\frac{2p-2}{2}}$]

CLASS X

Quadratic Equation

Q1 Solve the following by using formula:-

(i) $x^2 - 10x + 6 = 0$ two decimal place

(ii) $3x^2 + 5x - 9 = 0$ " " "

(iii) $x - \frac{18}{x} = 6$ two significant figure

(iv) $2x - \frac{1}{x} = 7$ two decimal place

(v) $5x^2 - 3x - 4 = 0$ three significant figures

(vi) $x^2 - 3(x+3) = 0$ two " "

(vii) $(x-1)^2 - 3x + 4 = 0$ two " "

Q2 Solve $2x^4 - 5x^2 + 3 = 0$ [Hint: put $x^2 = y$]

Q3 Solve $\sqrt{\frac{x}{1-x}} + \sqrt{\frac{1-x}{x}} = 2\frac{1}{5}$, $x \neq 0$ and $x \neq 1$

Q4 If $x=2$ and $x=3$ are roots of the equation $3x^2 - 2mx + 2n = 0$; find the values of m and n .

Q5 Find the solution set of the equation $3x^2 - 8x - 3 = 0$; when (i) $x \in \mathbb{Z}$ (ii) $x \in \mathbb{Q}$

Q6 Solve using formula $\sqrt{3}x^2 + 11x + 6\sqrt{3} = 0$

Q7 Find the values of p for which the quadratic equation $4x^2 + px + 3 = 0$ has equal roots.

Q8 If $x = -4$ is a root of the equation $x^2 + 2x + 4p = 0$, find the values of ' k ' for which the equation $x^2 + px(1+3k) + 7(3+2k) = 0$ has equal roots.

CLASS X
LINEAR INEQUATIONS

Solve and graph solution set on number line:-

Q1 $2y - 3 < y + 1 \leq 4y + 7 ; y \in \mathbb{R}$

Q2 $-8\frac{1}{2} < -\frac{1}{2} - 4x \leq 7\frac{1}{2}, x \in \mathbb{I}$

Q3 $-\frac{x}{3} < \frac{x}{2} - 1\frac{1}{3} < \frac{1}{6}, x \in \mathbb{R}$

Q4 $-2\frac{5}{6} < \frac{1}{2} - \frac{2x}{3} \leq 2, x \in \mathbb{W}$

Q5 Find the smallest value of x for
 $x - 3(2+x) < 2(3x-1)$
when (i) $x \in \mathbb{W}$ (ii) $x \in \mathbb{I}$ (iii) $x \in \mathbb{N}$

Q6 $A = \{x: -1 < x \leq 5, x \in \mathbb{R}\}, B = \{x: -4 \leq x < 3, x \in \mathbb{R}\}$
Represent (i) $A \cap B$, (ii) $A' \cap B$ on different number lines.

Q7 A is the solution set of $-3x + 4 < 2x - 3$
and B is the solution set of $4x - 5 < 12$,
where $x \in \mathbb{W}$. Find the sets (i) $A \cap B$ (ii) $A - B$

Q8 One-fourth of a stick is in water, two-third of it is buried in mud and rest part of the stick above the water, is greater than or equal to 2m. Find the length of the shortest stick.

Q9 Given $A = \{x: -1 \leq x \leq 3; x \in \mathbb{R}\}$
 $B = \{x: -3 < x \leq 2; x \in \mathbb{R}\}$

Shade $A \cap B, A \cup B, A - B, A' \cap B$ on different lines

Q10 An integer is such that one-third of the next integer is atleast 2 more than one-fourth of the previous integer. Find the smallest value of the integer.

CLASS X

MATRICES AND FACTOR THEOREM

Q1 If $A = \begin{bmatrix} 2 & -1 \\ 2 & 0 \end{bmatrix}$, $B = \begin{bmatrix} -3 & 2 \\ 4 & 0 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 0 \\ 0 & 2 \end{bmatrix}$,

find the matrix X such that $A + X = 2B + C$

Q2 If $A = \begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$, prove that $(A - 2I)(A - 3I) = O$

where I is the unit matrix of order 2 and O is zero matrix of order 2

Q3 If $\begin{bmatrix} a & 1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} 4 & 3 \\ -3 & 2 \end{bmatrix} = \begin{bmatrix} b & 11 \\ 4 & c \end{bmatrix}$, find the values of a, b and c

Q4 Let $\begin{bmatrix} 4 \\ 1 \end{bmatrix} A = \begin{bmatrix} -4 & 8 \\ -1 & 2 \end{bmatrix}$, where A is a matrix

(i) state the order of the matrix A (ii) Find matrix A

Q5 If $A = \begin{bmatrix} \sec 60^\circ & \cos 90^\circ \\ -3 \tan 45^\circ & \sin 90^\circ \end{bmatrix}$, $B = \begin{bmatrix} 0 & \cot 45^\circ \\ -2 \sin 90^\circ & \operatorname{cosec} 90^\circ \end{bmatrix}$

find (i) $2A - 3B$ (ii) A^2 (iii) BA

Q6 If $(x-2)$ is a factor for $2x^3 - x^2 - px - 2$

(i) find the value of p

(ii) factorize completely.

Q7 The polynomials $3x^3 - 9x^2 + kx - 1$ and $kx^2 - 9x - 2$ when divided by $3x+1$ leave the same remainder. Find the value of k .

Q8 Using factor theorem, factorise completely $x^3 - 3x^2 - 10x + 24$

Q9 Find the values of the constants a and b , if $(x-2)$ and $(x+3)$ are both factors of expression $x^3 + ax^2 + bx - 12$

Q10 If $(2x+1)$ is a factor of both the expressions $2x^2 - 5x + p$ and $2x^2 + 5x + q$, find the values of p and q . Hence find the other factors of both the polynomials.

CLASS X
Ratio and Proportion

- Ques 1 If $(2x^2 - 5y^2) : xy = 1 : 3$, find the ratio $x : y$
- Ques 2 What number should be subtracted from each of the numbers 31, 26 and 22 so that the remainder may be in continued proportion?
- Ques 3 If $a + c = 2b$ and $\frac{1}{b} + \frac{1}{d} = \frac{2}{c}$, then prove that a, b, c, d are in proportion.
- Ques 4 If a, b, c, d are in proportion, prove that
$$\frac{\sqrt{a^4 + c^4}}{\sqrt{b^4 + d^4}} = \frac{ma^2 + nc^2}{mb^2 + nd^2}$$
- Ques 5 If $\frac{x^2 + y^2}{x^2 - y^2} = \frac{17}{8}$, find the values of
(i) $x : y$ (ii) $\frac{x^3 + y^3}{x^3 - y^3}$
- Ques 6 Using properties of proportion, solve for x , given $\frac{x^4 + 1}{2x^2} = \frac{17}{8}$
- Ques 7 Find x in $\frac{\sqrt{x+4} + \sqrt{x-10}}{\sqrt{x+4} - \sqrt{x-10}} = \frac{5}{2}$
- Ques 8 If 2, 6, p , 54 and q are in continued proportion, find the values of p and q .
- Ques 9 If $x = \frac{2mab}{a+b}$, find the value of $\frac{x+ma}{x-ma} + \frac{x+mb}{x-mb}$
- Ques 10 If $(3x^2 + 2y^2) : (3x^2 - 2y^2) = 11 : 9$,
find the value of $\frac{3x^4 + 25y^4}{3x^4 - 25y^4}$