DPP
DAILY PRACTICE PROBLEMS

Class : IXTH **Subject : MATHS**
Date : **DPP No. : 3**

THE WORLD OF NUMBERS

SELECTED IMPORTANT QUESTIONS FROM GANITA MANJARI

Q 1. A merchant in the port city of Lothal is exchanging bags of spices for copper ingots. He receives 15 ingots for every 2 bags of spices. If he brings 12 bags of spices to the market, how many copper ingots will he leave with?

Q2. Look at the sequence of numbers on one column of the Ishango bone: 11, 13, 17, 19. What do these numbers have in common? List the next three numbers that fit this pattern.

Q3. We know that Natural Numbers are closed under addition the sum of any two natural numbers is always a natural number). Are they closed under subtraction? Provide a couple of examples to justify your answer.

Q4. The temperature in the high-altitude desert of Ladakh is recorded as $4^{\circ}C$ at noon. By midnight, it drops by $15^{\circ}C$. What is the midnight temperature?

Q5. A spice trader takes a loan (debt) of ₹ 850 . The next day, he makes a profit (fortune) of ₹1,200. The following week, he incurs a loss of ₹ 450 . Write this sequence as an equation using integers and calculate his final financial standing.

Q6. Calculate the following using Brahmagupta's laws:
(i) $(-12) \times 5$
(ii) $(-8) \times (-7)$
(iii) $0 - (-14)$
(iv) $(-20) \div 4$

Q 7. Explain, using a real-world example of debt, why subtracting a negative number is the same as adding a positive number (e.g., $10 - (-5) = 15$).

Q8. Prove that the following rational numbers are equal:
(i) $\frac{2}{3}$ and $\frac{4}{6}$
(ii) $\frac{5}{4}$ and $\frac{10}{8}$

(iii) $-\frac{3}{5}$ and $-\frac{6}{10}$

(iv) $\frac{9}{3}$ and 3

Q9. Find the sum:

(i) $\frac{2}{5}+\frac{3}{10}$

(ii) $\frac{7}{12}+\frac{5}{8}$

(iii) $-\frac{4}{7}+\frac{3}{14}$

Q10. Find the difference:

(i) $\frac{5}{6}-\frac{1}{4}$

(ii) $\frac{11}{8}-\frac{3}{4}$

(iii) $-\frac{7}{9}-\left(-\frac{2}{3}\right)$

Q11. Find the product:

(i) $\frac{2}{3}\times\frac{3}{10}$

(ii) $\frac{7}{11}\times\frac{5}{8}$

(iii) $-\frac{4}{7}\times\frac{5}{14}$

Q12. Find the quotient:

(i) $\frac{2}{3}\div\frac{3}{10}$

(ii) $\frac{7}{11}\div\frac{5}{8}$

(iii) $-\frac{4}{7}\div\frac{5}{14}$

Q 13. Show that:

$$\left(\frac{1}{2}+\frac{3}{4}\right)\times\frac{8}{3}=\frac{1}{2}\times\frac{8}{3}+\frac{3}{4}\times\frac{8}{3}$$

Q14. Simplify the following using the distributive property: $\frac{7}{9}\left(\frac{6}{7}-\frac{3}{4}\right)$

Q 15. Find the rational number x such that:

$$\frac{5}{6}\left(x+\frac{3}{5}\right)=\frac{5}{6}x+\frac{1}{2}$$

Q16. A tailor has $15\frac{3}{4}$ metres of fine silk. If making one kurta requires $2\frac{1}{4}$ metres of silk, exactly how many kurtas can he make?

Q17. Find three rational numbers between 3.1415 and 3.1416 .

Q18. Without performing long division, determine which of the following rational numbers will have terminating decimals and which will be repeating: $\frac{7}{20}, \frac{4}{15}, \frac{13}{250}$. Then check your answers by explicitly performing the long divisions and expressing these rational numbers as decimals.

Q19. Perform the long division for $\frac{1}{13}$. Identify the repeating block of digis Does it show cyclic properties if youevaluate $\frac{2}{13}$? Now compute $\frac{3}{13}, \frac{4}{13}$, etc. What do you notice?

Q20. Classify the following numbers as rational or irrational. For rationals, find the explicit fraction $\frac{p}{q}$.

(i) $\sqrt{81}$
(ii) $\sqrt{12}$
(iii) $0.33333\ldots$
(iv) $0.123451234512345\ldots$
(v) $1.01001000100001\ldots$
(vi) 23.5601856122398747901 20…

Q21. The number $0.\overline{9}$ (which means $0.99999\ldots$) is a rational number.
Using algebra (let $x = 0.\overline{9}$, multiply by 10 , and subtract), explain why 0.9 is exactly equal to 1 .

Q 22. Locate the following rational numbers on the number line.

(i) 0.532
(ii) $1.1\overline{5}$

Q23. If $\frac{x}{3} + \frac{x}{5} = \frac{16}{15}$, find the rational number x.

Q 24. Let a and b be two non-zero rational numbers such that $a + \frac{1}{b} = 0$. Without assigning any numerical values, determine whether ab is positive or negative. Justify your answer.

Q25. A rational number has a terminating decimal expansion whose last nonzero digit occurs in the 4^{th} decimal place. Show that such a number can be written in the form $\frac{p}{10^4}$ where p is an integer not divisible by 10 . Is it necessary that the denominator of this rational number when written in the lowest form, is divisible by 2^4 or 5^5 ? Give reasons.

Sol. In the given rational number,
the last non-zero digit is in the 4^{th} decimal place.
So, it can be written in the form:
$\frac{\text{Integer}}{10000} = \frac{\text{Integer}}{10^4} = \frac{p}{10^4}$,
where p is an integer.
Also, it is given that p is an integer, not divisible by 10 .
So, p cannot be a multiple of both 2 and 5.

Now, $\frac{p}{10^4} = \frac{p}{2^4 \times 5^4}$

Case I: When p is a multiple of 2

In this case, when we reduce $\frac{p}{2^4 \times 5^4}$ to the lowest form, the exponent of 2(in the denominator) will get reduced.
As p is not a multiple of 5 (because it cannot be a multiple of both 2 and 5), the exponent of 5 (in the denominator) will remain the same.
Hence, the denominator of this rational number, written in the lowest form, is still divisible by 5^4.
For example, if $p = 6$ then

$$\frac{p}{2^4 \times 5^4} = \frac{6}{2^4 \times 5^4} = \frac{3}{2^3 \times 5^4}$$

Clearly, the denominator $2^3 \times 5^4$ is divisible by 5^4.

Case II: When p is a multiple of 5

In this case, when we reduce $\frac{p}{2^4 \times 5^4}$ to the lowest form, the exponent of 5 (in the denominator) will get reduced.
As p is not a multiple of 2 (because it cannot be a multiple of both 2 and 5), the exponent of 2 (in the denominator) will remain the same.
Hence, the denominator of this rational number, written in the lowest form, is still divisible by 2^4.
For example, if $p = 5$ then

$$\frac{p}{2^4 \times 5^4} = \frac{5}{2^4 \times 5^4} = \frac{1}{2^4 \times 5^3}$$

Clearly, the denominator $2^4 \times 5^3$ is divisible by 2^4.

Case III: When p is neither a multiple of 2 nor a multiple of 5

In this case, when we reduce $\frac{p}{2^4 \times 5^4}$ to the lowest form, neither the exponent of 2 nor the exponent of 5 will get reduced.
Hence, the denominator of this rational number, written in the lowest form, is divisible by both 2^4 and 5^4.

For example, if $p = 7$ then

$$\frac{p}{2^4 \times 5^4} = \frac{7}{2^4 \times 5^4}$$

Clearly, the denominator $2^4 \times 5^4$ is divisible by both 2^4 and 5^4.

Hence, it is necessary that the denominator of this rational number $\left(\frac{p}{10^4}\right)$ when written in the lowest form, is divisible by 2^4 or 5^4.

ANSWER KEY

1. 90
2. 23,29,31,
3. No
4. -11
5. 100 Rs debt
6. (i) -60 (ii) 56 (iii) 14 (iv) -5
7. Imagine you have ₹ 10 after accounting for a ₹5 debt (₹15 - ₹5) to a shopkeeper. If the shopkeeper cancels the ₹ 5 debt, your money becomes ₹ 15 . So, removing a debt of ₹5, increases your amount by ₹ 5 :
$$10 - (-5) = 10 + 5 = 15$$
8. Prove
9. (i) $\frac{7}{10}$ (ii) $\frac{29}{24}$ (iii) $-\frac{5}{14}$
10. (i) $\frac{7}{12}$ (ii) $\frac{5}{8}$ (iii) $-\frac{1}{9}$
11. (i) $\frac{1}{5}$ (ii) $\frac{35}{88}$ (iii) $-\frac{10}{49}$
12. (i) $\frac{20}{9}$ (ii) $\frac{56}{55}$ (iii) $-\frac{8}{5}$
16. 7