All in One

RRB

Assistant Loco Pilot (ALP)

CBT-1 Exam 2025

VACANCIES

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CHAPTER

1

NUMBER SYSTEM

SECTION-A (MATHEMATICS)

Number

A number is a mathematical symbol representing a quantity.

E.g.: 2,0.33…, 0.6, $\sqrt{3}, \frac{1}{2}$ ..... etc.

Types of Numbers

Natural Numbers

The numbers that are used for counting are called natural numbers.

These are: 1, 2, 3, 4, 5,……

Note: 0 is not a natural number.

Whole Numbers

All the natural numbers including zero are called whole numbers.

E.g.: 0,1, 2, 3, 4, 5,…… are whole numbers.

Integers

All the whole numbers and negative of natural numbers are called integers.

E.g.: …… – 4, – 3, – 2, –1, 0, 1, 2, 3, 4, …… are integers.

Even Integers: All integers that are completely divisible by 2 are called even integers.

E.g.: …… – 6, – 4, – 2, 0, 2, 4, 6, …… are even integers.

Odd Integers: All integers that are not completely divisible by 2 are called odd integers.

E.g.: …… – 7, – 5, – 3, 1, 3, 5, 7, …… are odd integers.

Prime Numbers

A number which has exactly two factors, 1 and the number itself, is called a prime number.

E.g.: 2, 3, 5, 7, 11, 13, 17, 19, 23,....etc.

Note: 2 is both the least prime number and the only even prime number.

Composite Numbers

A number which has at least one factor other than 1 and the number itself is called a composite number.

E.g.: 4, 8, 234, 33, 9 … etc.

Note:

- 4 is the smallest composite number.
- 1 is neither a composite nor a prime number.

Co-Prime Numbers

Two numbers are said to be co-prime numbers if they do not have any common factor other than 1.

E.g.: 2 and 3, 2 and 5, 6 and 35, – 3 and –1 are co-prime numbers.
2 and 4, 21 and 6, 28 and – 7 are not co-prime numbers.

Real Numbers

All the numbers that are present on the number line is called real numbers.

E.g.: – 1, 2, $\frac{1}{3}$, $\sqrt{3}$, 0, etc.

Rational Numbers: A number that can be written in the form $\frac{p}{q}$ where p and q are integers, co-prime number and $q \neq 0$ is called rational number.

E.g.: 2, 3/7, 22/7, 2.5, 33.33.., 6.667.., etc.

Irrational Numbers: A number that can not be written in the form $\frac{p}{q}$ where p and q are integers and $q \neq 0$ is called irrational number. They have a non-terminating and non-repeating decimal places.

E.g.: $\sqrt{2}$, 2.38795...., π ..... etc.

Note: Real number is the collection of all rational and irrational numbers.

Digits

The symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 are called digits. These are building blocks of a number.

Face Value

Face value of a digit in a number is the digit itself.

E.g.: In 324 face value of 2 is 2, face value of 3 is 3 and face value of 4 is 4.

Place Value

Place value of a digit in a number is dependent on its place.

Place value of a digit at n^{th} place = (Digit) × 10^{n-1}, where n is the place of the digit in the number from right side.

E.g.: In 324, place value of 4 is $(4) \times 10^{1-1} = 4 \times 10^0 = 4 \times 1 = 4$
place value of 2 is $(2) \times 10^{2-1} = 2 \times 10^1 = 2 \times 10 = 20$,
place value of 3 is $(3) \times 10^{3-1} = 3 \times 10^2 = 3 \times 100 = 300$.

Note: Both face and place value of a digit at unit's place is the digit itself.

Fraction

A fraction is a number which represent a part of a whole:

E.g.: $\frac{3}{4}, \frac{1}{2}$, ... etc.

Proper Fraction: If in a fraction numerator is less than the denominator then the fraction is called proper fraction.

E.g.: $\frac{1}{2}, \frac{3}{7}, \frac{4}{5}$, …etc.

Improper Fraction: If in a fraction numerator is greater than or equal to the denominator then the fraction is called improper fraction.

E.g.: $\frac{4}{3}, \frac{13}{7}, \frac{2}{2}$ … etc.

Mixed Fraction: An improper fraction can be written as a combination of a whole and a part, and such fraction then called a mixed fraction. An improper fraction $\left(\frac{a}{b}\right)$ can be written as mixed fraction as:

$\frac{a}{b} = q\frac{r}{b}$ where, $a, r \geq 0$, $a \geq b$ and $a = bq + r$

E.g.: $\frac{5}{4}$ is written as $1\frac{1}{4}$, $\frac{25}{6}$ is written as $4\frac{1}{6}$ …. etc.

Ascending and Descending Order of Fraction

To arrange a list of fractions in ascending or descending order we make the denominators of each of the fractions equal to LCM of denominators of every fractions by multiplying the numerators and denominator of the fraction by appropriate numbers.

Then, we arrange the resultant fractions in ascending or descending order.

Example 1: Arrange $\frac{3}{7}, \frac{4}{9}, \frac{5}{14}$ and $\frac{7}{18}$ in ascending order.

(*a*) $\frac{3}{7}, \frac{4}{9}, \frac{5}{14}, \frac{7}{18}$ (*b*) $\frac{7}{18}, \frac{5}{14}, \frac{4}{9}, \frac{3}{7}$

(*c*) $\frac{5}{14}, \frac{4}{9}, \frac{3}{7}, \frac{7}{18}$ (*d*) $\frac{5}{14}, \frac{7}{18}, \frac{3}{7}, \frac{4}{9}$

Solution: (*d*) L.C.M. (7, 9, 14, 18) = 126

Now, $\frac{3}{7}=\frac{3}{7}\times\frac{18}{18}=\frac{54}{126}$, $\frac{4}{9}=\frac{4}{9}\times\frac{14}{14}=\frac{56}{126}$

$\frac{5}{14}=\frac{5}{14}\times\frac{9}{9}=\frac{45}{126}$, $\frac{7}{18}=\frac{7}{18}\times\frac{7}{7}=\frac{49}{126}$

45, 49, 54, 56 is the ascending order of the numerators of the resultant fractions.

So, ascending order of the given fractions is $\frac{5}{14}, \frac{7}{18}, \frac{3}{7}, \frac{4}{9}$.

Comparison of Two Fractions

Let $\frac{a}{b}$ and $\frac{c}{d}$ be two fractions.

Then, if $ad > bc$ then $\frac{a}{b} > \frac{c}{d}$ and if $ad < bc$ then $\frac{a}{b} < \frac{c}{d}$.

Example 2: Which one of the two fractions $\frac{15}{23}$ and $\frac{21}{37}$ is the greatest?

Solution: $ad = 15 \times 37 = 555$, $bc = 21 \times 23 = 483$

Since, $ad = 555 > 483 = bc$

So, $\frac{a}{b} > \frac{c}{d}$ *i.e.*, $\frac{15}{13} > \frac{21}{37}$

Note: We can use this concept for solving arrangement of fractions by eliminations of options by checking any of two fractions.

Unit Digit

Unit Digit of a Product of Two or More Numbers

To find the unit digit of the product of the given numbers:

Take the unit digit of each numbers and multiply them. Now the unit digit of this product will be same as the unit digit of the product of the original numbers.

E.g.: Unit digit of $23 \times 37 \times 432 \times 244 \times 6567 \times 234786$

= Unit digit of $3 \times 7 \times 2 \times 4 \times 7 \times 6$ = Unit digit of $21 \times 8 \times 42$

= Unit digit of $1 \times 8 \times 2$ = Unit digit of $16 = 6$

Unit Digit of a number raised to a power

- Use the following table to find the unit digit of a number, ending with 0, 1, 5 or 6, raised to any power.

Unit digit of a number ending with	0	1	5	6
Unit digit of a power of the number	0	1	5	6

E.g.: (*i*) The unit digit of $(30)^{35} = 0$

(*ii*) The unit digit of $(71)^{13} = 1$

(*iii*) The unit digit of $(35)^{12} = 5$

(*iv*) The unit digit of $(26)^{23} = 6$

- The unit digit of a number, ending with 4 or 9 and raised to a power is given by

Unit digit of a number ending with	Unit digit when power is odd	Unit digit when power is even
4	4	6
9	9	1

E.g.: (*i*) The unit digit of $(74)^{53} = 4$

(*ii*) The unit digit of $(74)^{24} = 6$

(*iii*) The unit digit of $(69)^{24} = 1$

(*iv*) The unit digit of $(69)^{33} = 9$

- The unit digit of the power of 2, 3, 7 and 8 repeat after every cycle of 4 steps therefore to find the unit digit of any power of a number ending with 2, 3, 7 and 8, first divide the power by 4 and look at the remainder ($r = 0, 1, 2$ or 3) and use the following table:

Unit digit of a power of the number				
Unit digit of a number ending with	When $r = 0$	When $r = 1$	When $r = 2$	When $r = 3$
2	6	2	4	8
3	1	3	9	7
7	1	7	9	3
8	6	8	4	2

E.g: (*i*) The unit digit of 87^{25}.

$\because$ r when 25 is divided by 4 is 1.

So, unit digit of $87^{25} = 7$

(*ii*) The unit digit of 72^{32}.

$\because$ r when 32 is divided by 4 is 0.

So, unit digit of $72^{32} = 6$.

Division Algorithm

For two positive integers a and b, there always exist unique whole numbers q and r such that $a = bq + r$, where $0 \le r < b$.

Where, a = Dividend, b = Divisor, q = Quotient and r = Remainder

Example 3: The remainder and quotient when 111 is divided by 12 is

(*a*) 0, 3 (*b*) 1, 9 (*c*) 2, 1 (*d*) 3, 9

Solution: (*d*) Since, $111 = 12 \times 9 + 3$

So, remainder = 3 and quotient = 9

Divisibility Rule

Divisibility by 2: A number is divisible by 2 if its unit digit is any of the digits 0, 2, 4, 6, and 8.

E.g.: 24, 20, 458, 316, 23472 all are divisible by 2.

Divisibility by 3: A number is divisible by 3 if the sum of its digits is divisible by 3.

E.g.: Sum of digits of 342 = 9, which is divisible by 3. So, 342 is divisible by 3.

Divisibility by 4: A number is divisible by 4 if either its last two digits are 0 or the number formed by the last two digits is divisible by 4.

E.g.: 2500 is divisible by 4 as its last two digits are 0.

125464 is divisible by 4 as the number formed by its last two digits is 64 which is divisible by 4.

Divisibility by 5: A number is divisible by 5 if its unit digit is any of the digits 0 and 5.

E.g.: 1235, 1360 are divisible by 5.

Divisibility by 7: A number is divisible by 7 if the difference of the twice of its unit's digit of given number and the number formed by the remaining digits is divisible by 7.

E.g.: 441 is divisible by 7 as, $44 - 2 \times 1 = 44 - 2 = 42$ which is divisible by 7.

Divisibility by 8: A number is divisible by 8 if its last three digits are 0 or the number formed by its last three digits is divisible by 8.

E.g.: 23000 is divisible by 8.

24248 is divisible by 8 as the number formed by its last three digits is 248 which is divisible by 8.

Divisibility by 9: A number is divisible by 9 if the sum of its digits is divisible by 9.

E.g.: 243 is divisible by 9 as the sum of its digits is 9 which is divisible by 9.

Divisibility by 10: A number is divisible by 10 if its unit digit is 0.

E.g.: 340 is divisible by 10.

Divisibility by 11: A number is divisible by 11 if the difference of the sum of digits at even places and the sum of digits at odd places is divisible by 11.

E.g.: 10681 is divisible by 11 as

(sum of digits at even places) – (sum of digits at odd places)

$= (0 + 8) - (1 + 6 + 1) = 8 - 8 = 0$, which is divisible by 11.

Divisibility by 13: A number is divisible by 13 if the sum of the 4 times of its unit's digit and the number formed by the remaining digits is divisible by 13.

E.g.: 819 is divisible by 13 as $81 + 9 \times 4 = 117$ is divisible by 13.

Divisibility by 16: A number is divisible by 16 if its last four digits are 0 or the number formed by its last four digits is divisible by 16.

E.g.: 10000 is divisible by 16. **E.g.,** 4126784 is divisible by 16 as 6784 is divisible 16.

Divisibility by 17: A number is divisible by 17 if the difference of the 5 times of its unit's digit and the number formed by the remaining digits is divisible by 17.

E.g.: 221 is divisible by 17 as $22 - 5 \times 1 = 17$ is divisible by 17.

Divisibility by 19: A number is divisible by 19 if the sum of double of its unit's digit and the number formed by the remaining digits is divisible by 19.

E.g.: 6859 is divisible by 19 as $685 + 9 \times 2 = 703$ is divisible by 19.

Divisibility by a composite number: A number is divisible by a composite number if it is divisible by every prime factor of the composite number.

E.g.: 324 is divisible by 4 as its last two digit 24 is divisible by 4, and it is divisible by 3 as sum of its digit $3 + 2 + 4 = 9$ is divisible by 3.

$\therefore$ 324 is divisible by 12.

Short Trick-1

- Remainder of $(x + a)^n$ when divided by x is same as the remainder of a^n when divided by x.

Example 4: What will be the remainder when 19^{100} is divided by 20?

(*a*) 19 (*b*) 20 (*c*) 3 (*d*) 1

Solution: (*d*) Remainder in $\frac{19^{100}}{20}$ = remainder in $\frac{(20-1)^{100}}{19}$

= remainder in $\frac{(-1)^{100}}{19} = 1$

Short Trick-2

- Remainder, when $A \times B \times C$ is divided by n is same as the remainder when $A_r \times B_r \times C_r$ is divided by n. Here, A_r, B_r and C_r are remainders when A, B and C divided by n respectively.

Example 5: What is the remainder when $56 \times 58 \times 96$ is divided by 13?

(*a*) 9 (*b*) 3 (*c*) 4 (*d*) 12

Solution: (*b*) Remainder in $\frac{56 \times 58 \times 96}{13}$ = remainder in $\frac{4 \times 6 \times 5}{13}$

i.e., $\frac{120}{13} = 3$

Some Important Points

- A number having 2, 3, 7 or 8 at its unit place can not be a perfect square.
- $(x^m - a^m)$ is divisible by $(x - a)$ for all values of m.
- $(x^m - a^m)$ is divisible by $(x + a)$ for even values of m.
- $(x^m + a^m)$ is divisible by $(x + a)$ for odd values of m.

Exercise

1. How many whole numbers are there between 244 and 332 which are exactly divisible by 7?

(*a*) 15 (*b*) 23 (*c*) 8 (*d*) 13

2. If the number 517 * 324 is completely divisible by 3, then the smallest whole number in the place of * will be?

(*a*) 2 (*b*) 3 (*c*) 4 (*d*) 5

3. If x and y are two digits of the number $653xy$ such that this number is divisible by 80, then $x + y = ?$

(*a*) 2 (*b*) 3 (*c*) 4 (*d*) 5

4. In a division sum, the divisor is 5 times the quotient and 4 times the remainder. If the remainder is 5, what is the dividend?

(*a*) 80 (*b*) 85 (*c*) 75 (*d*) 104

5. How many numbers from 1 to 100 are there each of which is exactly divisible by 4 but also has 4 as a digit?

(*a*) 21 (*b*) 20 (*c*) 7 (*d*) 10

6. The minimum number that should be added to the 2351 so that the number is divisible by 7.

(*a*) 1 (*b*) 6 (*c*) 5 (*d*) 8

7. The minimum number that should be subtracted to from 8774 so that the number is divisible by 13.

(*a*) 1 (*b*) 12 (*c*) 5 (*d*) 8

8. On dividing 15968 by a certain number, the quotient is 89 and the remainder is 37. Find the sum of the digits of the divisor.

(*a*) 12 (*b*) 19 (*c*) 17 (*d*) 21

9. When 121012 is divided by 12, the remainder is

(*a*) 0 (*b*) 2 (*c*) 3 (*d*) 4

10. Difference in the place values of 3 used at two places in the number 934530 is:

(*a*) 29970 (*b*) 30070

(*c*) 29570 (*d*) 29990

11. Which of the following is divisor of $5^3 - 3^3$?

(*a*) 2 (*b*) 8

(*c*) 4 (*d*) None of these

12. What is the common factor of $(17^{19} + 19^{19})$ and $(17^{17} + 19^{17})$?

(*a*) $(19 - 17)$ (*b*) $(17^{17} + 19^{17})$

(*c*) $(17^{19} + 19^{19})$ (*d*) $(17 + 19)$

13. Arrange the given ratios in descending order:

(*i*) 7 : 15 (*ii*) 15 : 23

(*iii*) 17 : 25 (*iv*) 21 : 39

Choose the correct answer from the options given below:

(*a*) (*iii*) > (*i*) > (*ii*) > (*iv*)

(*b*) (*i*) > (*iv*) > (*iii*) > (*ii*)

(*c*) (*iii*) > (*ii*) > (*iv*) > (*i*)

(*d*) (*iv*) > (*i*) > (*ii*) > (*iii*)

14. What is the sum of the greatest six digit number and lowest 5 digit number?

(*a*) 199999 (*b*) 109999

(*c*) 1009999 (*d*) 919999

15. Find the sum of the smallest and the greatest 3-digit numbers formed by using the digits 1, 2, 3, 4 without any repetition of digits.
(*a*) 1099 (*b*) 544 (*c*) 534 (*d*) 555

16. The least number by which 12500 should be divided to get a perfect square is.
(*a*) 3 (*b*) 5 (*c*) 15 (*d*) 10

17. Which of these numbers 6400, 125, 9261 and 4913 is not a perfect cube?
(*a*) 6400 (*b*) 125 (*c*) 9261 (*d*) 4913

18. Given below are two statements:
Statement-I: All natural numbers are rational numbers.
Statement-II: 1 is the smallest prime number.
In the light of the above statements, choose the most appropriate answer from the options given below:
(*a*) Both Statement-I and Statement-II are correct
(*b*) Both Statement-I and Statement-II are incorrect
(*c*) Statement-I is correct but Statement-II is incorrect
(*d*) Statement-I is incorrect but Statement-II is correct

19. What is the value of the expression 1 – 2 + 3 – 4 + 5 – 6 ..... to 100 terms?
(*a*) –50 (*b*) –55 (*c*) –49 (*d*) –60

20. What is the sum of all three digit numbers which are divisible by 15?
(*a*) 41200 (*b*) 36825
(*c*) 32850 (*d*) 28750

21. How many prime numbers are there between 100 and 120?
(*a*) 6 (*b*) 7 (*c*) 5 (*d*) 4

22. 6*m*61 is divisible by 11. What is the value of *m*?
(*a*) 0 (*b*) 4 (*c*) 3 (*d*) 5

23. If 5*A*72*B* is divisible by 11, then what is the value of *B* – *A*?
(*a*) 3 (*b*) 2 (*c*) 1 (*d*) 4

24. Which of the following numbers is divisible by 7?
(*a*) 3739 (*b*) 3661
(*c*) 3659 (*d*) 3915

25. Which of the following options is completely divisible by 11?
(*a*) 809781 (*b*) 107611
(*c*) 116571 (*d*) 963391

26. Which of the following numbers is divisible by 36?
(*a*) 47502 (*b*) 29412
(*c*) 54732 (*d*) 87064

27. Find the value of *k* such that the number *k*53206*k* is divisible by 6.
(*a*) 7 (*b*) 4 (*c*) 2 (*d*) 1

28. What is the remainder when 58^{29} is divided by 5?
(*a*) 2 (*b*) 4 (*c*) 3 (*d*) 7

29. Convert $0.4\bar{1}$ into fraction.
(*a*) $\frac{5}{9}$ (*b*) $\frac{3}{7}$ (*c*) $\frac{37}{90}$ (*d*) $\frac{4}{9}$

30. Find the remainder of $\frac{3126^{20^{21^{22^{23^{---}}}}}}{5}$
(*a*) 4 (*b*) 0
(*c*) 1 (*d*) 2

31. If '*x*' is divisible by 3 and 2, then $2x^3 + 3x^2$ is divisible by:
(*a*) 428 (*b*) 214
(*c*) 72 (*d*) 108

32. The least multiple of 7, which leaves a remainder of 4, when divided by 6, 9, 15 and 18 is:
(*a*) 364 (*b*) 357
(*c*) 371 (*d*) 350

33. What is the remainder when 35^{29} is divided by 10?
(*a*) 5 (*b*) 0
(*c*) 6 (*d*) 4

34. If a seven-digit number 42971K2 is divisible by 44, then the value of K is:
(*a*) 4 (*b*) 7
(*c*) 5 (*d*) 6

35. What will be the remainder when 3^{27} is divided by 26?
(*a*) 1 (*b*) 3
(*c*) 2 (*d*) 0

36. The least value of '*a*' for which the number 638*a*435 is completely divisible by 3 is:
(*a*) 2 (*b*) 3
(*c*) 4 (*d*) 1

Answers with Explanations

1. (*d*) ∵ 244 = 7 × 34 + 6
∴ Quotient when 244 is divided by 7 = 34
∴ No. of numbers divisible by 7 and less than 244 = 34
Also, 332 = 7 × 47 + 3
∴ Quotient when 332 is divisible by 7 = 47.
∴ No. of numbers divisible by 7 and less than 332 = 47
∴ Total number of required numbers = 47 – 34 = 13

2. (*a*) If the sum of all the digits of the given number is divisible by 3, then the given number is also divisible by 3.
Here, 5 + 1 + 7 + * 3 + 2 + 4
22 + *
If * = 2, then (22 + *) will become 24 and it is divisible by 3.
Hence the smallest whole number for * should be 2.

3. (*a*) Factors of 80 are 8 and 10. If the number is divisible by 80 we can say that the given number is divisible by both 8 and 10.
If the unit digit of the given number is 0, then it is divisible by 10.
So, *y* = 0
To check if it is divisible by 8, we have check if the last three digits of the number is divisible by 8.
Let *x* = 2
Last three digits = 320 (divisible by 8).
So, *x* + *y* = 2 + 0 = 2

4. (*b*) In *a* = *bq* + *r* we have,
b = 5*q* = 4*r*
∵ *r* = 5
∴ $b = 4 \times 5 = 20$ and $q = \frac{4r}{5} = \frac{4 \times 5}{5} = 4$
∴ Required dividend, *a* = 20 × 4 + 5 = 85

5. (*c*) List of numbers which contain 4 as a digit: 4, 14, 24, 34, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 54, 64, 74, 84, 94.
The numbers divisible by 4 from the above are: 4, 24, 40, 44, 48, 64, 84.
Therefore, there are 7 such numbers.

6. (*a*) Required number = (7 – *r*), where *r* is the remainder when 2351 is divided by 7.
Now, *r* = 6 as 2351 = 335 × 7 + 6
Required number = 7 – 6 = 1

7. (*b*) Remainder (*r*) when 8774 is divided by 13 = 12
as 8774 = 674 × 13 + 12
∴ Required number = 12

8. (*c*) We have, dividend, *a* = 15968
Quotient, *q* = 89
And remainder, *r* = 37
Let *b* be the divisor.
Then, *a* = *bq* + *r*
∵ 15968 = *b* × 89 + 37
$\Rightarrow b = \frac{15968 - 37}{89} = \frac{15931}{89} = 179$
Hence, sum of the digits of the divisor = 1 + 7 + 9 = 17

9. (*d*) 121012 = 12 × 10084 + 4
∴ Remainder = 4

10. (*a*) Place value of 3 at 10000th place = 3 × 10000 = 30000
Also, place value of 3 at 10th place = 3 × 10 = 30
∴ Required difference = 30000 – 30 = 29970

11. (*a*) $\because a^m - b^m$ is divisible by $a - b$ for all m.
$\therefore 5^3 - 3^3$ is divisible by $(5 - 3)$, i.e., 2.

12. (*d*) $a^m + b^m$ is divisible by $a + b$ for all odd m.
$\therefore (17^{19} + 19^{19})$ and $(17^{17} + 19^{17})$ are divisible by $(17 + 19)$ as 19 and 17 are odd.
$\therefore (17 + 19)$ is required common factor.

13. (*c*) For $\frac{7}{15}$ and $\frac{15}{23}$:
$\because 7 \times 23 = 161 < 225 = 15 \times 15$.
So, (*i*) < (*ii*), which is only in (*c*).
So, option (*c*) is correct.

14. (*c*) Required number = 999999 + 10000 = 1009999

15. (*d*) The smallest 3-digit number = 123
The greatest 3-digit number = 432
The required sum = 123 + 432 = 555

16. (*b*) $12500 = (5 \times 5) \times (5 \times 5) \times (2 \times 2) \times 5$
Thus, there is one 5 which is not in pair.
So, after dividing 12500 by 5.
Number = $\frac{12500}{5} = 2500 = (50)^2$
Thus the required number is 5.

17. (*a*) A number ending with 0 can be perfect cube if it has multiple of 3 trailing zero at the end. Since, 6400 has only 2 trailing zeroes at the end.
So, 6400 is not a perfect cube.

18. (*c*) All the natural number can be written in the form of $\frac{n}{1}$ where n and 1 are integers.
So, all the natural numbers are rational numbers. Thus, I is correct.
1 is not a prime number. In fact, 2 is the smallest prime number.
So, II is incorrect.

19. (*a*) 1 – 2 + 3 – 4 + 5 – 6..... to 100 terms
= (1 + 3 + 5 + ... + 99) – (2 + 4 + 6 + ... + 100)
$= \frac{50}{2} \times (1 + 99) - \frac{50}{2} \times (2 + 100)$
= 2500 – 2550 = –50

20. (*c*) We know that, three digits numbers divisible by 15 are 105, 120, ..., 990.
Which is a arithmetic progression
$n = \frac{990 - 105}{15} + 1 = 60$
$a = 105$, $l = 990$ and $n = 60$
So,
$\frac{n}{2}(a + l) = \frac{60}{2}(105 + 990) = 30 \times 1095$
= 32850

21. (*c*) Prime numbers between 100 to 120 are 101, 103, 107, 109, 113.
Therefore, 5 prime numbers are there between 100 to 120.

22. (*a*) If $6m61$ is divisible by 11.
Then,
$(6 - m) + (6 - 1) = 11 - m$
Hence, $11 - m = 11 \Rightarrow m = 0$

23. (*c*) Divisibility rule of 11: Difference of sum of even placed digits and odd placed digits is zero or multiple of 11. The given number is $5A72B$.
The difference of the sum of digits at odd position and sum of digits at even position in the number.
$= (5 + 7 + B) - (A + 2)$
$= B - A + 10$
$B - A + 10$ will be divisible by 11 if the value of $B - A$ is 1.

24. (*b*) Going through options:
Option (*a*): $\frac{3739}{7}$ gives remainder 1.
Option (*b*): $\frac{3661}{7}$ gives remainder 0.
Clearly, 3661 is completely divisible by 7.

25. (*d*) Divisibility rule of 11: Difference of sum of odd placed digits and even placed digits is zero or multiple of 11
Now, in option (*d*), 963391
$= (9 + 3 + 9) - (6 + 3 + 1) = 21 - 10 = 11$

26. (*b*) If a number is divisible by 36 then it must be divisible by 4 & 9
Also in the given option, only number 29412 is divisible by both 4 & 9,

27. (*b*) A number is divisible by 6 if it is divisible by both 2 and 3.
For the number to be divisible by 2 the value of k should be an even number.
From the options we can see that there are only two possible values of k i.e either 2 or 4.
Divisibility rule of 3: A number is divisible by 3 if the sum of the digits of the number is completely divisible by 3.
Now, $k + 5 + 3 + 2 + 0 + 6 + k = 2k + 16$
For $k = 2$, $2k + 16 = 20$, which is not divisible by 3.
For $k = 4$, $2k + 16 = 24$, which is completely divisible by 3.
Therefore, required value of $k = 4$

28. (*c*) $\text{Rem.}\left[\frac{(58)^{29}}{5}\right]$
$= \text{Rem.}\left[\frac{(55 + 3)^{29}}{5}\right] = \text{Rem.}\left[\frac{(3)^{29}}{5}\right]$
$= \text{Rem.}\left[\frac{(3^2)^{14+1}}{5}\right] = \text{Rem.}\left[\frac{(-1)^{14}.3}{5}\right] = 3$

29. (*c*) Let, $x = 0.4\overline{1} = 0.41111$ ... (*i*)
Multiply by 10 both side,
$10x = 4.1111$ ... (*ii*)
(*ii*) – (*i*)
$10x - x = (4.111...) - (0.4111...)$
$\Rightarrow 9x = 3.7$
$\Rightarrow x = \frac{37}{90}$

30. (*c*) Firstly,
$\frac{3126}{5} = 1$ remainder.
1 remains 1 after any power.
Therefore, $\frac{3126^{20^{21^{22^{23^{---}}}}}}{5} = 1$ remainder.

31. (*d*) If x is divisible by both 3 and 2, then it is divisible by 6.
The expression is $2x^3 + 3x^2$
$\Rightarrow 2(6)^3 + 3(6)^2$
$= 432 + 108 = 540$
$\therefore$ 540 is divisible by 108.
So, $2x^3 + 3x^2$ is divisible by 108.

32. (*a*) LCM of 6, 9, 15 and 18 = 90
The number which leaves a remainder of 4, when divided by 6, 9, 15 and 18 = $90k + 4$ where, $k = 1, 2, 3,...$
To be multiple of 7, the number $90k + 4$, should be divisible by 7 as well.
From option,
for, $k = 4$, $90k + 4 = 364$, which is also divisible by 7.

33. (*a*) $\text{Rem}\left[\frac{(35)^{29}}{10}\right]$
$= \text{Rem.}\left[\frac{(30 + 5)^{29}}{10}\right] = \text{Rem.}\left[\frac{5^{29}}{10}\right]$
$= \text{Rem.}\left[\frac{5}{10}\right]$
[$\because$ unit digit of 5^{29} is always 5]
= 5

34. (*b*) Divisibility of 44: A number only be divisible by 44, if the number are divisible by 4 and 11
Divisibility of 4: A number is divisible by 4, if the last two digits of the number are divisible by 4.
Divisibility of 11: The given number can only be completely divided by 11 if the difference of the sum of digits at odd position and sum of digits at even position a number is 0 or multiple of 11.
Here, last two digits of 42971K2 are K2
Possible values of K = 1, 3, 5, 7, 9
Then, it is divisible by 4
Now, For the divisibility of 11,
$\Rightarrow (4 + 9 + 1 + 2) - (2 + 7 + K)$
$= 16 - 9 - K$
So, possible values of K = 7

35. (*a*) Remainder of $(3^{27} \div 26)$ = remainder of $(3^{3\times9} \div 26)$
= remainder of $(27^9 \div 26)$ = remainder of
$\frac{(26 + 1)^9}{26} = \text{Remainder}\left(\frac{(1)^9}{26}\right) = 1$

36. (*d*) The sum of digits of the number is divisible by 3.
Here, number = $638a435$
Sum of the digits
$= 6 + 3 + 8 + a + 4 + 3 + 5 = (29 + a)$
$(29 + a)$ only be divisible by 3, if $a = 1, 4, 7$
Therefore, least possible value of $a = 1$

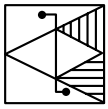
Solved Paper

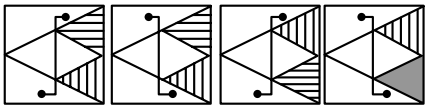
RRB ALP CBT I-2018

(29 Aug 2018 Shift 1)

20

1. Choose the correct water image of the problem figure.

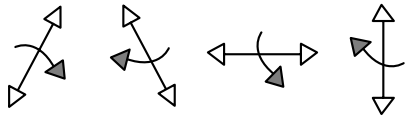




(*a*) (*b*) (*c*) (*d*)

2. 5th February 2018 is a Monday. 8th April 2019 will be a:
(*a*) Wednesday (*b*) Tuesday
(*c*) Monday (*d*) Sunday

3. Select the figure which does NOT belong to the group.



(*a*) (*b*) (*c*) (*d*)

4. An electric bulb was bought at ₹ 4200 Its value depreciates at the rate of 8% per annum Its value after one year will be:
(*a*) ₹ 3,684 (*b*) ₹ 3,800
(*c*) ₹ 3,864 (*d*) ₹ 3,746

5. Which Indian model won the Miss World 2017 contest held in China?
(*a*) Zoya
(*b*) Noyonika Chatterjee
(*c*) Manushi Chhillar
(*d*) Alia Bhatt

6. Who is the only cricketer to score three double centuries in One - Day Cricket?
(*a*) Virendra Sehwag
(*b*) Ricky Ponting
(*c*) Chris Gayle
(*d*) Rohit Sharma

7. Which of the following is a chemical change?
(*a*) Butter turning rancid
(*b*) Making dry ice from CO2
(*c*) Heating a platinum wire
(*d*) Magnetization of iron

8. Select the option that represents the number of triangles in the given figure.

(*a*) 6 (*b*) 10 (*c*) 7 (*d*) 9

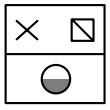
9. What is the highest percentage slab for GST In India?
(*a*) 20% (*b*) 32%
(*c*) 25% (*d*) 28%

10. A positive integer, which when added to 1000, gives a sum which is greater than 10.06 when it is multiplied by 100. This positive integer is
(*a*) 1 (*b*) 7
(*c*) 3 (*d*) 5

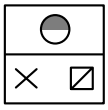
11. Non-metals generally contain _____ electrons in their outermost shell.
(*a*) 1, 2 or 3 (*b*) 5, 6, 7 or 8
(*c*) 8, 9 or 10 (*d*) 10 to 8

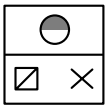
12. From the given four answer figures choose the correct water image of the problem figure.

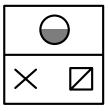
Problem Figure

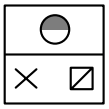


Answer Figures

(*a*) 

(*b*) 

(*c*) 

(*d*) 

13. What is the radius of an atom used to measure?
(*a*) Atomic number (*b*) Atomic mass
(*c*) Atomic size (*d*) Atomicity

14. If a force of 20 N is applied on a body with a mass 10 kg, what will be the acceleration produced?
(*a*) 100 m/sec^2 (*b*) 200 m/sec^2
(*c*) 5 m/sec^2 (*d*) 2 m/sec^2

15. The formula of Power is _____.
(*a*) Momentum/Time
(*b*) Work/Time
(*c*) Speed/Time
(*d*) Displacement/Time

16. An object is placed at a distance of 20 cm from a convex lens of focal length 10 cm. The image is formed at a distance of:
(*a*) 15 cm (*b*) 5 cm
(*c*) 20 cm (*d*) 10 cm

17. Select the word pair that is analogous to the given word pair.
Sankranti : Andhra Pradesh
(*a*) Onam : Kerala
(*b*) Bhangra : Punjab
(*c*) Christmas : Christians
(*d*) Kathak : Uttar Pradesh

18. The LCM of 14, 35 and 56 is:
(*a*) 280 (*b*) 140
(*c*) 210 (*d*) 560

19. Under which Indian emperor's reign was the Jama Masjid in Delhi built?
(*a*) Humayun (*b*) Babur
(*c*) Aurangzeb (*d*) Shah Jahan

20. If the valency of Aluminium is 3 and that of Oxygen is 2, then the chemical formula of Aluminium oxide is:
(*a*) $(AIO)_{3+2}$ (b) AIO_2
(*c*) AI_3O_2 (*d*) AI_2O_3

21. Sree and Kavi are a couple. Siri and Samyu are sisters. Samyu is the sister of Kavi. How is Siri related to Sree?
(*a*) Uncle (*b*) Brother
(*c*) Cousin (*d*) Sister-in-law

22. If α & β are the zeros of the polynomial $5x^2 - 7x + 2$ then the sum of their reciprocals is:
(*a*) $\frac{5}{2}$ (*b*) $\frac{7}{5}$
(*c*) $\frac{2}{5}$ (*d*) $\frac{7}{2}$

23. In which of the following permanent tissue are the cells dead?
(*a*) Parenchyma (*b*) Collenchymas
(*c*) Sclerenchyma (*d*) Aerenchyma

24. Testes are located outside the abdominal cavity in the:
(*a*) Urinary bladder (*b*) Ovary
(*c*) Vagina (*d*) Scrotum

25. The smallest number by which 72 must be multiplied to obtain a perfect square is:
(*a*) 4 (*b*) 6
(*c*) 8 (*d*) 2

26. A man travels 15 km towards the east, then turns right and travels 20 km. He then turns left and travels 30 km. Finally, he takes a right turn and covers 40 km. The shortest distance between the starting point and the destination is:
(*a*) 50 km (*b*) 75 km
(*c*) 100 km (*d*) 80 km

27. If an anchored boat is rocked by waves whose crests are 80 m apart and whose velocity is 20 m/s, then the time required by the crests to reach the boat is _____.
(*a*) 0.5 s (*b*) 5 s (*c*) 0.2 s (*d*) 4 s

28. $-70 + 28 \div (7 - 3) = ?$
(*a*) –9 (*b*) –69
(*c*) –10.5 (*d*) –63

29. In a test Paran secured 63 marks that was also equivalent to obtaining 84% marks. How many marks was the test out of?
(*a*) 80 (*b*) 65
(*c*) 75 (*d*) 85

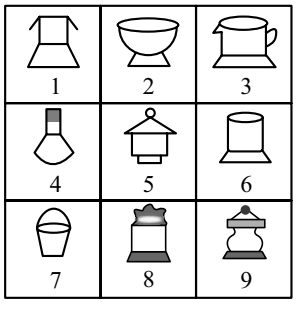
30. A and B can complete a task in 40 days, B and C can complete it in 30 days while C and A can complete the same task together in 24 days. How many days will each of A, B and C take to complete the task individually?
(*a*) 48, 96 and 32 (*b*) 32, 48 and 96
(*c*) 60, 120 and 40 (*d*) 40, 120 and 60

31. Which Indian American is the CEO of Adobe Systems?
(*a*) Francisco D'Souza
(*b*) Shantanu Narayen
(*c*) Sundar Pichai
(*d*) Sanjay Kumar Jha

32. Reproducing new plants by cells instead of vegetative parts or seeds is called:
(*a*) Tissue culture (*b*) Regeneration
(*c*) Multiple fission (*d*) Binary fission

33. Consider the given statement true and decide which of the given assumptions is (are) implicit.
Statement:
A teacher tells a student, "if you don't finish your homework, you will not be allowed into the class".
Assumptions:
1. Discipline is a way to create effective learning.
2. The teacher will be happy not to have a student who is not punctual in his work.
(*a*) Only assumption I is implicit.
(*b*) Neither assumption I nor II is implicit.
(*c*) Only assumption II is implicit.
(*d*) Both assumptions I and II are implicit.

34. If three groups could be formed using the given figures only once, these groups would be _____.

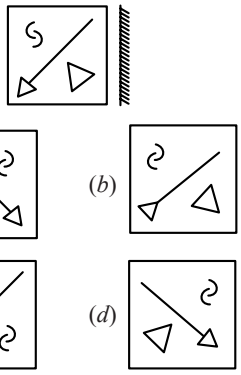


(*a*) (1 ,4, 7), (2, 3, 6) and (5, 9, 8)
(*b*) (1, 4, 7), (2, 9, 6) and (5, 3, 8)
(*c*) (1, 4, 7), (5, 3, 6) and (2, 9, 8)
(*d*) (2, 4, 7), (1, 3, 6) and (5, 9, 8)

35. A rectangle having 10 cm and 6 cm as its dimensions was reconstructed to make a rhombus having the same perimeter as that of the rectangle and 60° as one of its angles. The area of the rhombus, in cm2, was:
(*a*) $24\sqrt{3}$ (*b*) $8\sqrt{3}$
(*c*) $16\sqrt{3}$ (*d*) $32\sqrt{3}$

36. Who is first female president of National Association of software and Services Companies (NASSCOM)?
(*a*) Vnitha Narayana
(*b*) Debjani Ghosh
(*c*) Kiran Mazumdar Shaw
(*d*) Mallika Srinivasan

37. Select the Answer Figure that is the correct mirror image of the given Problem Figure.



38. What happens to the ammeter reading when the length of the wire is doubled?
(*a*) It increases two times
(*b*) It decreases to one half
(*c*) It decreases to three-fourth
(*d*) It remains the same

39. Which of the following has NO unit?
(*a*) Density (*b*) Relative density
(*c*) Displacement (*d*) Pressure

40. Which of the following signs and numbers should be interchanged such that for the following expression, LHS = RHS.
$6 \times 4 + 2 = 16$
(*a*) × with +, 2 with 6
(*b*) × with +, 4 with 2
(*c*) × with +, 16 with 6
(*d*) × with +, 4 with 6

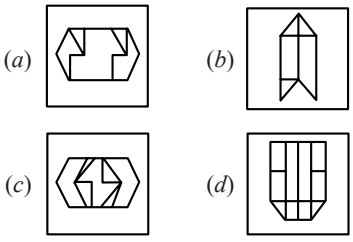
41. The sum of the lengths of the edges of a cube is equal to half the perimeter of a square. If the numerical value of the volume of the cube is equal to the numerical value of the area of the square, then the length of one side of the square is:
(*a*) 108 units (*b*) 36 units
(*c*) 216 units (*d*) 288 units

42. Who is the newly appointed Governor of Bihar as of March 2018?
(*a*) Satya Pal Malik
(*b*) Kiran Bedi
(*c*) Devandra Kumar Joshi
(*d*) Ram vilas Paswan

43. The problem figure is embedded in one of the four answer figures. Which of the four figures contains the problem figure?

Problem Figure

Answer Figures



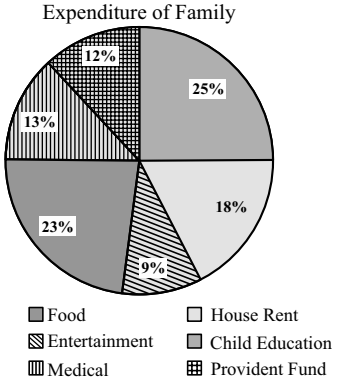
44. Which of the following elements has the unique ability to form bonds with other atoms of the same element giving rise to large molecules?
(*a*) Aluminium (*b*) Hydrogen
(*c*) Carbon (*d*) Nitrogen

45. The energy possessed by a body due to its change in position or shape is called:
(*a*) Kinetic Energy (*b*) Chemical Energy
(*c*) Nuclear Energy (*d*) Potential Energy

46. Select the missing term in the given sequence.
E1, H2, K6, N24, _____
(*a*) Q72 (*b*) P120
(*b*) Q720 (*d*) Q120

47. Consider the argument and decide which of the given assumptions is/are implicit.
Argument:
Due to potholes in the city a large number of people are unable to reach the airport on time.
Assumptions:
1. Reaching the airport on time is not necessary.
2. There is no other route to the airport.
(*a*) Neither 1 nor 2 is implicit
(*b*) Only assumption 2 is implicit
(*c*) Only assumption 1 is implicit
(*d*) Both 1 and 2 are implicit

48. The chart represents the domestic expenditure of a family per month with total expenditure being ₹ 33650 then the annual saving for provident fund is:



69. Using the sequence ABC$+#DEF&=?GHI!2*@, fill in the blank given in the following expression.
A $ D _____ G ! @
(*a*) & (*b*) ?
(*c*) = (*d*) F

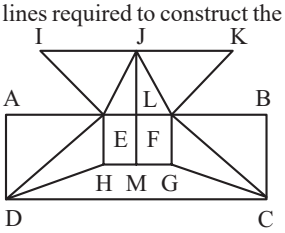
70. [63 – (–3) {–2 – 8 – 3}] ÷ 3 {6 + (– 2) (–1)} = ?
(*a*) 0 (*b*) 3
(*c*) 1 (*d*) 2

71. Which of the following solutions do not conduct electricity?
(*a*) Sodium hydroxide solution
(*b*) Glucose solution
(*c*) Acetic acid Solution
(*d*) Hydrochloric acid solution

72. Who is the author of the book 'Lone Fox Dancing: My Autobiography'?
(*a*) Ruskin Bond (*b*) Arundhati Roy
(*c*) Shobha De (*d*) V. S. Naipaul

73. If in a certain code, SKYJACKING is written as AJYKSGNIKC, then how will CHEAPJACKS be written as in the same code?
(*a*) PAEHCSKCAJ
(*b*) PAAEHCSKCAJ
(*c*) PAEHCCSKCAJ
(*d*) PAEHCSKAJ

74. What is the minimum number of straight lines required to construct the given figure?



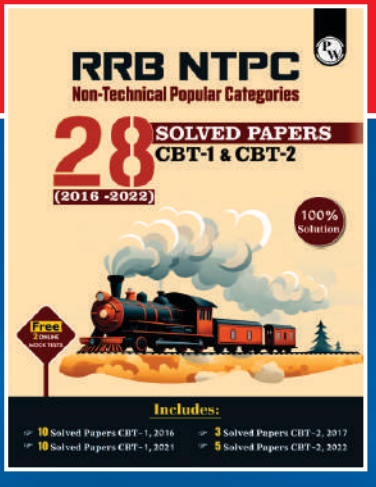
(*a*) 17 (*b*) 14
(*c*) 18 (*d*) 16

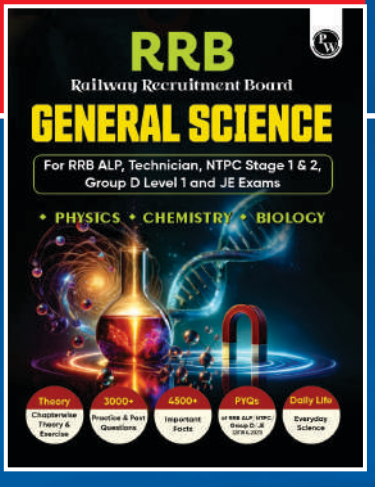
75. Complete digestion of carbohydrates, proteins and fats takes place in the:
(*a*) Oesophagus (*b*) Stomach
(*c*) Small intestine (*d*) Large intestine

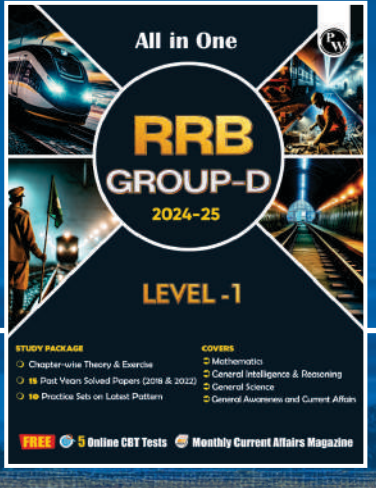
Answer keys
(Scan QR code for Detailed Explanation)

1. (*a*)	**2.** (*c*)	**3.** (*c*)	**4.** (*c*)	**5.** (*c*)	**6.** (*d*)	**7.** (*a*)	**8.** (*d*)	**9.** (*d*)	**10.** (*b*)
11. (*b*)	**12.** (*c*)	**13.** (*c*)	**14.** (*d*)	**15.** (*b*)-	**16.** (*c*)	**17.** (*a*)	**18.** (*a*)	**19.** (*d*)	**20.** (*d*)
21. (*d*)	**22.** (*d*)	**23.** (*c*)	**24.** (*d*)	**25.** (*d*)	**26.** (*b*)	**27.** (*d*)	**28.** (*d*)	**29.** (*c*)	**30.** (*c*)
31. (*b*)	**32.** (*a*)	**33.** (*a*)	**34.** (*a*)	**35.** (*d*)	**36.** (*b*)	**37.** (*d*)	**38.** (*b*)	**39.** (*b*)	**40.** (*d*)
41. (*c*)	**42.** (*a*)	**43.** (*c*)	**44.** (*c*)	**45.** (*d*)	**46.** (*d*)	**47.** (*b*)	**48.** (*d*)	**49.** (*b*)	**50.** (*c*)
51. (*b*)	**52.** (*a*)	**53.** (*a*)	**54.** (*a*)	**55.** (*a*)	**56.** (*a*)	**57.** (*b*)	**58.** (*d*)	**59.** (*a*)	**60.** (*b*)
61. (*b*)	**62.** (*b*)	**63.** (*d*)	**64.** (*c*)	**65.** (*d*)	**66.** (*c*)	**67.** (*a*)	**68.** (*d*)	**69.** (*a*)	**70.** (*c*)
71. (*b*)	**72.** (*a*)	**73.** (*a*)	**74.** (*a*)	**75.** (*c*)					

Useful for Railway Exams







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