Number System

TALENT & OLYMPIAD

Every number we have studied so far are real numbers. The real numbers are divided into two categories as rational and irrational numbers. All the positive counting numbers are called the natural numbers. It starts from 1 till infinity. The positive numbers which starts from zero are called whole numbers. The collections of natural numbers, their negatives along with the number zero are called integers the rational numbers are the numbers in the form $\frac{p}{q}, q \neq 0$ where p and q are integers.

Decimal Expansion of Rational Numbers

There are rational numbers which can be expressed as terminating decimals or non-terminating decimals. The non-terminating decimals may be repeating or non-repeating.. The rational number whose denominator has factor 2 or 5 are terminating and rest are non-terminating.

Tests of Divisibility

- A number is divisible by 2, if its units place have the digit 1,2,4,6 and 8.
- A number is divisible by 3, if sum of all the digits in the given number is a multiple of 3.
- A number is divisible by 4, if its last two digits are divisible by 4.
- A number is divisible by 5, if the units place of the given number is either 0 or 5.
- A number is divisible 6, if it is divisible by both 2 and 3.
- A number is divisible by 8, if its last three digits are divisible by 8.
- A number is divisible by 9, if sum of digits is divisible by 9.
- A number is divisible by 10, if its units place have the digit 0.
- A number is divisible by 11 if the difference between the sum of the digits at odd and even places is either 0 or a multiple of 11.

Some Important Results

- $1+2+3+--------+n=\frac{n(n+1)}{2}$
- $1^2+2^2+3^2+--------+n^2=\frac{n(n+1)(2n+1)}{6}$
- $1^3+2^3+3^3+--------+n^3=\left[\frac{n(n+1)}{2}\right]^{-2}$
- x^n+y^n in divisible by $(x+y)$ for all values of add
- x^n-y^n in divisible by $(x-y)$ for all values of n
- If a number is divisible by m and n, then it is always divisible by the LCM of m and n.
- x^n-y^n IS divisible by $(x+y)$ if in even

Self Evaluation TEST

Duration 10 Minutes

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1. **Find the greatest number of three digits which when divided by 34 leaves remainder as 2.**

(a) 992 (b) 988
(c) 994 (d)

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2. **Find the HCF of 4568 and 6896.**

(a) 4 (b) 6
(c) 2 (d) 8

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3. **If the HCF and LCM of two numbers are 9 and 924 respectively, then find the product of two numbers.**

(a) 8216 (b) 8968
(c) 8316 (d) 8896

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4. **Which one of the following is terminating decimals?**

(a) $\frac{126}{45}$ (b) $\frac{294}{350}$
(c) $\frac{426}{125}$ (d) $\frac{456}{1050}$

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5. **Which one of the following is non-terminating decimals?**

(a) $\frac{9}{40}$ (b) $\frac{2}{9}$
(c) $\frac{11}{40}$ (d) $\frac{13}{65}$

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6. **Find the largest positive number that will divide 396, 434, and 540 leaving the remainder 5, 9, and 13** respectively.

(a) 15 (b) 13
(c) 17 (d) 19
(e) None of these

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7. **Find the greatest number of four digit exactly divisible by 8, 12, and 15.**

(a) 9980 (b) 9940
(c) 9960 (d) 9920 (e) None of these

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8. **Two soldiers start running around a circular path. First soldiers takes 24 minutes and second solider takes 18 minutes to complete one round of the path. If both of them starts at the same point, then find after how many minutes they will meet again at the same starting point.**

(a) 64 minutes (b) 80 minutes
(c) 90 minutes (d) 72 minutes
(e) None of these

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9. **Find the smallest number which, when divided by 32, 45, and 68 leaves remainder 5 in each case.**

(a) 24480 (b) 7560
(c) 24485 (d) 7565
(e) None of these

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10. **Find the smallest number which when increased by 15 is exactly divisible by both 504 and 424.**

(a) 26697 (b) 26682
(c) 26712 (d) 26667
(e) None of these

Answers – Self Evaluation Test

1.	B	**2.**	D	**3.**	C	**4.**	C	**5.**	B	**6.**	C	**7.**	C	**8.**	C	**9.**	C	**10.**	A

Self Evaluation Test

SOLUTIONS

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3. Product of the numbers $LCM \times HCF = 9 \times 924 = 8316$

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6. 396 – 5 = 391; 434 – 9 = 425;
540 – 13 = 527
$391 = 23 \times 17$
$425 = 25 \times 17$ and $527 = 31 \times 17$
Hence the required number will be 17.

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9. First we have to find the LCM of 32, 45 and 68
$32 = 2 \times 2 \times 2 \times 2 \times 2$
$45 = 3 \times 3 \times 5$
$68 = 2 \times 2 \times 17$
Therefore required number will be:
$(2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 17) + 5 = 24485$
