SANJEEVANI PUBLIC SCHOOL

CLASS :- X.

SUBJECT :- MATHEMATICS.

NOTE :-

(1) Write down the Syllabus of Annual Exam on first Page of Register given below :-

→ Ch-1- Real Numbers, Ch-2- Polynomials, Ch-3- Pair of Linear Equations in Two variables, Ch-4- Quadratic Equation, Ch-5 Arithmetic Progressions, Ch-6- Triangles. Ch-7- Co-ordinate Geometry, Ch-8- Introduction to Trigonometry, Ch-9- Some Application of Trigonometry Ch-10- Circles, Ch-11- Constructions, Ch-12- Area Related to Circles, Ch-13- Surface Area and Volume, Ch-14- Statistics, Ch-15- Probability.

(2.) After one Page, Write down Ch-1- Real Numbers on the Top of the Page.

[CLASS WORK] Ch-1 - Real Numbers :-

Topics of the Chapter-1 :-

→ (1) Euclid's division Lemma., (2) fundamental theorem of Arithmetic, (3) Proofs of results in irrationality of $\sqrt{2}$, $\sqrt{3}$, $\sqrt{5}$, (4) Decimal Expansion of rational numbers in terms of Terminating / non-terminating recurring decimals.

Ch-1 - Ex. 1.1.

Euclid's division Lemma :- It states that for Any two Positive integers a and b, we can find two whole numbers q and r such that :-

$$a = bq + r, \text{ where } 0 \le r < b.$$

Here, a = Dividend, b = Divisor, q = quotient

r = remainder.

formula, Divided = (Divisor x quotient) + Remainder.

for Example,

$$\begin{array}{r|l} & 2 \leftarrow \text{quotient} \\ \text{Divisor} \rightarrow 4 & 9 \leftarrow \text{Dividend} \\ & \underline{8} \\ & 1 \leftarrow \text{Remainder.} \end{array}$$

Acc. to above formula, 9 = (4 x 2) + 1

Q1. Use Euclid's Division algorithm to find the HCF of (i) 135 and 225.

225 > 135

Use Euclid's division Algorithm.

$a = bq + r, \quad 0 \le r < b.$

$225 = 135 \times 1 + 90$ (step I)

$135 = 90 \times 1 + 45$ (step II)

$90 = 45 \times 2 + 0$ (step III)

$$\begin{array}{r|l} 135 & 225 \; (1 \leftarrow (\mathrm{I}) \\ & \underline{-135} \\ 90 & 135 \; (1 \leftarrow (\mathrm{II}) \\ & \underline{-90} \\ 45 & 90 \; (2 \leftarrow (\mathrm{III}) \\ & \underline{-90} \\ & 0 \end{array}$$

HCF (135, 225) = 45.

Note :- (i) In last step, where r = 0, then divisor must be HCF.

(ii) Use Above formula in Remaining questions of Ex. 1.1 of Ch-1.

Q2.) Show that any Positive integers is of the form $6q+1$ or $6q+3$ or $6q+5$, where q is some integers.

Sol:-2:- Let 'a' be any positive integer. By Using Euclid's division Lemma, $a = bq+r$, $0 \leq r < b$ ——(1) and $b = 6$. from (1) eq^n, $a = 6q+r$, $0 \leq r < 6$ [$b=6$]

∴ The Possible remainders are., 0, 1, 2, 3, 4, 5

$a = 6q+0$ [$r=0$],

$a = 6q+1$ [$r=1$], $a = 6q+2$ [$r=2$], $a = 6q+3$ ($r=3$)

$a = 6q+4$ ($r=4$), $a = 6q+5$ [$r=5$].

therefore, $6q+1$, $6q+3$ and $6q+5$ are in the form of odd integers. for Some integers q.

Q4.) Show that the square of any positive integer is of the form $3m$ or $3m+1$ for Some integer m.

Soll- Let 'a' be any Positive integer. By Euclid's division Lemma, $a = bq+r$, $0 \leq r < b$ and $b = 3$.

∴ we get $a = 3q+r$, $0 \leq r < 3$ [∵ $b=3$] ——①

∴ The Possible remainders are 0, 1, 2,

Put $r=0$ in ① eqn.	Put $r=1$ in ① eqn.	Put $r=2$ in ① eq^n.
$a = 3q+0$	∴ $a = 3q+1$	∴ $a = 3q+2$.
$a = 3q$		

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Case-I :- $a = 3q$

Squaring both sides

$(a)^2 = (3q)^2$

$a^2 = 9q^2$

$a^2 = 3(3q^2)$

$a^2 = 3m$, where $3q^2 = m$

Case-II :- $a = 3q+1$

Squaring both sides.

$(a)^2 = (3q+1)^2$

$(a+b)^2 = a^2+b^2+2ab.$

$a^2 = (3q)^2+(1)^2+2\times 3q\times 1$

$a^2 = 9q^2+1+6q.$

$a^2 = (9q^2+6q)+1$

$a^2 = 3(3q^2+2q)+1$

$a^2 = 3m+1$, where $3q^2+2q = m$

Case-III :-

$a = 3q+2$

Squaring both sides

$(a)^2 = (3q+2)^2$

$a^2 = (3q)^2+(2)^2+2\times 3q\times 2$ $[\because (a+b)^2 = a^2+b^2+2ab]$.

$a^2 = 9q^2+4+12q$

$a^2 = 9q^2+12q+3+1$

$a^2 = 3[3q^2+4q+1]+1$

$a^2 = 3m+1$, where $3q^2+4q+1 = m$.

$\therefore$ the square of any positive integer is in the form of $3m$ or $3m+1$ for some integer m.

HOME TASK :- Remaining Parts of Ex 1.1 of Ch-1.

Ch-1 :- Ex. 1.2. Questions.

CLASS WORK :-

Q1.) Express each number as a Product of its. Prime factors.

(i) 140.

Sol!- (i)

$140 = 2 \times 2 \times 5 \times 7$

$= 2^2 \times 5^1 \times 7$

$$\begin{array}{r|l} 2 & 140 \\ \hline 2 & 70 \\ \hline 5 & 35 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

Note!- Solve by using fundamental theorem of Arithmetic.

(iii)

$3825 = 3 \times 3 \times 5 \times 5 \times 17$

$= 3^2 \times 5^2 \times 17^1$.

$$\begin{array}{r|l} 3 & 3825 \\ \hline 3 & 1275 \\ \hline 5 & 425 \\ \hline 5 & 85 \\ \hline 17 & 17 \\ \hline & 1 \end{array}$$

(v) $7429 =$

$17^1 \times 19^1 \times 23^1$

$$\begin{array}{r|l} 17 & 7429 \\ \hline 19 & 437 \\ \hline 23 & 23 \\ \hline & 1 \end{array}$$

Q2.) find the LCM and HCF of the following Pairs of integers and verify that H.C.F x LCM = Product of two numbers.

(i) 26 and 91

$$\begin{array}{r|l} 2 & 26 \\ \hline 13 & 13 \\ \hline & 1 \end{array} \qquad \begin{array}{r|l} 7 & 91 \\ \hline 13 & 13 \\ \hline & 1 \end{array}$$

$26 = 2 \times 13$

$91 = 7 \times 13$

HCF = 13.

LCM $= 13 \times 2 \times 7$

$= 13 \times 14$

$= 182$.

verify.

Use formula.

HCF x LCM = I^{st} No. x II^{nd} No.

$\Rightarrow 13 \times 182 = 26 \times 91$

$2366 = 2366$.

Q4.) Given that HCF (306, 657) = 9, find LCM (306, 657)

Sol!- Use formula,

HCF x LCM = I^{st} No. x II^{nd} No.

$\Rightarrow 9 \times LCM = 306 \times 657$

$\Rightarrow LCM = 306 \times 657$

$LCM = \dfrac{\overset{34}{\cancel{306}} \times 657}{\cancel{9}}$

$= 34 \times 657 =$

$= 22338$.

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Q6.) Explain why $(7 \times 11 \times 13) + 13$ and $(7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1) + 5$ are Composite Numbers.

Sol!- (i) $(7 \times 11 \times 13) + 13$

$\Rightarrow 13 \times [(7 \times 11) + 1]$

$\Rightarrow 13 \times [77 + 1]$

$\Rightarrow 13 \times 78.$

Yes it is a Composite nos because it has more than two factors like as 2, 13, 3.

(ii) $(7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1) + 5$

$\Rightarrow 5 \times [(7 \times 6 \times 4 \times 3 \times 2) + 1]$

$\Rightarrow 5 \times [1008 + 1]$

$\Rightarrow 5 \times 1009.$

Yes it is a Composite Nos. because it has more than two factors.

HOME TASK.!- Ex 1.2 :- Remaining Questions & Parts.
Ex. 1.3.

CLASS WORK.!-

Q1.) Prove that $\sqrt{5}$ is an irrational number.

Sol!- Let us suppose that $\sqrt{5}$ is a rational number

$\sqrt{5} = \frac{p}{q}$, where p and q are Co-prime Integers and $q \neq 0$.

Squaring both sides.

$(\sqrt{5})^2 = \left(\frac{p}{q}\right)^2$

$\frac{5}{1} \times \frac{p^2}{q^2}$

$q^2 = \frac{p^2}{5}$

p^2 is divisible by 5

$\therefore p$ is also divisible by 5

Put $p = 5n$

$q^2 = \frac{(5n)^2}{5}$

$q^2 = \frac{5\cancel{25}n^2}{\cancel{5}}$

$q^2 = 5n^2$

$n^2 = \frac{q^2}{5}$

q^2 is divisible by 5

$\therefore q$ is also divisible by 5.

$\Rightarrow$ 5 is a common factor in both p and q.
it creates a contradiction, our supposition is wrong. therefore, $\sqrt{5}$ is an irrational number.

Q2.) Prove that $3+2\sqrt{3}$ is an irrational number.

Sol: Let us suppose that $3+2\sqrt{3}$ is a rational number.

$3+2\sqrt{3} = \frac{p}{q}$, where p and q are co-prime integers and $q \neq 0$.

$\Rightarrow 2\sqrt{3} = \frac{p}{q} - 3$

$\Rightarrow \frac{2\sqrt{3}}{1} \times \frac{p-3q}{q}$

$\Rightarrow \sqrt{3} = \frac{p-3q}{2q}$

$\Rightarrow \frac{p-3q}{2q}$ is a rational number [$\because \frac{p}{q}$ is a rational number]

$\Rightarrow \sqrt{3}$ is also a rational number

But $\sqrt{3}$ is an irrational number

it creates a contradiction our supposition is wrong.

$\therefore 3+2\sqrt{3}$ is an irrational number.

HOME TASK
Do Examples of Ch-1- Real Numbers.

HOMETASK :- Remaining Questions/Parts of Ex.1.3.

CLASS WORK :- Ex. 1.4.

Q1.) Without actually performing the long division, state whether the following rational numbers will have a terminating decimal expansion or a non-terminating

Repeating decimal expansion.

(i) $\frac{13}{3125}$

$$\begin{array}{r|l} 5 & 3125 \\ 5 & 625 \\ 5 & 125 \\ 5 & 25 \\ 5 & 5 \\ & 1 \end{array}$$

$\Rightarrow \frac{13}{5 \times 5 \times 5 \times 5 \times 5}$

$\Rightarrow \frac{13}{5^5}$

$\therefore$ it has a terminating decimal expansion.
because it holds the Condition $2^m 5^n = q$.

(iii) $\frac{64}{455}$

$$\begin{array}{r|l} 5 & 455 \\ 7 & 91 \\ 13 & 13 \\ & 1 \end{array}$$

$\Rightarrow \frac{64}{5 \times 7 \times 13}$

it has a non-terminating repeating decimal Expansion.
because it does not hold the Condition $q = 2^m 5^n$.

Q2.) Write down the decimal expansions of those rational numbers in question 1 which have terminating decimal expansion.

HOME TASK.
Remaining Parts & Questions of Ex 1.4 of Ch-1.

(i) $\frac{13}{3125}$

$$\begin{array}{r|l} 5 & 3125 \\ 5 & 625 \\ 5 & 125 \\ 5 & 25 \\ 5 & 5 \\ & 1 \end{array}$$

$\Rightarrow \frac{13}{5^5}$

it has terminating decimal expansion

$\Rightarrow \frac{13}{5^5} \times \frac{2^5}{2^5}$

$\Rightarrow \frac{13 \times 2 \times 2 \times 2 \times 2 \times 2}{10^5}$

$\Rightarrow \frac{416}{100000} = 0.00416.$

(iv) $\frac{\cancel{15}\ 3}{\cancel{1600}\ 320}$

$$\begin{array}{r|l} 2 & 320 \\ 2 & 160 \\ 2 & 80 \\ 2 & 40 \\ 2 & 20 \\ 2 & 10 \\ 5 & 5 \\ & 1 \end{array}$$

$\Rightarrow \frac{3}{320}$

$\Rightarrow \frac{3}{2^6 \times 5^1} \times \frac{5^5}{5^5}$

$\Rightarrow \frac{3 \times 5 \times 5 \times 5 \times 5 \times 5}{2^6 \times 5^6}$

$\Rightarrow \frac{9375}{10^6} \Rightarrow \frac{9375}{1000000}$

$\Rightarrow 0.009375.$

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