Quantitative Aptitude

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Part A: Verbal Reasoning

Section-D: Numerical Ability

CHAPTER 1

NUMBER SYSTEM

NUMBER SYSTEM

A number system relates quantities and symbols. The base or radix of a number system represents the number of digits or basic symbols in that particular number system.

Decimal is a base (or radix) 10 numeral system. This means that the system has ten symbols or numerals to represent any quantity. These symbols are called Digits. The ten symbols are 1, 2, 3, 4, 5, 6, 7, 8, 9 and 0.

Types of Numbers :

Real numbers: Real numbers comprise the full spectrum of numbers. They can take on any form – fractions or whole numbers, decimal points or no decimal points. The full range of real numbers includes decimals that can go on forever and ever without end.

For Example: $8, 6, 2+\sqrt{3}, \frac{3}{5}$ etc.

Natural numbers: A natural number is a number that comes naturally. Natural Numbers are counting numbers from 1, 2, 3, 4, 5, ...

Whole numbers: Whole numbers are just all the natural numbers plus zero.

For Example: 0, 1, 2, 3, 4, 5, and so on upto infinity.

Integers: Integers incorporate all the qualities of whole numbers and their opposites (or additive inverses of the whole numbers). Integers can be described as being positive and negative whole numbers.

For Example: $\ldots -3, -2, -1, 0, 1, 2, 3, \ldots$

Rational numbers: All numbers of the form $\frac{p}{q}$ where p and q are integers ($q \neq 0$) are called Rational numbers.

For Example: $4, \frac{3}{4}, 0, \ldots.$

Irrational numbers: Irrational numbers are the opposite of rational numbers. An irrational number cannot be written as a fraction, and decimal values for irrational numbers never end and do not have a repeating pattern in them. *'pi'* with its never-ending decimal places, is irrational.

For Example: $\sqrt{7}, \sqrt{5}, 2+\sqrt{2}, \pi, \ldots..$

Even numbers: An even number is one that can be divided evenly by two leaving no remainder, such as 2, 4, 6, and 8.

Odd numbers: An odd number is one that does not divide evenly by two, such as 1, 3, 5, and 7.

Prime numbers: A prime number is a number which can be divided only by 1 and itself. The prime number has only two factors, 1 and itself.

For example: 2, 3, 5, 7, 11, 13, 17, ... are prime numbers.

Composite Number: A Composite Number is a number which can be divided into a number of factors other than 1 and itself . Any composite number has additional factors than 1 and itself.

For example: 4, 6, 8, 9, 10 .....

Co-primes or Relatively prime numbers: A pair of numbers not having any common factors other than 1 or –1. (Or alternatively their greatest common factor is 1 or –1)

For Example: 15 and 28 are co-prime, because the factors of 15 (1,3,5,15), and the factors of 28 (1,2,4,7,14,28) are not in common (except for 1).

Twin Primes: A pair of prime numbers that differ by 2 (successive odd numbers that are both Prime numbers).

For Example: (3,5), (5,7), (11,13), ...

Numbers at a glance

Example	Number type
0.45	rational, real
3.1415926535....	irrational, real
3.14159	rational, real
0	whole, integer, rational, real
$\frac{5}{3}$	rational, real
$1\frac{2}{3}=\frac{5}{3}$	rational, real
$\sqrt{2}=1.41421356$	irrational, real
$-\sqrt{81}=-9$	integer, rational, real
-3	rational, real
$\sqrt{25}=5$	natural, whole, integer, rational, real
$9/3=3$	natural, whole, integer, rational, real
–0.75	rational, real
$\pi = 3.1428571\ldots$	irrational, real
3.144444.....	rational, real (since it is a repeating decimal)
$\sqrt{-9}$	Imaginary

PLACE VALUE AND FACE VALUE

In decimal number system, the value of a digit depends on its place or position in the number. Each place has a value of 10 times the place to its right.

Place value : Place value is a positional system of notation in which the position of a number with respect to a point determines its value. In the decimal system, the value of the digits is based on the number ten.

Each position in a decimal number has a value that is a power of 10. A decimal point separates the non-negative powers of 10, $(10)^0=1$, $(10)^1=10$, $(10)^2=100$, $(10)^3=1000$, etc.) on the left from the negative powers of 10, $(10)^{-1}=\frac{1}{10}$, $(10)^{-2}=\frac{1}{100}$, $(10)^{-3}=\frac{1}{1000}$, etc.) on the right.

Face value : The face value of a number is the value of the number without regard to where it is in another number. So 4 7 always has a face value of 7. However the place value includes the position of the number in another number. So in the number 4,732, the 7 has a place value of 700, but has a face value of just 7.

***Example*: Place and face values of the digits in the number 495, 784:**

Number	Digit	Place value	Face value
495,784	4	400000	4
	9	90000	9
	5	5000	5
	7	700	7
	8	80	8
	4	4	4

NAMES OF DIGITS ACCORDING TO THEIR PLACE VALUE.

Indian Method	International Method		
Unit	Unit	**1**	**1**
Ten	Ten	**10**	10^1
Hundred	Hundred	**100**	10^2
Thousand	Thousand	**1000**	10^3
Ten thousand	Ten thousand	**10000**	10^4
Lakh	Hundred thousand	**100000**	10^5
Ten lakh	One million	**1000000**	10^6
Crore	Ten million	**10000000**	10^7
Ten crore	Hundred million	**100000000**	10^8
Arab	Billion	**1000000000**	10^9

FRACTIONS

A fraction is known as a rational number and written in the form of $\frac{p}{q}$ where p and q are integers and $q \neq 0$. The lower number 'q' is known as denominator and the upper number 'p' is known as numerator.

Type of Fractions :

Proper Fraction: The fraction in which numerator is less than the denominator is called a proper fraction.

For Example: $\frac{2}{3}, \frac{5}{6}, \frac{10}{11}$ etc.

Improper fraction : The fraction in which numerator is greater than the denominator is called improper fraction.

For Example : $\frac{3}{2}, \frac{6}{5}, \frac{8}{7}$, etc

Mixed fraction : Mixed fraction is a composite of a fraction and a whole number.

For example: $2\frac{1}{2}, 3\frac{3}{4}, 5\frac{6}{7}$ etc.

Complex fraction: A complex fraction is that fraction in which numerator or denominator or both are fractions.

For Example: $\frac{\frac{2}{3}}{4}, \frac{\frac{2}{5}}{\frac{6}{7}}, \frac{\frac{3}{7}}{\frac{5}{6}}$, etc.

Decimal fraction: The fraction whose denominator is 10 or its higher power, is called a decimal fraction.

For Example: $\frac{7}{10}, \frac{11}{100}, \frac{12}{1000}$

Continued fraction: Fractions which contain addition or subtraction of fractions or a series of fractions generally in denominator (sometimes in numerator also) are called continued fractions.

These are It is also defined as fractions whose numerator is an integer and whose denominator is an integer plus a fraction.

For Example: $2-\cfrac{\frac{2}{2}}{2+\frac{3}{4}}$

Comparison of Fractions :

- **If the denominators of all the given fractions are equal then the fraction with greater numerator will be the greater fraction.**

  For Example: $\frac{4}{7}, \frac{2}{7}, \frac{8}{7}, \frac{9}{7}$

  then, $\frac{9}{7} > \frac{8}{7} > \frac{4}{7} > \frac{2}{7}$

- **If the numerators of all the given fractions are equal then the fraction with smaller denominator will be greater fraction.**

  For Example: $\frac{7}{4}, \frac{7}{2}, \frac{7}{8}, \frac{7}{9}$ then, $\frac{7}{2} > \frac{7}{4} > \frac{7}{8} > \frac{7}{9}$

- **When numerator is greater than denominator and the differences of numerator and denominator are equal, then the fraction with smaller numerator will be the greater faction.**

  For Example: $\frac{5}{2}, \frac{7}{4}, \frac{11}{8}, \frac{8}{5}$

  then, $\frac{5}{2} > \frac{7}{4} > \frac{8}{5} > \frac{11}{8}$

Quicker Method (Cross Multiplication) :

This is a shortcut method to compare fractions. Using this method we can compare all types of fractions.

$\frac{5}{9} \; ? \; \frac{4}{7}$

$5 \times 7 = 35 \qquad 9 \times 4 = 36$

The fraction whose numerator is in the greater product is greater.

Since 36 is greater than 35, hence, $\frac{4}{7} > \frac{5}{9}$

LCM AND HCF

Factors and Multiples : If a number x divides another number y exactly, we say that x is a factor of y. Also y is called a multiple of x.

Highest Common Factor (HCF) :

The H.C.F. of two or more than two numbers is the greatest number that divides each one of them exactly. There are two methods for determining H.C.F.:

1. **Prime factorization method :** We can determine the H.C.F. of 144, 180 and 108 from following process.

   $144 = \underline{2 \times 2} \times 2 \times 2 \times \underline{3 \times 3}$

   $108 = \underline{2 \times 2} \times \underline{3 \times 3} \times 3$

   $180 = \underline{2 \times 2} \times \underline{3 \times 3} \times 5$

   In prime factoriation of the above mentioned three numbers, the common factorization is $2 \times 2 \times 3 \times 3 = 36$.

   Thus, required H.C.F. of 144, 180 and 108 is 36.

2. **Division Method:** We can determine the H.C.F. of above mentioned numbers from the following process :

$$144 \overline{)\,180\,(\,1} \quad 144 \quad \overline{36)\,144\,(\,4} \quad 144 \quad \times\times\times$$

Thus, the H.C.F of 144 and 180 is 36.

Now, we find the H.C.F of 36 and 108.

$$36 \overline{)\,108\,(\,3} \quad 108 \quad \times\times\times$$

So, required H.C.F is 36.

Lowest Common Multiple (LCM) :

The L.C.M. of two or more than two numbers is the least number which is exactly divisible by each one of the given numbers.

❖ **Formula**: Product of two numbers = (their H.C.F.) × (their L.C.M.).

We can determine L.C.M. of two given numbers by the following two methods:

1. **Prime Factorization method:** Suppose we have to find the L.C.M. of 12, 16 and 30, then

   $12 = 2 \times 2 \times 3$

   $16 = 2 \times 2 \times 2 \times 2$

   $30 = 2 \times 3 \times 5$

   Thus, required L.C.M. of the given numbers

   $= \underline{2 \times 2 \times 2 \times 2 \times 2} \times \underline{3} \times \underline{5} = 240$

2. **Division method:** We can determine the L.C.M. of above mentioned numbers from the following process :

$$2 \mid 12,\ 16,\ 30$$
$$2 \mid 6,\ 8,\ 15$$
$$3 \mid 3,\ 4,\ 15$$
$$1,\ 4,\ 5$$

Thus, required L.C.M. of the given number

$= 2 \times 2 \times 3 \times 1 \times 4 \times 5 = 240$

H.C.F. and L.C.M. of Fractions:

❖ H.C.F. of factions $= \dfrac{\text{H.C.F. of Numerators}}{\text{L.C.M. of Denominators}}$

For Example, we have to find the H.C.F. of $\frac{1}{2}$ and $\frac{3}{4}$.

Then, H.C.F. of $\frac{1}{2}$ and $\frac{3}{4} = \dfrac{\text{H.C.F. of 1 and 3}}{\text{L.C.M. of 2 and 4}} = \dfrac{1}{4}$

❖. L.C.M of fractions $= \dfrac{\text{L.C.M. of Numerators}}{\text{H.C.F. Denominators}}$

For Example, we have to find the L.C.M. of $\frac{1}{2}$ and $\frac{3}{4}$.

Then, L.C.M. of $\frac{1}{2}$ and $\frac{3}{4} = \dfrac{\text{L.C.M. of 1 and 3}}{\text{H.C.F. of 2 and 4}} = \dfrac{3}{2}$

Formulae to Remember

- ❖ The product of two numbers = (HCF of the numbers) × (LCM of the numbers)
- ❖ Sum of first n natural numbers $= \dfrac{n(n+1)}{2}$
- ❖ Sum of first n even numbers $= \dfrac{\text{Last even number (last even number + 2)}}{4}$
- ❖ Sum of first n odd numbers $= \left(\dfrac{\text{last odd number} + 1}{2}\right)^2$

In the sequence, A, A + D, A + 2D, A + 3D ..... Nth term = A + (N – 1) D

and sum of N terms $= \dfrac{N}{2}[2A + (N-1)D]$

Rules of Divisibility

These rules let you test if one number can be evenly divided by another, without having to do too much calculation!

(Divisibility Conditions)		
A number is divisible by	**If**	**Example**
2	The last digit is even (0, 2, 4, 6, 8 …..)	12**8** is 129 is not
3	The sum of the digits is evenly/ completely divisible by 3	381 (3 + 8 + 1 = 12, and 12 ÷ 3 = 4) **Yes** 217 (2 + 1 + 7 = 10, and 10 ÷ 3 = 3 $^{1}/_{3}$) **No**
4	The last 2 digits are evenly/ completelydivisible by 4	13**12,** (12 ÷ 4 = 3) is 70**19** is not
5	The last digit is 0 or 5	17**5** is 809 is not
6	The number is evenly / completely divisible by both 2 and 3	114 (it is even and 1 + 1 + 4 = 6 and 6 ÷ 3 = 2) Yes 308 (it is even but 3 + 0 + 8 = 11 and 11 ÷ 3 = $3\frac{2}{3}$) **No**
7	If you double the last digit and subtract it from the rest of the number and the answer is : **0 or divisible by 7** (Note : for bigger numbers you can apply this rule to the answer again if you want)	672 (Double 2 is 4, 67 - 4 = 63, and 63 ÷ 7 = 9) **Yes** 905 (Double 5 is 10 , 90 - 10 = 80, and 80 ÷ 7 = 11 3/7) No
8	The last three digits are divisible by 8	109**816** (816 ÷ 8 = 102) **Yes** 216**302** (302 ÷ 8 = 37 3/4) **No**
9	The sum of the digits is divisible by 9 (Note : for bigger numbers you can apply this rule to the answer again if you want)	1629 (1 + 6 + 2 + 9 = 18, and again, 1 + 8 = 9) **Yes** 2013 (2 + 0 + 1 + 3 = 6) **No**
10	The number ends in 0	22**0** is 221 is not
11	If the difference of the sum of the digits at odd places and the sum of the digits at even places is **0 or divisible by 11**	1**3**6**4** ((3 + 4) – (1 + 6) = **0**) **Yes** 2**5**176 ((5 + 7) – (2 + 1 + 6) = **3**) **No**
12	(i) The number is divisible by 3 and 4 both, or (ii) If you subtract the last digit from twice the rest of the number and the answer is : **0 or divisible by 12** (Note : for bigger numbers this can be applied repeatedly)	648 (6 + 4 + 8 = 18 and 18 ÷ 3 = 6, and 48 ÷ 4 = 12) **Yes** 916 (9 + 1 + 6 = 16, 16 ÷ 3 = $5\frac{1}{3}$) **No**

SOLVED EXAMPLES

EXAMPLE ▶ 1 : If an amount of ₹ 198011 is distributed equally amongst 47 persons, how much amount would each person get ?

(a) ₹4123 (b) ₹4231
(c) ₹4213 (d) ₹4132
(e) None of these

Sol. (c) Sum received by each person $= ₹\left(\frac{198011}{47}\right) = ₹4213$

EXAMPLE ▶ 2 : A company canteen requires 798 bananas per week. Totally how many bananas will it require for the months of January, February and March, 2008 if the number of employees did not change during this period ?

(a) 10480 (b) 10277
(c) 10586 (d) 10374
(e) None of these

Sol. (d) Number of days in the months of January, February and March in 2008

$= 31 + 29 + 31 = 91$ days $= 91 \div 7$ weeks $= 13$ weeks

$\because$ Consumption of bananas in 1 week = 798

$\therefore$ Consumption of bananas in 13 weeks

$= 13 \times 798 = 10374$

EXAMPLE ▶ 3 : The cost of 2 rings and 4 bangles is ₹ 46854. What is the cost of 5 rings and 10 bangles ?

(a) ₹ 115345 (b) ₹ 117135
(c) ₹ 116675 (d) Cannot be determined
(e) None of these

Sol. (b) Let the CP of 1 ring and 1 bangle be ₹ x and ₹ y respectively.

$2x + 4y = 46854$

$\Rightarrow 2.5(2x + 4y) = 2.5 \times 46854$

$\Rightarrow 5x + 10y = ₹117135$

EXAMPLE ▶ 4 : If the sum of four consecutive even numbers is 228, which is the smallest of the numbers ?

(a) 52 (b) 54
(c) 56 (d) 48
(e) None of these

Sol. (b) According to the question,

$x + x + 2 + x + 4 + x + 6 = 228$

$\Rightarrow 4x + 12 = 228$

$\Rightarrow 4x = 228 - 12 = 216$

$\therefore x = \frac{216}{4} = 54$

$\therefore$ The smallest even number = 54

EXAMPLE ▶ 5 : The difference between a two-digit number and the number obtained after interchanging the two digits of the two- digit number is 27. The sum of the two digits of the two-digit number is 15. What is the two-digit number ?

(a) 87 (b) 96
(c) 69 (d) Cannot be determined
(e) None of these

Sol. (d) Let the two digit nubmer be $10x + y$, where x is the first digit and y the second digit.

$\therefore (10x + y) - (10y + x) = 27$

$9x - 9y = 27$

$x - y = 3$ ....(a)

also $x + y = 15$ ....(b)

$\therefore x = 9$ and $y = 6$

$\therefore$ Required number is 96 or 69

EXAMPLE ▶ 6 : Five bells begin to toll together at intervals of 9 seconds, 6 seconds, 4 seconds, 10 seconds and 8 seconds respectively. How many times will they toll together in the span of one hour (excluding the toll at the start)?

(a) 5 (b) 8
(c) 10 (d) Cannot be determined
(e) None of these

Sol. (c)

2	9, 6, 4, 10, 8
2	9, 3, 2, 5, 4
3	9, 3, 1, 5, 2
	3, 1, 1, 5, 2

$\therefore$ LCM $= 2 \times 2 \times 2 \times 3 \times 3 \times 5 = 360$ sec.

$= \frac{1}{10}$ Hour.

The bells will toll together after an interval of $\frac{1}{10}$ hour.

$\therefore$ they will toll together 10 times in $\frac{1}{10}$ hour.

EXAMPLE ▶ 7 : Samantha, Jessica and Roseline begin to jog around a circular stadium. They complete their one lap around the stadium in 84 seconds, 56 seconds and 63 seconds respectively. After how many seconds will they be together at the starting point?

(a) 336 (b) 504
(c) 252 (d) Cannot be determined
(e) None of these

Sol. (b) LCM of 84, 56, 63

2	84, 56, 63,
2	42, 28, 63,
7	21, 14, 63,
3	3, 2 9
	1, 2, 3,

$\therefore 2 \times 2 \times 7 \times 3 \times 2 \times 3 = 504$

Hence, all three persons will be together at the starting point after 504 seconds.

EXAMPLE ▶ 8 : If the fractions $\frac{2}{5}, \frac{3}{8}, \frac{4}{9}, \frac{5}{13}$ and $\frac{6}{11}$ are arranged in ascending order of their values, which one will be the fourth?

(a) $\frac{4}{9}$ **(b)** $\frac{5}{13}$

(c) $\frac{3}{8}$ **(d)** $\frac{2}{5}$

(e) None of these

Sol. (a) $\frac{2}{5} = 0.4,$ $\frac{3}{8} = 0.375,$

$\frac{4}{9} = 0.44,$ $\frac{5}{13} = 0.38,$

$\frac{6}{11} = 0.54$

$\therefore$ Ascending order is

$= \frac{3}{8}, \frac{5}{13}, \frac{2}{5}, \frac{4}{9}, \frac{6}{11}$

So the fourth one will be $\frac{4}{9}$.

EXAMPLE ▶ 9 : Bhuvan has some hens and some cows. If the total number of animal-heads are 71 and the total number of feet are 228, how many hens does Bhuvan have ?

(a) 43 **(b) 32**

(c) 24

(d) Cannot be determined

(e) None of these

Sol. (e) Let Bhuwan have x hens and y cows

According to the question,

$x + y = 71$ ...(i)

$2x + 4y = 228$ ...(ii)

Multiply equation (i) by 4 and subtract equation (ii) from it :

$4x + 4y - 2x - 4y = 284 - 228$

or, $2x = 56$

or, $x = \frac{56}{2} = 28$

$\therefore$ Number of hens = 28

EXAMPLE ▶ 10 : $\frac{1}{4}$th of $\frac{2}{5}$th of a number is 82. What is the number?

(a) 410 **(b) 820**

(c) 420 **(d) 220**

(e) None of these

Sol. (b) Let the number be = x

According to the question,

$x \times \frac{2}{5} \times \frac{1}{4} = 82$

or, $x = \frac{82 \times 5 \times 4}{2} = 820$

EXERCISE

1. What is 456 times 121?
   (a) 56453 (b) 54167
   (c) 55176 (d) 54155
   (e) None of these
2. The product of two consecutive even numbers is 12768. What is the greater number ?
   (a) 110 (b) 108
   (c) 114 (d) 112
   (e) None of these
3. An amount of ₹ 50176 is distributed equally amongst 32 persons. How much amount would each person get?
   (a) ₹1,555 (b) ₹1,478
   (c) ₹1,460 (d) ₹1,568
   (e) None of these
4. If an amount of ₹ 1,72,850 is equally distributed amongst 25 people, how much amount would each person get ?
   (a) ₹8912.50 (b) ₹8642.50
   (c) ₹7130 (d) ₹6914
   (e) None of these
5. The sum of four consecutive even numbers. A, B, C, and D is 180. What is the sum of the set of next four consecutive even numbers ?
   (a) 214 (b) 212
   (c) 196 (d) 204
   (e) None of these
6. What is 786 times 964 ?
   (a) 759276 (b) 749844
   (c) 75416 (d) 757704
   (e) None of these
7. The difference between a two-digit number and the number obtained by interchanging the two digits of the number is 18. The sum of the two digits of the number is 12. What is the product of the two digits of the two digits number ?
   (a) 35 (b) 27
   (c) 32 (d) Cannot be determined
   (e) None of these
8. What is 783 times 869?
   (a) 678689 (b) 678861
   (c) 680427 (d) 681993
   (e) None of these
9. There are 15 dozen candles in a box. If there are 39 such boxes. How many candles are there in all the boxes together?
   (a) 7020 (b) 6660
   (c) 6552 (d) 3510
   (e) None of these
10. Monica, Veronica and Rachael begin to jog around a circular stadium. They complete their one lap in 48 seconds, 64 seconds and 72 seconds respectively. After how many seconds will they be together at the starting point ?
    (a) 336 (b) 252
    (c) 576 (d) Cannot be determined
    (e) None of these
11. The product of two consecutive odd numbers is 19043. Which is the smaller number?
    (a) 137 (b) 131
    (c) 133 (d) 129
    (e) None of these
12. What is 131 times 333 ?
    (a) 46323 (b) 43623
    (c) 43290 (d) 44955
    (e) None of these
13. The product of two successive numbers is 8556. What is the smaller number?
    (a) 89 (b) 94
    (c) 90 (d) 92
    (e) None of these
14. A canteen requires 112 kgs of wheat for one week. How many kgs of wheat will it require for 69 days?
    (a) 1,204kgs (b) 1,401kgs
    (c) 1,104kgs (d) 1,014kgs
    (e) None of these
15. If an amount of Rs 41,910 is distributed equally amongst 22 persons, how much amount would each person get ?
    (a) ₹1905 (b) ₹2000
    (c) ₹745 (d) ₹765
    (e) None of these
16. The product of two consecutive even numbers is 4488. Which is the smaller number?
    (a) 62 (b) 71
    (c) 66 (d) 65
    (e) None of these
17. A canteen requires 21 dozen bananas for one week. How many dozen bananas will it require for 54 days?
    (a) 162 (b) 1944
    (c) 165 (d) 2052
    (e) None of these

18. If an amount of ₹ 72,128 is distributed equally amongst 46 persons how much amount would each person get?
(a) ₹1555 (b) ₹1478
(c) ₹1460 (d) ₹1568
(e) None of these

19. What is 234 times 167 ?
(a) 42768 (b) 41184
(c) 40581 (d) 39078
(e) None of these

20. What is the least number to be added to 1500 to make it a perfect square?
(a) 20 (b) 21
(c) 22 (d) 23
(e) None of these

21. The sum of three consecutive integers is 39. Which of the following is the largest among the three?
(a) 12 (b) 15
(c) 13 (d) 16
(e) None of these

22. How many pieces of 8.6 metres length cloth can be cut out of a length of 455.8 metres cloth?
(a) 43 (b) 48
(c) 55 (d) 53
(e) 62

23. The product of two successive numbers is 3192. What is the smaller number?
(a) 59 (b) 58
(c) 57 (d) 56
(e) None of these

24. What is 184 times 156?
(a) 28704 (b) 29704
(c) 30604 (d) 27604
(e) None of these

25. If an amount of ₹ 15,487 is divided equally among 76 students, approximately how much amount will each student get?
(a) ₹206 (b) ₹210
(c) ₹204 (d) ₹218
(e) ₹212

26. The product of two consecutive even numbers is 16128. Which is the larger number?
(a) 132 (b) 128
(c) 124 (d) 126
(e) None of these

27. There are 12 dozen mangoes in a box. If there are 43 such boxes, how many mangoes are there in all the boxes together?
(a) 516 (b) 3096
(c) 6192 (d) 628
(e) None of these

28. What is 768 times 859?
(a) 656276 (b) 661248
(c) 658176 (d) 659712
(e) None of these

29. A canteen requires 13 dozen bananas per day. How many bananas will it require for 9 weeks?
(a) 728 (b) 9828
(c) 1404 (d) 9882
(e) None of these

30. The cost of 3 chairs and 10 tables is ₹ 9856. What is the cost of 6 chairs and 20 tables?
(a) ₹17227 (b) ₹18712
(c) ₹19172 (d) Cannot be determined
(e) None of these

31. An amount of ₹123098 is distributed equally amongst 61 persons. How much amount would each person get?
(a) ₹2018 (b) ₹2108
(c) ₹2258 (d) ₹2388
(e) None of these

32. The sum of a set of five consecutive even numbers is 140. What is the sum of the next set of five consecutive even numbers?
(a) 190 (b) 180
(c) 200 (d) 160
(e) None of these

33. What is 963 times 788 ?
(a) 757268 (b) 759632
(c) 758056 (d) 758844
(e) None of these

34. The cost of 5 tables and 6 chairs is ₹ 2,884. What is the cost of 15 tables and 18 chairs?
(a) ₹3300 (b) ₹7332
(c) ₹5600 (d) ₹8652
(e) None of these

35. $\frac{3}{5}$ of a number is 250 more than 40% of the same number. What is the number?
(a) 1250 (b) 1180
(c) 1200 (d) 1220
(e) none of these

36. The product of two consecutive odd numbers is 1763. What is the larger number?
(a) 43 (b) 39
(c) 41 (d) 37
(e) None of these

37. A canteen requires 4,560 kgs of rice for 30 days. How many kgs, of rice does the canteen require for one week?
(a) 1078 kgs (b) 944 kgs
(c) 1054kgs (d) 1068 kgs
(e) None of these

38. If an amount of ₹ 13,957 is divided equally among 45 people, how much approximate amount will each person get?
(a) ₹330 (b) ₹250
(c) ₹275 (d) ₹310
(e) None of these

39. The product of two consecutive even numbers is 5328. What is the smaller number?
(a) 70 (b) 68
(c) 74 (d) 72
(e) None of these

40. Three girls start jogging from the same point around a circular track and they complete one round in 24 seconds, 36 seconds and 48 seconds respectively. After how much time will they meet at one point?
(a) 2 minutes, 20 seconds
(b) 2 minutes, 24 seconds
(c) 4 minutes 12 seconds
(d) 3 minutes 36 seconds
(e) None of these

41. The average of four consecutive even numbers is 27. What is the highest number?
(a) 32 (b) 28
(c) 30 (d) 34
(e) None of these

42. Three friends A, B and C start running around a circular stadium and complete a single round in 24, 36 and 30 seconds respectively. After how many minutes will they meet again at the starting point?
(a) 12 (b) 6
(c) 8 (d) 15
(e) 18

43. If the fractions $\frac{1}{2}, \frac{2}{3}, \frac{5}{9}, \frac{6}{13}$, and $\frac{7}{9}$ are arranged in ascending order of their values, which one will be the fourth ?
(a) $\frac{2}{3}$ (b) $\frac{6}{13}$
(c) $\frac{5}{9}$ (d) $\frac{7}{9}$
(e) None of these

44. If the following fractions $\frac{7}{8}, \frac{4}{5}, \frac{8}{14}, \frac{3}{5}$ and $\frac{5}{6}$ are arranged in descending order which will be the last in the series?
(a) $\frac{8}{14}$ (b) $\frac{7}{8}$
(c) $\frac{4}{5}$ (d) $\frac{3}{5}$
(e) $\frac{5}{6}$

45. If the fractions $\frac{2}{5}, \frac{3}{4}, \frac{4}{5}, \frac{5}{7}$ and $\frac{6}{11}$ are arranged in ascending order of their values, which one will be the fourth ?
(a) $\frac{2}{5}$ (b) $\frac{3}{4}$
(c) $\frac{4}{5}$ (d) $\frac{6}{11}$
(e) $\frac{5}{7}$

46. The difference between two numbers is 3 and the difference between their squares is 63. Which is the larger number?
(a) 12 (b) 9
(c) 15
(d) Cannot be determined
(e) None of these

47. If the difference between a number and two fifths of the number is 30, find the number.
(a) 50 (b) 75
(c) 57 (d) 60
(e) None of these

48. If among 54 students each contributes ₹ 60, the amount to buy new books for the library can be collected . If 9 students drop out how much additional amount does each student have to pay ?
(a) ₹ 18 (b) ₹ 10
(c) ₹ 12 (d) Cannot be determined
(e) None of these

49. If $(12)^3$ is subtracted from the square of a number the answer so obtained is 976. What is the number?
(a) 58 (b) 56
(c) 54 (d) 52
(e) None of these

50. The cost of 5 chairs and 8 tables is ₹ 6,574. What is the cost of 10 chairs and 16 tables?
(a) ₹15674 (b) ₹16435
(c) ₹13148 (d) Cannot be determined
(e) None of these

51. If $(56)^2$ is added to the square of a number, the answer so obtained is 4985. What is the number?
(a) 52 (b) 43
(c) 65 (d) 39
(e) None of these

52. The difference between a number and one fifth of it is 84. What is the number?
(a) 95 (b) 100
(c) 105 (d) 108
(e) 112

53. Kishan has some hens and some cows. If the total number of animal heads are 59 and the total number of feet are 190, how many cows does Kishan have ?
(a) 36 (b) 32
(c) 23 (d) Cannot be determined
(e) None of these

54. Gopal has some hens and some goats. If the total number of animal heads are 43 and total number of feet are 142, how many hens does Gopal have?
(a) 28 (b) 21
(c) 15 (d) Cannot be determined
(e) None of these

55. The difference between a two-digit number and the number obtained by interchanging the two digits of the number is 9. The sum of the digits of the number is 15. What is the product of the two digits of the two-digit number?
(a) 54 (b) 72
(c) 56 (d) Cannot be determined
(e) None of these

56. The number obtained by interchanging the two digits of a two-digit number is less than the original number by 18. The sum of the two digits of the number is 16. What is the original number?
(a) 97 (b) 87
(c) 79 (d) Cannot be determined
(e) None of these

57. If all the fractions $\frac{3}{5}, \frac{1}{8}, \frac{8}{11}, \frac{4}{9}, \frac{2}{7}, \frac{5}{7}$ and $\frac{5}{12}$ are arranged in the descending order of their values, which one will be the third?
(a) $\frac{1}{8}$ (b) $\frac{4}{9}$
(c) $\frac{5}{12}$ (d) $\frac{8}{11}$
(e) None of these

58. Farah got married 8 years ago. Today her age is $1\frac{2}{7}$ times her age at the time of her marriage. At present her daughter's age is one-sixth of her age. What was her daughter's age 3 years ago?
(a) 6 years (b) 2 years
(c) 3 years (d) Cannot be determined
(e) None of these

59. Swapnil, Aakash and Vinay begin to jog around a circular stadium. They complete one lap in 36 seconds, 48 seconds and 42 seconds respectively. After how many seconds will they be together at the starting point?s \
(a) 504 seconds (b) 940 seconds
(c) 1008 seconds (d) 470 seconds
(e) None of these

60. A, B, C, D and E are five consecutive odd numbers The sum of A and C is 146. What is the value of E?
(a) 75 (b) 81
(c) 71 (d) 79
(e) None of these

61. The product of two consecutive even numbers is 582168. Which is the smaller number?
(a) 760 (b) 762
(c) 764 (d) 766
(e) 756

62. Seema's present age is four times her son's present age and four-seventh of her father's present age. The average of the present ages of all three of them is 32 years. What is the difference between the Seema's son's present age and Seema's father's present age ?
(a) 44 years (b) 48 years
(c) 46 years (d) Cannot be determined
(e) None of these

63. The sum of five consecutive even numbers of set A is 280. What is the sum of a different set B of five consecutive numbers whose lowest number is 71 less than double the lowest number of set A ?
(a) 182 (b) 165
(c) 172 (d) 175
(e) None of these

64. Deepak has some hens and some goats. If the total number of animal heads is 90 and the total number of animal feet is 248, what is the total number of goats Deepak has ?
(a) 32 (b) 36
(c) 34
(d) Cannot be determined
(e) None of these

65. The sum of the two digits of a two digit number is 15 and the difference between the two digits of the two digit number is 3. What is the product of the two digits of the two-digit number ?
(a) 56 (b) 63
(c) 42
(d) Cannot be determined
(e) None of these

66. The sum of the squares of two consecutive even numbers is 6500. Which is the smaller number?
(a) 54 (b) 52
(c) 48 (d) 56
(e) None of these

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

ANSWERS & EXPLANATIONS

1. (c) $456 \times 121 = 55176$
2. (c) From the given alternatives,
   $112 \times 114 = 12768$
   $\therefore$ Larger number = 114
3. (d) Amount received by each person
   $= ₹ \frac{50176}{32} = 1568$
4. (d) Amount received by each person
   $= \frac{172850}{25} = ₹ 6914$
5. (b) $A + A + 2 + A + 4 + A + 6 = 180$
   $4A + 12 = 180$
   $A = 42.$
   $\therefore$ Next four consecutive even numbers are
   $50 + 52 + 54 + 56 = 212$
6. (d) $786 \times 964 = 757704.$
7. (a) Let the two-digit number be $= 10x + y$, where $x > y$
   According to the question,
   $10x + y - 10y - x = 18$
   or, $9x - 9y = 18$
   or, $9(x - y) = 18$
   or, $x - y = \frac{18}{9} = 2$ ...(i)
   and, $x + y = 12$ ...(ii)
   From equations (i) and (ii)
   $2x = 14 \Rightarrow x = \frac{14}{2} = 7$
   From equation (i)
   $y = 7 - 2 = 5$
   $\therefore$ Required product $= xy = 7 \times 5 = 35$
8. (c) $783 \times 869 = 680427$
9. (a) Total number of candles $= 15 \times 12 \times 39 = 7020$
10. (c) Required time = LCM of 48, 64 and 72

2	48,	64,	72
2	24,	32,	36
2	12,	16,	18
2	6,	8,	9
3	3,	4,	9
	1,	4,	3

   LCM $= 2 \times 2 \times 2 \times 2 \times 3 \times 4 \times 3 = 576$ seconds.
11. (a) Out of the given alternatives,
   $137 \times 139 = 19043$
   $\therefore$ Required smaller number = 137
12. (b) $? = 333 \times 131 = 43623$
13. (d) Let the numbers be x and $(x + 1)$,
   $\therefore$ $x(x+1) = 8556$
   or, $x^2 + x - 8556 = 0$
   or, $x^2 + 93x - 92x - 8556 = 0$
   or, $(x^2 + 93)(x - 92) = 0$
   $\therefore$ $x = 92$

14. (c) Quantity of wheat for 7 days = 112 kg

$\therefore$ Quantity of wheat for 1 day $= \frac{112}{7}$ kg

$\therefore$ Quantity of wheat for 69 days

$= \frac{112}{7} \times 69 = 1104$ kg

15. (a) Required amount $= \frac{41910}{22} = ₹1905$

16. (c) Let the smaller number be x

$\because \quad x \times (x+2) = 4488$

$\Rightarrow \quad x^2 + 2x - 4488 = 0$

$\Rightarrow \quad (x+68)(x-66) = 0$

$\therefore \quad x = 66$

17. (a) Required number of bananas

$= \frac{21}{7} \times 54 = 162$ dozen

18. (d) Amount received by each person

$= \frac{72128}{46} = ₹1568$

19. (d) $234 \times 167 = 39078$

20. (b) $38^2 = 1444$

$39^2 = 1521$

$\therefore$ Required number $= 1521 - 1500 = 21$

21. (e) Let the three consecutive integers be x, x + 1 and x + 2

According to the question,

$x + x + 1 + x + 2 = 39$

or, $3x + 3 = 39$

or, $3x = 39 - 3 = 36$

or, $x = \frac{36}{3} = 12$

$\therefore$ Required largest number $= x + 2 = 12 + 2 = 14$

22. (d) Number of pieces $= \frac{455.8}{8.6} = 53$

23. (d) Out of the given alternatives,

$56 \times 57 = 3192$

24. (a) Required product $= 184 \times 156 = 28704$

25. (c) Amount received by each student

$= \frac{15487}{76} = \approx ₹204$

26. (b) Quicker Approach:

The unit's digit of the number 16128 is 8,

From the given answer choices, $126 \times 128 = 16128$

$\therefore$ Required larger number = 128

27. (c) Number of mangoes = 12 dozens

$= 12 \times 12 = 144$

$\therefore$ Number of mangoes in 43 boxes

$= 43 \times 144 = 6192$

28. (d) Required product $= 768 \times 859 = 659712$

29. (b) Requirement of bananas for 1 day in the canteen = 13 dozens

$\therefore$ Requirement of bananas for 9 weeks i.e. 63 days

$= 63 \times 13$ dozens

$= 63 \times 13 \times 12 = 9828.$

30. (e) Let the cost of one chair be ₹ x and that of a table be = ₹y

According to the question,

$3x + 10y = ₹9856$

or, $2 \times (3x + 10y) = 2 \times 9856$

$\therefore \quad 6x + 20y = ₹19712$

31. (a) Amount received by each person

$= \frac{123098}{61} = ₹2018$

32. (a) According to the question,

$x + x + 2 + x + 4 + x + 6 + x + 8 = 140$

or, $5x + 20 = 140$

or, $5x = 120$

$\therefore \quad x = \frac{120}{5} = 24$

$\therefore \quad x + 8 = 24 + 8 = 32$

The next set of five consecutive even number will start with = 34

$\therefore$ Required sum $= 34 + 36 + 38 + 40 + 42 = 190$

33. (d) $963 \times 788 = 758844$

34. (d) Let the cost of a table be = ₹x and that chair be = ₹y

According to the question,

$5x + 6y = ₹2884$

$\therefore \quad 3 \times 5x + 3 \times 6y = 3 \times ₹2884$

or, $15x + 18y = ₹8652$

35. (a) Let the number be x

Then $\frac{3x}{5} - \frac{2x}{5} = 250$

$\Rightarrow \quad x = 250 \times 5$

$= 1250$

36. (a) From the given alternatives,
$1763 = 43 \times 41$

37. (e) Required quantity of rice $= \frac{4560 \times 7}{30}$ kg $= 1064$ kg

38. (d) amount received by each person

$= \frac{13957}{45} = ₹310.15 \approx ₹310$

39. (d) Let the smaller number be x
$\because \quad x(x+2) = 5358$
$\Rightarrow \quad x^2 + 2x - 5328 = 0$
$\Rightarrow \quad (x+74)(x-42) = 0$
$\therefore \quad x = 72$

40. (b) Required time
= L.C.M of 24, 36 and 48
= 144 seconds
= 2 minutes 24 seconds

41. (c) $\frac{x + x + 2 + x + 4 + x + 6}{4} = 27$

$\Rightarrow \quad x = \frac{27 \times 4 - 12}{4}$

$= \frac{96}{4} = 24$

$\therefore$ Highest number $= 24 + 6 = 30$

42. (b) Required time = L.C.M of 24, 36 and 30
= 360 seconds = 6 minutes

43. (a) The given fractions are $\frac{1}{2}, \frac{2}{3}, \frac{5}{9}, \frac{6}{13}$ and $\frac{7}{9}$

LCM of their denominators is 234

$\therefore \quad \frac{117, 78, 26, 18, 26}{234}$

$\frac{117, 2 \times 78, 5 \times 26, 6 \times 18, 7 \times 26}{234}$

$\frac{117, 156, 130, 108, 182}{234}$

On arranging the numerators in ascending order
108, 117, 130, 156, 182.
$\therefore$ Ascending order of the fraction is

$\frac{6}{13} < \frac{1}{2} < \frac{5}{9} < \frac{2}{3} < \frac{7}{9}$

44. (a) Decimal equivalents of fractions

$\frac{7}{8} = 0.875, \quad \frac{4}{5} = 0.8$

$\frac{8}{14} = 0.57, \quad \frac{3}{5} = 0.6$

$\frac{5}{6} = 0.83$

$\therefore \quad 0.875 > 0.83 > 0.8 > 0.6 > 0.57$

$\therefore \quad \frac{7}{8} > \frac{5}{6} > \frac{4}{5} > \frac{3}{5} > \frac{8}{14}$

45. (b) Decimal equivalent of given fractions:

$\frac{2}{5} = 0.4; \quad \frac{3}{4} = 0.75; \quad \frac{4}{5} = 0.8;$

$\frac{5}{7} = 0.714; \quad \frac{6}{11} = 0.545$

Clearly, $0.4 < 0.545 < 0.714 < 0.75 < 0.8$

$\therefore \quad \frac{2}{5} < \frac{6}{11} < \frac{5}{7} < \frac{3}{4} < \frac{4}{5}$

46. (a) Let the larger and smaller numbers be x and y respectively.
Then, $x - y = 3$ ...(i)
and, $x^2 - y^2 = 63$
$\Rightarrow \quad (x+y)(x-y) = 63$

$\Rightarrow \quad (x+y) = \frac{63}{3} = 21$ ...(ii)

From equation (i) and (ii),
$x = 12$

47. (a) Let the number be = x
According to the question,

$x - \frac{2x}{5} = 30$

$\Rightarrow \quad \frac{3x}{5} = 30$

$\Rightarrow \quad x = \frac{30 \times 5}{3} = 50$

48. (c) Sum to be collected from 54 students $= 60 \times 54 = 3240$ ₹
Sum collected from 45 students $= 60 \times 45 = 2700$ ₹
Difference = 3240 - 2700 = 540 ₹
$\therefore$ Additional amount to be paid by each student

$= \frac{540}{45} = ₹12$

49. (d) Let the number be x.
$\because \quad x^2 - (12)^3 = 976$
$\therefore \quad x^2 = 976 + 1728 = 2704$
$\therefore \quad x = \sqrt{2704} = 52$

50. (c) $\because$ 5 chairs + 8 tables = ₹6574
$\therefore$ 10 chairs + 16 tables $= 6574 \times 2 =$ ₹ 13148

51. (b) Let the number be x.
$\because \quad x^2 + (56)^2 = 4985$
$\Rightarrow \quad x^2 = 4985 - 3136 = 1849$
$\therefore \quad x = \sqrt{1849} = 43$

52. (c) $\left(1-\frac{1}{5}\right)$ of the number $= 84$

$\therefore$ number $= \left(\frac{84\times 5}{4}\right) = 105$

53. (a) A hen has two legs whereas a cow has four legs.
But both of them have one head each.
Let Kishan have x cows
$\therefore$ Number of hens $= 59 - x$.
According to the question,
$4 \times x + (59 - x) \times 2 = 190$
or, $4x + 118 - 2x = 190$
or, $2x = 190 - 118 = 72$

$\therefore$ $x = \frac{72}{2} = 36$

Number of cows $= 36$

54. (c) Let the number of hens $= x$
$\therefore$ Number of goats $= 43 - x$
According to the question,
$x \times 2 + (43 - x) \times 4 = 142$
or, $2x + 172 - 4x = 142$
or, $2x = 172 - 142$

$\therefore$ $x = \frac{30}{2} = 15$

$\therefore$ Number of hens $= 15$

55. (c) Let the two-digit number be
$= 10x + y$, where $x < y$.
Number obtained after interchanging the digits
$= 10y + x$
According to the question,
$10y + x - 10x - y = 9$
or, $9y - 9x = 9$
or, $9(y - x) = 9$
or, $y - x = 1$ ...(i)
and $x + y = 15$ ...(ii)
From equations (i) and (ii),
$y = 8$ and $x = 7$
$\therefore$ Required product $= 8 \times 7 = 56$

56. (a) Let the number be $(10x + y)$
Then, $(10x + y) - (10y + x) = 18$
$\Rightarrow$ $9x - 9y = 18$
$\Rightarrow$ $x - y = 2$ ...(i)
and, $x + y = 16$ ...(ii)
$x = 9, y = 7$
From equations (i) and (ii),
So, the number is $(10 \times 9 + 7) = 97$

57. (e) $\frac{3}{5} = 0.6, \frac{1}{8} = 0.125,$

$\frac{8}{11} = 0.727, \frac{4}{9} = 0.44,$

$\frac{2}{7} = 0.285, \frac{5}{7} = 0.714,$

$\frac{5}{12} = 0.416$

Descending order :

$\frac{8}{11}, \frac{5}{7}, \frac{3}{5}, \frac{4}{9}, \frac{5}{12}, \frac{2}{7}, \frac{1}{8}$

So, $\frac{3}{5}$ is the third.

58. (c) Let Farah's age at the time of her marriage be x.

Then, $(x + 8) = x \times \frac{9}{7}$

$\Rightarrow \frac{9x}{7} - x = 8$

$\Rightarrow x = \frac{8 \times 7}{2} = 28$ years

$\therefore$ Farah's present age $= 28 + 8 = 36$ years

$\therefore$ Daughter's age 3 years ago $= 36 \times \frac{1}{6} - 3$

$= 3$ years

59. (c) They will be together at the starting point after the L.C.M of 36, 48 and 42
L.C.M. of 36, 48, 42 = 1008 seconds

60. (d) $A + C = 146$
or $A + A + 4 = 146$

or $A = \frac{146 - 4}{2} = 71$

$\therefore$ $E = A + 8 = 71 + 8 = 79$

61. (b) Let the numbers be x and $(x + 2)$
Then, $x \times (x + 2) = 582168$
$\Rightarrow$ $x^2 + 2x - 582168 = 0$
$\Rightarrow$ $x^2 + 764x - 762x - 582168 = 0$
$\Rightarrow$ $(x + 764)(x - 762) = 0$
$\Rightarrow$ $x = 762$

62. (b) Let Seema's present age be x years.

Then, Seema's son's present age $= \frac{x}{4}$ years

Seema's father's present age $= \frac{7x}{4}$ years.

Then, $x + \frac{x}{4} + \frac{7x}{4} = 32 \times 3$

$\Rightarrow \quad 12x = 96 \times 4$

$\Rightarrow \quad x = \dfrac{96 \times 4}{12} = 32$

$\therefore$ Required difference $= \dfrac{7 \times 32}{4} - \dfrac{32}{4}$

$= 56 - 8 = 48$ years

63. (d) Lowest number of set A $= \dfrac{280}{5} - 4 = 52$

Lowest number of other set $= 52 \times 2 - 71 = 33$

$\therefore$ Required sum $= 33 + 34 + 35 + 36 + 37 = 175$

64. (c) Let total number of goats be x.

Then, total number of hens $= (90 - x)$

So, $x \times 4 + (90 - x) \times 2 = 248$

$\Rightarrow \quad 4x - 2x = 248 - 180$

$x = \dfrac{68}{2} = 34$

65. (e) Let the two digits be x and y.

Then, $x + y = 15$ ... (i)

$x - y = 3$ ... (ii)

from equation (i) and (ii), $x = 9, y = 6$

$\therefore$ Product $= 9 \times 6 = 54$

66. (d) Let the two numbers be x and $(x + 2)$.

Then, $x^2 + (x + 2)^2 = 6500$

$\Rightarrow \quad x^2 + x^2 + 4x + 4 = 6500$

$\Rightarrow \quad 2x^2 + 4x - 6496 = 0$

$\Rightarrow \quad x^2 + 2x - 3248 = 0$

$\Rightarrow \quad x^2 + 58x - 56x - 3248 = 0$

$\Rightarrow \quad (x + 58)(x - 56) = 0$

$\Rightarrow \quad x = 56$

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CHAPTER 2

SIMPLIFICATION

SIMPLIFICATION

Algebraic expressions contain alphabetic symbols as well as numbers. When an algebraic expression is simplified, an equivalent expression is found that is simpler than the original. This usually means that the simplified expression is smaller than the original.

BODMAS RULE :

This rule depicts the correct sequence in which the operations are to be executed, so as to find out the value of a given expression. Here, 'B' stands for 'Bracket', ' O' for 'of', ' D' for 'Division, ' M' for 'Multiplication', ' A' for 'Addition', ' S' for 'Subtraction'.

When an expression contains a vinculum (a horizontal line above an expression), before applying the 'BODMAS' rule, we simplify the expression under the vinculum.

The next step is to evaluate all the expressions in the brackets.

After removing the brackets, we must use the following operations strictly in the following order:

1. of
2. Division, Multiplication
3. Addtition, Subtraction

So, the order of precedence is:

V Vinculum first
B Brackets
O Of, Orders (i.e. Powers and Square Roots, etc.)
DM Division and Multiplication (left-to-right)
AS Addition and Subtraction (left-to-right)

LAWS OF SURDS AND INDICES

LAWS OF SURDS:

- $\left(a^{\frac{1}{n}}\right)^n = a$
- $a^{\frac{1}{n}} b^{\frac{1}{n}} = (ab)^{\frac{1}{n}}$
- $\left(a^{\frac{1}{n}}\right)^{\frac{1}{m}} = a^{\frac{1}{mn}}$

All these laws follow from the laws of indices.

TYPES OF SURDS :

Mixed surds: If one factor of a surd is a rational number and the other factor is an irrational number, then the surd is called a mixed surd.

Example: $2\sqrt{5}, -2\sqrt{3}$

Pure surds: If a surd has unity as its only rational factor, the other factor being an irrational number, then it is called a pure surd.

Examples: $\sqrt{3}, \sqrt{a}$

Since surds are irrational numbers, they can be added or subtracted as real numbers. Also a rational number can be added or subtracted from a surd. The result will be a real number.

Examples: $\sqrt{5}+3;\ 2-\sqrt{7};\ \sqrt{3}-2$

ADDITION AND SUBTRACTION OF SURDS :

Example: $5\sqrt{2}+20\sqrt{2}-3\sqrt{2}=22\sqrt{2}$

Example: $\sqrt{45}-3\sqrt{20}+4\sqrt{5}=3\sqrt{5}-6\sqrt{5}+4\sqrt{5}=\sqrt{5}$

Multiplying and Dividing Surds :

Surds can be multiplied by using the laws of surds. To multiply or divide Surds they have to first be made of the same order.

Examples: $\sqrt{4}\times\sqrt{22}=\sqrt{88}$, $\sqrt{162}/\sqrt{9}=3\sqrt{2}$

LAWS OF INDICES :

- $a^m \times a^n = a^{m+n}$
- $a^m \div a^n = a^{m-n}$
- $(a^m)^n = a^{mn}$
- $a^{\frac{1}{m}} = \sqrt[m]{a}$
- $a^{-m} = \frac{1}{a^m}$
- $a^{m/n} = \sqrt[n]{a^m}$
- $a^0 = 1$

Examples:

$\sqrt[5]{4^3} = (4^3)^{\frac{1}{5}} = (4^{\frac{3}{5}})$

$5^3 \times 5^4 = 5^7$

$\frac{5^5}{5^2} = 5^3$

Other Important Formulae

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

$(a^2 - b^2) = (a-b)(a+b)$

$(a+b)^2 = (a-b)^2 + 4ab$

$(a-b)^3 = a^3 - b^3 - 3ab(a-b)$

$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

$(a+b+c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$

$x^3 + \frac{1}{x^3} = \left(x + \frac{1}{x}\right)^3 - 3\left(x + \frac{1}{x}\right)$

If $a+b+c=0$, then $a^3 + b^3 + c^3 = 3abc$

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

$(a+b)^2 + (a-b)^2 = 2(a^2 + b^2)$

$(a+b)^3 = a^3 + b^3 + 3ab(a+b)$

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

$a^3 + b^3 + c^3 - 3abc = (a+b+c)(a^2 + b^2 + c^2 - ab - bc - ac)$

$x^2 + \frac{1}{x^2} = \left(x + \frac{1}{x}\right)^2 - 2 = \left(x - \frac{1}{x}\right)^2 + 2$

SOLVED EXAMPLES

EXAMPLE ▶ 1 : What value should come in place of the question mark (?) in the following question ?

$432 \times 66 - 1562 = ?$

(a) 23450 **(b) 24360**
(c) 25890 **(d) 26950**
(e) None of these

Sol. (d) $? = 432 \times 66 - 1562$
$= 28512 - 1562 = 26950$

EXAMPLE ▶ 2 : What value should come in place of the question mark (?) in the following question ?

$44^3 \times 16^3 - 18678^2 = ?$

(a) 45980 **(b) 44890**
(c) 43780 **(d) 42670**
(e) None of these

Sol. (a) $? = 44^3 \times 16^3 - 18678^2$
$= 348913664 - 348867684$
$= 45980$

EXAMPLE ▶ 3 : What value should come in place of the question mark (?) in the following question ?

$$6\frac{2}{3} \div 4\frac{4}{5} = ?$$

(a) $1\frac{1}{3}$ **(b)** $1\frac{7}{18}$

(c) $1\frac{12}{19}$ **(d)** $1\frac{5}{8}$

(e) None of these

Sol. (b)

$$? = \frac{20}{3} \div \frac{24}{5}$$

$$= \frac{20}{3} \times \frac{5}{24} = \frac{25}{18} = 1\frac{7}{18}$$

EXAMPLE ▶ 4 : What value should come in place of the question mark (?) in the following question ?

$\frac{3}{8}$ **of** $\frac{5}{7}$ **of** $\frac{2}{5}$ **of 1680 = ?**

(a) 150 **(b) 180**
(c) 210 **(d) 240**
(e) None of these

Sol. (b) $? = 1680 \times \frac{2}{5} \times \frac{5}{7} \times \frac{3}{8} = 180$

EXAMPLE ▶ 5 : If $(28)^3$ is subtracted from the square of a number, the answer so obtained is 1457. What is the number?

(a) 127 **(b) 136**
(c) 142 **(d) 153**
(e) None of these

Sol. (d) Let the number be x.
According to the question,
$x^2 - (28)^3 = 1457$
$\Rightarrow x^2 - 21952 = 1457$
$\Rightarrow x^2 - 21952 - 1457 = 0$
$\Rightarrow x^2 = 23409$
$\Rightarrow x = \sqrt{23409} = 153$

EXAMPLE ▶ 6 : If $(89)^2$ is added to the square of a number, the answer so obtained is 16202. What is the number?

(a) 91 **(b) 8281**
(c) 8649 **(d) 93**
(e) None of these

Sol. (a) Let the number be x.
According to the question,
$x^2 + (89)^2 = 16202$

$\Rightarrow x^2 + 7921 = 16202$

$\Rightarrow x^2 = 16202 - 7921 = 8281$

$\Rightarrow x = \sqrt{8281} = 91$

EXAMPLE ▶ 7 : $\dfrac{4\times2+6}{5\times16-2} = ?$

(a) 5 **(b)** $\frac{16}{35}$

(c) $\frac{1}{5}$ **(d)** $\frac{16}{39}$

(e) None of these

Sol. (e) $? = \dfrac{4\times2+6}{5\times16-2} = \dfrac{8+6}{80-2} = \dfrac{14}{78} = \dfrac{7}{39}$

EXAMPLE ▶ 8 : If $(41)^2$ is added to the square of a number, the answer so obtained is 7457. What is the number ?

(a) 76 **(b) 63**

(c) 81 **(d) 82**

(e) None of these

Sol. (a) Required number

$= \sqrt{7457 - (41)^2}$

$= \sqrt{7457 - 1681}$

$= \sqrt{5776} = 76$

EXAMPLE ▶ 9 : What approximate value should come in place of question mark (?) in the following questions?

(you are not expected to calculate the exact value)

$(935.82)^2 = ?$

(a) 870000 **(b) 867500**

(c) 888800 **(d) 875800**

(e) 899800

Sol. (d) $? = (935.82)^2 \approx (936)^2$

$\approx 936 \times 936 = 876096 \approx 875800$

EXAMPLE ▶ 10 : What approximate value should come in place of the question mark (?) in the following question?

$4444 \div 56 \times (23)^2 + 63 = ?$

(a) 45670 **(b) 46290**

(c) 44630 **(d) 43530**

(e) 42050

Sol. (e) $? = \left(\dfrac{4444\times23\times23}{56}\right) + 63$

$\approx \left(\dfrac{4450\times23\times23}{56}\right) + 63$

$\approx 42037 + 63 = 42100 \approx 42050$

EXERCISE

Directions: In the following find the value of '?'

1. $56.6 \times 16.6 \times 6.6 = ?$

(a) 6102.196 (b) 6021.196

(c) 6210.196 (d) 6012.196

(e) None of these

2. $? \div 46 \times 16 = 368$

(a) 1124 (b) 1236

(c) 1058 (d) 966

(e) None of these

3. $999.99 + 99.99 + 9.99 = ?$

(a) 1109.99 (b) 1019.89

(c) 1108.99 (d) 1099.88

(e) none of these

4. $11.6 \times ? = 899$

(a) 77.5 (b) 78.5

(c) 79.5 (d) 81.5

(e) none of these

5. $85332 - 11638 - 60994 = ?$

(a) 12700 (b) 12600

(c) 12800 (d) 12500

(e) None of these

6. ? of 57.75 of 0.8 = 3187.8

(a) 45 (b) 27

(c) 64 (d) 69

(e) None of these

7. $(?)^2 - (12)^3 = 976$

(a) 58 (b) 56

(c) 54 (d) 52

(e) None of these

8. $351 \div 6 \div 0.5 = ?$

(a) 117 (b) 119

(c) 121 (d) 123

(e) None of these

9. $18 \times ? = 7776 \div 12$
   (a) 32 (b) 42
   (c) 160 (d) 36
   (e) None of these

10. $11 \times 55 \div 5 + 9 = ?$
   (a) 120 (b) 140
   (c) 48 (d) 180
   (e) None of these

11. $85333 - 11638 - 60994 = ?$
   (a) 12701 (b) 12600
   (c) 12800 (d) 12500
   (e) None of these

12. $8^4 - 8^2 = ?$
   (a) 64 (b) 512
   (c) 4032 (d) 4096
   (e) None of these

13. $6.3 \times 12.8 \times 9.9 - 69.996 = ?$
   (a) 738.54 (b) 758.94
   (c) 728.34 (d) 748.74
   (e) None of these

14. $8 + 18 \times 368 \div 16 = ?$
   (a) 598 (b) 356
   (c) 648 (d) 422
   (e) None of these

15. $11059 + 8889 - 908 = ? \times 85$
   (a) 236 (b) 212
   (c) 248 (d) 272
   (e) None of these

16. $66606 + 40998 = ? - 24848$
   (a) 132452 (b) 132242
   (c) 132425 (d) 132254
   (e) None of these

17. $894.65 - 388.24 + 100.99 = ?$
   (a) 617.4 (b) 607.4
   (c) 597.4 (d) 587.4
   (e) None of these

18. $1181 + 1520 = (26)^2 + (?)^2$
   (a) 49 (b) 43
   (c) 47 (d) 45
   (e) None of these

19. $59475 \div \sqrt{?} = 195 \times 5$
   (a) 3969 (b) 3481
   (c) 4225 (d) 3249
   (e) None of these

20. $\sqrt{?} + 29 = \sqrt{2704}$
   (a) 23 (b) 529
   (c) 441 (d) 21
   (e) None of these

21. What is the least number to be added to 1500 to make it a perfect square ?
   (a) 21 (b) 35
   (c) 43 (d) 59
   (e) None of these

22. $-\frac{4}{5}$ of $1150 + \frac{5}{6}$ of $1248 = ?$
   (a) 140 (b) 115
   (c) 125 (d) 120
   (e) None of these

23. $235 + 75 \times 8 = ?$
   (a) 2480 (b) 835
   (c) 1955 (d) 2840
   (e) none of these

24. $5986 - 2340 = 1496 + ?$
   (a) 2150 (b) 1150
   (c) 2140 (d) 1970
   (e) none of these

25. $7^{\frac{1}{4}} \times (343)^{0.25} = ?$
   (a) $\sqrt{7}$ (b) 49
   (c) 7 (d) $7\sqrt{7}$
   (e) None of these

26. $57.63 - 37.26 = 39.27 - ?$
   (a) 18.90 (b) 18.54
   (c) 19.73 (d) 19.54
   (e) None of these

27. $\sqrt{1089} + \sqrt{289} = \sqrt{?}$
   (a) 625 (b) 50
   (c) 25 (d) 1378
   (e) None of these

28. $12.8 \times 2.5 + 8.6 = ?$
   (a) 41.3 (b) 39.6
   (c) 40.6 (d) 142.08
   (e) None of these

29. $(14^2 - 13^2) \div 3 = ?^2$
   (a) 9 (b) 3
   (c) 27 (d) 6
   (e) None of these

30. $(19)^{12} \times (19)^8 \div (19)^4 = (19)^?$
   (a) 24 (b) 8
   (c) 6 (d) 12
   (e) None of these

31. $70.56 \div 11.2 = ?$
   (a) 63 (b) 6.3
   (c) 7.72 (d) 0.53
   (e) None of these

32. If $x+y=23$ and $xy=126$; then $(x)^2+(y)^2=?$
(a) 250 (b) 317
(c) 340 (d) Cannot be determined
(e) None of these

33. $986.23+7.952+8176.158=?$
(a) 9170.340 (b) 9169.230
(c) 9241.908 (d) 9170.762
(e) None of these

34. $\sqrt{1296} \div \sqrt{36} = ?$
(a) 1 (b) 36
(c) 6 (d) 18
(e) None of these

35. $112 \div 7 \div 4 = 8 \times ?$
(a) 0.25 (b) 0.05
(c) 0.5 (d) 8
(e) None of these

36. $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{4}{8}$ of $3750 = ?$
(a) 625 (b) 312.5
(c) 125 (d) 250
(e) None of these

37. $\frac{3\times8+4}{9\times15-9}=?$
(a) $\frac{16}{9}$ (b) $\frac{2}{3}$
(c) $\frac{4}{9}$ (d) $\frac{3}{2}$
(e) None of these

38. $(87324-79576)\times1.5=?$
(a) 1162.2 (b) 11622
(c) 1372.2 (d) 1163.7
(e) None of these

39. $(331+19)\times(15-11)\times(37+13)=?$
(a) 70000 (b) 4131
(c) 30250 (d) 20350
(e) None of these

40. $11.88\times\frac{250}{18}=?$
(a) 16.50 (b) 4131
(c) 30250 (d) 20350
(e) None of these

41. $\frac{1}{2}\times\frac{3}{4}\div\left(\frac{9}{2}\times\frac{5}{8}\right)=?$
(a) $\frac{5}{96}$ (b) $\frac{15}{8}$
(c) $\frac{5}{108}$ (d) $\frac{12}{5}$
(e) None of these

42. $\frac{18+17\times3-1}{8-15\div3-1}=?$
(a) 17 (b) 26
(c) 13 (d) 34
(e) None of these

43. $1\frac{1}{2}+1\frac{2}{3}\div\left(\frac{6}{7}-\frac{5}{6}\right)=?$
(a) 71.5 (b) 133
(c) $\frac{19}{252}$ (d) $\frac{19}{180}$
(e) None of these

44. $\sqrt{?}-63=9^2$
(a) 12 (b) 144
(c) 324 (d) 128
(e) None of these

45. $916.28-72.4=728.2+?$
(a) 115.86 (b) 125.68
(c) 215.68 (d) 216.04
(e) None of these

46. $7776\div18\times3=?$
(a) 144 (b) 1926
(c) 1296 (d) 1266
(e) None of these

47. $8994-4178-2094=?$
(a) 2720 (b) 2726
(c) 2730 (d) 2734
(e) None of these

48. $315\times114-1565=?$
(a) 34534 (b) 34435
(c) 34345 (d) 33445
(e) None of these

49. $1256\div(32\times0.25)=?$
(a) 160 (b) 154
(c) 165 (d) 157
(e) None of these

50. $69.2\times18.4\times4.5=?$
(a) 5729.76 (b) 5972.76
(c) 5279.76 (d) 5792.76
(e) None of these

51. $3.2 \times 6.8 \times 9.5 = ?$
(a) 207.62 (b) 202.67
(c) 206.27 (d) 207.72
(e) None of these

52. $15^3 \times 9^3 - 1555^2 = ?$
(a) 41250 (b) 43250
(c) 42350 (d) 44250
(e) None of these

53. $8\frac{2}{5} \div 10\frac{2}{25} = ?$
(a) $\frac{5}{6}$ (b) $\frac{7}{8}$
(c) $\frac{4}{5}$ (d) $\frac{3}{4}$
(e) None of these

54. $\frac{3}{5}$ of $\frac{3}{4}$ of $\frac{5}{6}$ of $992 = ?$
(a) 388 (b) 390
(c) 372 (d) 376
(e) None of these

55. $\sqrt{?} + 17 = \sqrt{961}$
(a) 169 (b) 256
(c) 225 (d) 196
(e) None of these

56. $123 \div 6 \div 0.8 = ?$
(a) 25.625 (b) 23.545
(c) 27.455 (d) 21.365
(e) None of these

Choose the correct option.

57. What is the least number to be added to 3986 to make it a perfect square ?
(a) 118 (b) 95
(c) 110 (d) 100
(e) None of these

58. $\sqrt{3781} \times 5.36 \approx ?$
(a) 350 (b) 330
(c) 240 (d) 280
(e) 410

59. If $(26)^2$ is subtracted from square of a number, the answer so obtained is 549. What is the number?
(a) 35 (b) 33
(c) 29 (d) 41
(e) None of these

60. $[(4)^3 \times (5)^4] \div (4)^5 = ?$
(a) 30.0925 (b) 39.0625
(c) 35.6015 (d) 29.0825
(e) None of these

61. $\frac{1.6 \times 3.2}{0.08} = ?$
(a) 6.4 (b) 8
(c) 64 (d) 0.8
(e) None of these

62. $(7857 + 3596 + 4123) \div 96 = ?$
(a) 155.06 (b) 162.25
(c) 151.83 (d) 165.70
(e) None of these

63. $5321 \div 305 \times (19)^2 \simeq ?$
(a) 6150 (b) 6425
(c) 6380 (d) 6355
(e) 6300

64. If $(61)^2$ is added to the square of a number, the answer so obtained is 5242. What is the number?
(a) 40 (b) 39
(c) 37 (d) 43
(e) None of these

65. What is the least number to be added to 4400 to make it a perfect square?
(a) 87 (b) 91
(c) 93 (d) 89
(e) None of these

66. The difference between two numbers is 3 and the difference of their squares is 63. Find the greater number.
(a) 12 (b) 9
(c) 15 (d) Cannot be determined
(e) None of these

67. How much less is $\frac{4}{5}$ of 1150 from $\frac{5}{6}$ of 1248 ?
(a) 140 (b) 115
(c) 125 (d) 120
(e) None of these

68. If $(74)^2$ is subtracted from the square of a number, the answer so obtained is 5340. What is the number?
(a) 98 (b) 102
(c) 104 (d) 110
(e) None of these

69. If $2x + 3y = 78$ and $3x + 2y = 72$, what is the value of $x + y$?
(a) 36 (b) 32
(c) 30 (d) Cannot be determined
(e) None of these

70. $741560 + 935416 + 1143 + 17364 = ?$
(a) 1694583 (b) 1695438
(c) 1695483 (d) 1659483
(e) None of these

71. $(84)^2 \div \sqrt{?} = 168$
(a) 1936 (b) 1521
(c) 1681 (d) 1764
(e) None of these

72. $514789 - 317463 - 87695 - 11207 = ?$
(a) 96584 (b) 98242
(c) 96845 (d) 98424
(e) None of these

73. $\sqrt[3]{50653} = ?$
(a) 39 (b) 43
(c) 33 (d) 41
(e) None of these

74. $(17891 + 16239 - 26352) \times ? = 93336$
(a) 12 (b) 15
(c) 18 (d) 8
(e) None of these

75. $\frac{1}{4} \times 6624 \times \frac{1}{6} \times 12 = ?$
(a) 3312 (b) 3864
(c) 2208 (d) 4416
(e) None of these

76. $\frac{18 \times 15 - 50}{(40 \times 80) \div 160} = ?$
(a) 20 (b) 8.5
(c) 11.5 (d) 22
(e) None of these

77. $\sqrt{?} \times \sqrt{1681} = 2296$
(a) 2196 (b) 3364
(c) 2809 (d) 3025
(e) None of these

78. If $(74)^2$ is subtracted from the square of a number, the answer so obtained is 3740. What is the number?
(a) 9216 (b) 98
(c) 9604 (d) 96
(e) None of these

79. $93 \times 45 \div 25 = ?$
(a) 167.4 (b) 837
(c) 279 (d) 130.2
(e) None of these

80. $0.08 \times ? \times 1.6 = 0.2944$
(a) 1.3 (b) 0.4
(c) 0.2 (d) 2.3
(e) None of these

81. $6 \times 66 \times 666 = ?$
(a) 263736 (b) 267336
(c) 263763 (d) 263376
(e) None of these

82. $5\frac{1}{7} \times 8\frac{1}{6} \div 7\frac{7}{8} = ?$
(a) $1\frac{7}{9}$ (b) $1\frac{7}{8}$
(c) $5\frac{1}{3}$ (d) $5\frac{2}{3}$
(e) None of these

83. $(7)^3 \div \sqrt{?} + 7 = 14$
(a) 49 (b) 1764
(c) 441 (d) 3136
(e) None of these

84. $\sqrt[3]{12167} \times ? = 1035$
(a) 35 (b) 25
(c) 55 (d) 15
(e) None of these

85. $1256 \times 3892 = ?$
(a) 4883582 (b) 4888352
(c) 4888532 (d) 4883852
(e) None of these

86. $0.08 \times 0.5 + 0.9 = ?$
(a) 1.3 (b) 0.94
(c) 0.112 (d) 1.5
(e) None of these

87. $8195 \div 745 + ? \times 12 = 7847$
(a) 648 (b) 593
(c) 601 (d) 653
(e) None of these

88. $4123 \div (2.3)^2 - 446 = ?$
(a) 401 (b) 441
(c) 301 (d) 333
(e) 386

89. If $x + y = 18$ and $xy = 72$, what is the value of $(x)^2 + (y)^2$?
(a) 120 (b) 90
(c) 180 (d) Cannot be determined
(e) None of these

90. Which least number should be added to 8115 to make it a perfect square?
(a) 349 (b) 166
(c) 144 (d) 194
(e) None of these

91. If $(46)^2$ is subtracted from the square of a number, the answer so obtained is 485. What is the number ?
(a) 4 (b) 51
(c) 56 (d) 53
(e) None of these

92. $666 \div (2.4 \times ?) = 185$
(a) 1.5 (b) 2.5
(c) 0.5 (d) 5
(e) None of these

93. $956 \times 753 = ?$
(a) 723692 (b) 727398
(c) 710308 (d) 719868
(e) None of these

94. $\frac{3}{8} \times \frac{4}{7} \times ? = 5376$
(a) 30912 (b) 25144
(c) 24808 (d) 25088
(e) None of these

95. $[(9)^3 \times (?)^2] \div 21 = 1701$
(a) 6 (b) 3
(c) 11 (d) 4
(e) None of these

96. $897214 - 336 - 46521 - 1249 - 632176 = ?$
(a) 217832 (b) 216725
(c) 216932 (d) 315950
(e) None of these

97. $\sqrt{11881} \times \sqrt{?} = 10137$
(a) 8649 (b) 9216
(c) 8281 (d) 9409
(e) None of these

98. $3.5 \times 2.4 \times ? = 42$
(a) 1.5 (b) 0.2
(c) 0.8 (d) 1.2
(e) None of these

99. $\sqrt[3]{804357} = ?$
(a) 98 (b) 89
(c) 96 (d) 93
(e) None of these

100. $\sqrt{?} \div 16 \times 24 = 186$
(a) 14884 (b) 13924
(c) 15376 (d) 15876
(e) None of these

101. $(?)^2 \div (0.04)^2 \times 5.6 = 117740$
(a) 33.64 (b) 6.2
(c) 38.44 (d) 5.4
(e) None of these

102. $9418 - ? + 1436 + 2156 = 5658$
(a) 7523 (b) 7352
(c) 7232 (d) 7325
(e) None of these

103. $9865 + ? + 3174 + 2257 = 19425$
(a) 4047 (b) 4136
(c) 4129 (d) 4092
(e) None of these

104. $\frac{9}{?} \times 33824 = 63$
(a) 4228 (b) 4832
(c) 2416 (d) 8456
(e) None of these

105. $(99)^2 - (?)^2 + (38)^2 = 8436$
(a) 57 (b) 53
(c) 49 (d) 61
(e) None of these

106. $12.36 \times 18.15 + 21.52 = ?$
(a) 250.3036 (b) 209.1448
(c) 249.454 (d) 245.854
(e) None of these

107. $(98764 + 89881 + 99763 + 66342) \div (1186 + ? + 1040 + 1870) = 55$
(a) 2354 (b) 2368
(c) 2254 (d) 2404
(e) None of these

108. $(64)^2 \div \sqrt[3]{32768} = ?$
(a) 128 (b) 132
(c) 142 (d) 104
(e) None of these

109. $\frac{21 \times 14 - 34}{12.4 + 5.6 - 15.5} = ?$
(a) 95 (b) 100
(c) 110 (d) 106
(e) None of these

110. $0.09 \times 6.8 \times ? = 2.142$
(a) 2.5 (b) 4.4
(c) 3.5 (d) 2.4
(e) None of these

111. $11\frac{1}{7} + 2\frac{5}{8} = ?$
(a) $110\frac{1}{7}$ (b) $13\frac{45}{56}$
(c) $96\frac{3}{8}$ (d) $13\frac{43}{56}$
(e) None of these

112. $894 \div 28 \times \sqrt{589} \approx ?$
(a) 700 (b) 686
(c) 796 (d) 775
(e) 754

113. If $(57)^2$ is added to the square of a number, the answer so obtained is 8010. What is the number?
(a) 61 (b) 63
(c) 67 (d) 59
(e) None of these

114. $7275.84 - 889.4 + 124.518 = ?$
(a) 6550.202 (b) 6560.598
(c) 6550.958 (d) 6510.958
(e) None of these

115. $\frac{12^2 - 4^2}{9^2 - 3^2} = ?$
(a) $1\frac{7}{9}$ (b) $1\frac{8}{9}$
(c) $1\frac{1}{3}$ (d) 9
(e) None of these

116. $18800 \div 470 \div 20 = ?$
(a) 800 (b) 2
(c) 23.5 (d) 0.10
(e) None of these

117. $\sqrt{?} + 136 = 320$ of $\frac{5}{8}$
(a) 1936 (b) 4624
(c) 4196 (d) 4096
(e) None of these

118. $777.07 + 77.77 + 0.77 + 7.07 + 7 + 77 = ?$
(a) 946.78 (b) 946.68
(c) 964.68 (d) 946.86
(e) None of these

119. $0.4 \times ? = 0.000016$
(a) 4 (b) 0.04
(c) 0.0004 (d) 400
(e) None of these

120. $4^7 \div 16^4 \times \sqrt{16} = ?$
(a) $\frac{1}{16}$ (b) $\frac{1}{4}$
(c) 4 (d) 1
(e) None of these

121. $0.99 \times 1000 \times 14 \div 11 \div 0.7 = ?$
(a) 18 (b) 180
(c) 1.8 (d) 1800
(e) None of these

122. $95^{3.7} \div 95^{0.9989} \approx 95^{?}$
(a) 1.9 (b) 3
(c) 2.99 (d) 3.6
(e) 2.7

123. $\sqrt{10000} + 1891.992$ of $\frac{3.001}{4.987} \approx ?$
(a) 2500 (b) 1230
(c) 1640 (d) 1525
(e) 2130

124. $0.0004 \div 0.0001 \times 36.000009 \approx ?$
(a) 0.10 (b) 1.45
(c) 145 (d) 14.5
(e) 1450

125. $3739 + 164 \times 27 \approx ?$
(a) 1054000 (b) 4000
(c) 8200 (d) 690
(e) 6300

126. $9876 \div 24.96 + 215.005 - ? \approx 309.99$
(a) 395 (b) 395
(c) 300 (d) 315
(e) 310

127. $[(135)^2 \div 15 \times 32] \div ? = 45 \times 24$
(a) 18 (b) 24
(c) 36 (d) 44
(e) None of these

128. $(96)^2 + (63)^2 = (?)^2 - (111)^2 - 8350$
(a) 33856 (b) 30276
(c) 174 (d) 184
(e) None of these

129. $4368 + 2158 - 596 - ? = 3421 + 1262$
(a) 1066 (b) 1174
(c) 1247 (d) 1387
(e) None of these

130. $2172 \div ? = 1832 - 956 - 514$
(a) 6 (b) 8
(c) 10 (d) 12
(e) None of these

131. $666.06 + 66.60 + 0.66 + 6.06 + 6 + 60 = ?$
(a) 819.56 (b) 805.38
(c) 826.44 (d) 798.62
(e) None of these

132. $205 \times ? \times 13 = 33625 + 25005$
(a) 22 (b) 27
(c) 33 (d) 39
(e) None of these

133. $(10)^{24} \times (10)^{-21} = ?$
(a) 3 (b) 10
(c) 100 (d) 1000
(e) None of these

134. What is the least number to be added to 4321 to make it a perfect square?
(a) 32 (b) 34
(c) 36 (d) 38
(e) None of these

135. $628.306 + 6.1325 \times 44.0268 \approx ?$
(a) 820 (b) 970
(c) 1050 (d) 1175
(e) 900

136. $1896 \div 29 + 445 \approx ?$
(a) 485 (b) 510
(c) 528 (d) 493
(e) 536

137. $(9795 + 7621 + 938) \div (541 + 831 + 496) \approx ?$
(a) 9 (b) 13
(c) 17 (d) 23
(e) 29

138. $814296 \times 36 \approx ? \times 96324$
(a) 326 (b) 272
(c) 304 (d) 358
(e) 260

139. $78 \div 5 \div 0.5 = ?$
(a) 15.6 (b) 31.2
(c) 7.8 (d) 0.4
(e) None of these

140. $12.22 + 22.21 + 221.12 = ?$
(a) 250.55 (b) 255.50
(c) 250.05 (d) 255.05
(e) None of these

141. $12^4 \times 12^{13} = ?$
(a) 12^7 (b) 12^{39}
(c) 12^{17} (d) 12^{-7}
(e) None of these

142. $464 \div (16 \times 2.32) = ?$
(a) 12.5 (b) 14.5
(c) 10.5 (d) 8.5
(e) None of these

143. If $(9)^3$ is subtracted from the square of a number, the answer so obtained is 567. What is the number?
(a) 36 (b) 28
(c) 42 (d) 48
(e) None of these

144. If $(78)^2$ is subtracted from the square of a number, the answer so obtained is 6,460. What is the number?
(a) 109 (b) 111
(c) 113 (d) 115
(e) None of these

145. $4275 \div 496 \times (21)^2 \approx ?$
(a) 3795 (b) 3800
(c) 3810 (d) 3875
(e) 3995

146. $14^{13} \times 14^3 = ?$
(a) 14^{39} (b) 14^7
(c) 14^{16} (d) 14^{10}
(e) None of these

147. What is the least number to be added to 4700 to make it a perfect square?
(a) 74 (b) 69
(c) 76 (d) 61
(e) None of these

148. $21.25 + 22.52 \times 212.22 = ?$
(a) 256.99 (b) 245.99
(c) 252.99 (d) 258.99
(e) None of these

149. $\frac{3}{5}$ of $\frac{3}{4}$ of $\frac{5}{6}$ of $992 = ?$
(a) 388 (b) 390
(c) 372 (d) 376
(e) None of these

150. $6.4 \times ? = 361.6$
(a) 63.5 (b) 52.5
(c) 66.5 (d) 56.5
(e) None of these

151. $2412 + 1139 + 5498 = ?$
(a) 8949 (b) 9049
(c) 8749 (d) 9249
(e) None of these

152. $3.2 \times 6.8 \times 9.5 = ?$
(a) 207.62 (b) 202.67
(c) 206.27 (d) 207.72
(e) None of these

153. $8994 - 4178 - 2094 = ?$
(a) 2720 (b) 2726
(c) 2730 (d) 2734
(e) None of these

154. $\sqrt{?} + 17 = \sqrt{961}$
(a) 169 (b) 256
(c) 225 (d) 196
(e) None of these

155. $9441 + 3991 - 606 = ? \times 53$
(a) 236 (b) 238
(c) 230 (d) 234
(e) None of these

156. $1719 \div 18 = ?$
(a) 95.5 (b) 96
(c) 97.5 (d) 99
(e) None of these

157. $58369 + 69521 = ? + 31972$
(a) 95998 (b) 95189 (c) 95918 (d) 95981 (e) None of these

158. $5470 \div 378 \times (19)^2 \approx ?$
(a) 5236 (b) 5265
(c) 5204 (d) 5250
(e) None of these

159. What is the least number to be added to 3986 to make it a perfect square?
(a) 188 (b) 95
(c) 110 (d) 100
(e) 5224

160. $832.456 - 539.982 - 123.321 = ?$
(a) 196.153 (b) 149.153
(c) 169.153 (d) 176.135
(e) None of these

161. $236.69 + 356.74 = 393.39 + ?$
(a) 200.04 (b) 201.04
(c) 200.14 (d) 202.14
(e) 203.04

162. $\frac{35 \times 15 \times 10}{25 \times 2} = ?$
(a) 105 (b) 115
(c) 70 (d) 35
(e) None of these

163. $859.05 + 427.89 + 663.17 = ?$
(a) 1585.91 (b) 1286.94
(c) 1950.02 (d) 1950.11
(e) 1951.01

164. $7 \times ? = 29.05$
(a) 4.05 (b) 4.15
(c) 3.95 (d) 4.25
(e) None of these

165. $\frac{558 \times 45}{18 \times 4.5} = ?$
(a) 314 (b) 313
(c) 312 (d) 311
(e) None of these

166. $559 + 965 = ? \times 16$
(a) 92.05 (b) 95.25
(c) 93.15 (d) 94.35
(e) None of these

167. $7\frac{3}{4} + 5\frac{1}{4} + 8\frac{1}{2} = ?$
(a) $20\frac{1}{4}$ (b) $21\frac{1}{2}$
(c) $21\frac{3}{4}$ (d) $21\frac{3}{4}$
(e) $20\frac{3}{4}$

168. $9.1 \times 7.5 \times 6.2 = ?$
(a) 423.15 (b) 68.25
(c) 593.775 (d) 472.5
(e) None of these

169. $49 + \sqrt{?} = 87$
(a) 1444 (b) 1442
(c) 1448 (d) 1456
(e) 1460

170. $\sqrt{?} - 17 = 22$
(a) 1511 (b) 1531
(c) 1515 (d) 1553
(e) 1521

171. $5989 \div 48 \times 11 \approx ?$
(a) 1375 (b) 1370
(c) 1372 (d) 1368
(e) 1365

172. If $3x + 5y = 44$ and $10x - 2y = 16$, what is the value of x?
(a) 7 (b) 3
(c) 5.5 (d) 6.5
(e) None of these

173. If $x + y = 20$ and $xy = 84$, then $(x)^2 + (y)^2 = ?$
(a) 232 (b) 400
(c) 128 (d) Cannot be determined
(e) None of these

174. $\sqrt{876} \times 20.6 + 165.34 \approx ?$
(a) 700 (b) 686
(c) 775 (d) 846
(e) 745

Answer Key									
1	(e)	36	(a)	71	(d)	106	(d)	141	(c)
2	(c)	37	(e)	72	(d)	107	(a)	142	(a)
3	(e)	38	(b)	73	(e)	108	(a)	143	(a)
4	(a)	39	(a)	74	(a)	109	(e)	144	(e)
5	(a)	40	(e)	75	(a)	110	(c)	145	(b)
6	(d)	41	(e)	76	(e)	111	(d)	146	(c)
7	(d)	42	(d)	77	(e)	112	(d)	147	(d)
8	(a)	43	(a)	78	(d)	113	(e)	148	(e)
9	(d)	44	(e)	79	(a)	114	(d)	149	(c)
10	(e)	45	(e)	80	(d)	115	(a)	150	(d)
11	(a)	46	(c)	81	(a)	116	(b)	151	(b)
12	(c)	47	(e)	82	(c)	117	(d)	152	(e)
13	(c)	48	(c)	83	(e)	118	(b)	153	(e)
14	(d)	49	(d)	84	(e)	119	(c)	154	(d)
15	(e)	50	(a)	85	(b)	120	(d)	155	(e)
16	(a)	51	(e)	86	(b)	121	(d)	156	(a)
17	(b)	52	(c)	87	(d)	122	(e)	157	(c)
18	(d)	53	(a)	88	(d)	123	(b)	158	(e)
19	(e)	54	(c)	89	(c)	124	(c)	159	(c)
20	(b)	55	(d)	90	(b)	125	(c)	160	(c)
21	(a)	56	(a)	91	(b)	126	(c)	161	(a)
22	(d)	57	(c)	92	(a)	127	(c)	162	(a)
23	(b)	58	(b)	93	(d)	128	(d)	163	(d)
24	(a)	59	(a)	94	(d)	129	(c)	164	(b)
25	(c)	60	(b)	95	(e)	130	(a)	165	(e)
26	(a)	61	(c)	96	(c)	131	(b)	166	(b)
27	(e)	62	(b)	97	(a)	132	(a)	167	(b)
28	(c)	63	(e)	98	(e)	133	(d)	168	(a)
29	(b)	64	(b)	99	(d)	134	(e)	169	(a)
30	(e)	65	(d)	100	(c)	135	(e)	170	(e)
31	(b)	66	(a)	101	(e)	136	(b)	171	(c)
32	(e)	67	(d)	102	(b)	137	(a)	172	(b)
33	(a)	68	(c)	103	(c)	138	(c)	173	(a)
34	(c)	69	(c)	104	(b)	139	(b)	174	(c)
35	(c)	70	(c)	105	(b)	140	(e)		

ANSWERS & EXPLANATIONS

1. (e) $? = 56.6 \times 16.6 \times 6.6$
$= 6201.096$

2. (c) $\frac{?}{46} \times 16 = 368$

$\Rightarrow ? = \frac{368 \times 46}{16} = 1058$

3. (e) $? = 999.99 + 99.99 + 9.99 = 1109.97$

4. (a) $? = \frac{899}{11.6} = 77.5$

5. (a) $? = 85332 - 11638 - 60994$
$? = 85332 - 72632$
$\therefore ? = 12700$

6. (d) $? = \frac{3187.8}{57.75 \times 0.8} = 69$