

Computation Operations

Learning objectives

2.1 Addition

2.4 Estimating the Difference

2.7 Division

2.10 Factors

2.2 Estimating the Sum

2.5 Multiplication

2.8 Estimating the Quotient

2.11 Multiples

2.3 Subtraction

2.6 Estimating the Product

2.9 Unitary Method

2.1 ADDITION

Addition of 5-digit and 6-digit Numbers (Without Regrouping)

We have already learnt the addition of 4-digit numbers. Now, we will learn the addition of numbers with 5-digits and 6-digits.

To add 5-digit/6-digit numbers, we will

- Arrange the digits in specific columns.
- Starting from the ones, add ones followed by adding tens, hundreds, thousands and then ten thousands.

$$\begin{array}{rcccccc}
 & \text{TTh} & \text{Th} & \text{H} & \text{T} & \text{O} & \\
 & 4 & 2 & 1 & 6 & 5 & \text{Addend} \\
 + & 1 & 0 & 2 & 1 & 2 & \text{Addend} \\
 \hline
 \text{Sum} \rightarrow & 5 & 2 & 3 & 7 & 7 &
 \end{array}$$

Addition of 5-digit and 6-digit Numbers (With Regrouping)

To add 5-digit/6-digit numbers, first arrange the numbers in specific columns.

- Add the ones

$$8 \text{ ones} + 4 \text{ ones} = 12 \text{ ones} = 1 \text{ ten} + 2 \text{ ones}$$

Write 2 in ones column and carry 1 ten to the tens column.

- Add the tens

$$3 \text{ tens} + 4 \text{ tens} + 1 \text{ ten (carried over)} = 8 \text{ tens}$$

- Add the hundreds

$$6 \text{ hundreds} + 7 \text{ hundreds} = 13 \text{ hundreds} = 1 \text{ thousand} + 3 \text{ hundreds}$$

Write 3 in hundreds column and carry 1 thousand to the thousands column.

- Add the thousands

$$5 \text{ thousands} + 1 \text{ thousand} + 1 \text{ thousand (carried over)} = 7 \text{ thousands}$$

- Add the ten thousands

$$4 \text{ ten thousands} + 2 \text{ ten thousands} = 6 \text{ ten thousands}$$

Therefore, $45638 + 21744 = 67382$

$$\begin{array}{rcccccc}
 & \text{TTh} & \text{Th} & \text{H} & \text{T} & \text{O} & \\
 & & \textcircled{1} & & \textcircled{1} & & \\
 & 4 & 5 & 6 & 3 & 8 & \\
 + & 2 & 1 & 7 & 4 & 4 & \\
 \hline
 & 6 & 7 & 3 & 8 & 2 &
 \end{array}$$

Properties of Addition

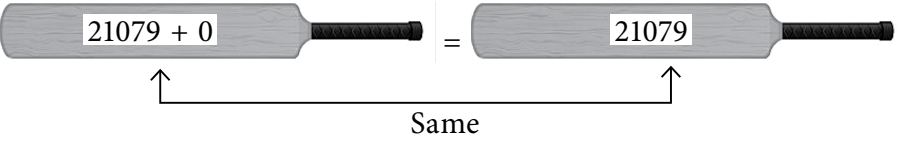
➤ If two numbers are added in any order, then their sum will remain same.



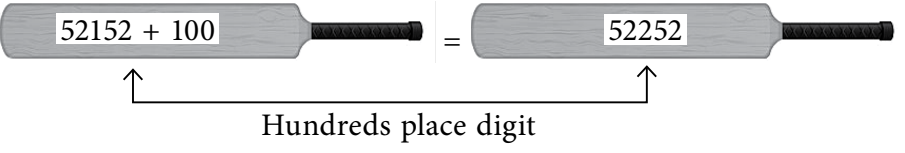
➤ If three or more numbers are added, then their sum will remain same even if the order of grouping is changed.



➤ The sum of zero and a number is the number itself.



➤ Addition of 10, 100 and 1000 to a number increases the digit at tens, hundreds and thousands place respectively by 1.



To find the missing digit in the addend, subtract the digit in other addend from the digit in the sum.

2.2 ESTIMATING THE SUM

To estimate the sum of two numbers, we estimate the two numbers and then find the sum. Let's study estimation with the help of an example.

Actual numbers		Estimated numbers	
6 6 2 3	————→	7 0 0 0	
+ 4 2 3 1	————→	+ 4 0 0 0	
Actual sum <u>1 0 8 5 4</u>		<u>1 1 0 0 0</u> Estimated sum	

2.3 SUBTRACTION

Subtraction of 5-digit/6-digit Numbers (Without Regrouping)

To subtract 5-digit/6-digit numbers, we will

- Arrange the digits in the specific place value columns.
- Starting from the ones, subtract ones followed by subtracting tens, hundreds, thousands and tens thousands.

	TTh	Th	H	T	O	
	5	2	4	6	4	Minuend
-	1	1	2	5	3	Subtrahend
Difference →	4	1	2	1	1	

Subtraction of 5-digit/6-digit Numbers (With Regrouping)

To subtract the 5-digit/6-digit numbers, first arrange the number in specific columns, then follow the below steps.

- Subtract the ones
5 ones – 4 ones = 1 ones
- Subtract the tens
Since, 0 is smaller than 3, regroup hundreds and tens
2 hundreds 0 tens = 1 hundreds 10 tens
So, 10 tens – 3 tens = 7 tens
- Subtract the hundreds
1 hundreds – 1 hundreds = 0
- Subtract the thousands
Since, 2 is smaller than 5, regroup ten thousands and thousands.
7 ten thousands 2 thousands = 6 ten thousands + 12 thousands
So, 12 thousands – 5 thousands = 7 thousands
- Subtract the ten thousands
6 ten thousands – 6 ten thousands = 0
Therefore, $72205 - 65134 = 7071$

	TTh	Th	H	T	O	
	⑥	⑫	①	⑩		
-	7	2	2	0	5	
-	6	5	1	3	4	
	0	7	0	7	1	

Properties of Subtraction

- If 0 is subtracted from any number, the difference is the number itself.

- If a number is subtracted from a number itself, the difference is zero.

- If 10, 100 and 1000 are subtracted from a number, then digits at tens place, hundreds place and thousands place are decreased by 1 respectively.



2.4 ESTIMATING THE DIFFERENCE

To estimate the difference of two numbers, we estimate the two numbers and then find the difference. Let's study estimation with the help of an example.

Actual numbers	Estimated numbers
$\begin{array}{r} 68\cancel{3}\cancel{1}5 \\ - 2815 \\ \hline 4016 \end{array}$	$\begin{array}{r} 7000 \\ - 3000 \\ \hline 4000 \end{array}$
Actual difference	Estimated difference

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- To find the digit in minuend, the digit in subtrahend is added to the digit in difference.
- To find the digit in subtrahend, subtract the digit in difference from the digit in minuend.

SELF TEST - 1

- What should be added to 2055 to make 20555? (A) 18500 (B) 10000 (C) 20000 (D) 25000
- 1000 less than 43652 is _____. (A) 43642 (B) 43552 (C) 42652 (D) 40652
- Estimate the difference of 70899 and 46237. (A) 40000 (B) 10000 (C) 20000 (D) 11111
- Round off the sum of 140 and 51692 to the nearest hundreds. (A) 50000 (B) 51800 (C) 51900 (D) 52000
- $CDXXV + CCV - LXV =$ _____. (A) 565 (B) 605 (C) 1095 (D) 905

2.5 MULTIPLICATION

Multiplication is equal grouping or repeated addition.

$$8 + 8 + 8 + 8 + 8 = 40$$

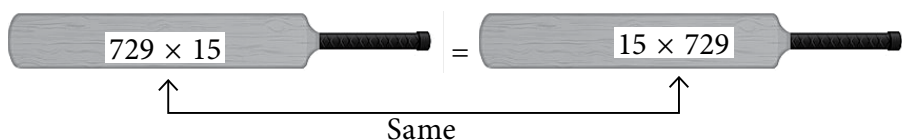
or

$$\begin{array}{ccc} 8 & \times & 5 \\ \swarrow & & \searrow \\ & 40 & \end{array}$$

Factor Factor Product

Properties of Multiplication

- If the order of numbers is changed, then the product remains same.



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- Double of any number is same as multiplying by 2.
- Triple of any number is same as multiplying by 3.

- ▶ The product of any number with 1 is the number itself.

$$\begin{array}{c} \text{625} \times 1 \\ \uparrow \\ \text{625} \end{array} = \begin{array}{c} \text{625} \\ \uparrow \end{array}$$

Same

- ▶ The product of any number with 0 is 0.

$$\begin{array}{c} \text{515} \times 0 \\ \uparrow \\ 0 \end{array}$$

- ▶ If three or more numbers are multiplied together, then the product will remain same even if they can be grouped in any order.

$$\begin{array}{c} (712 \times 5) \times 3 \\ \uparrow \\ 712 \times (5 \times 3) \end{array}$$

- ▶ Break the number into two smaller numbers and then multiply. Now add the two results. The product will remain same.

$$\begin{array}{c} 6 \times 25 \\ \uparrow \\ 6 \times (20 + 5) \\ \uparrow \\ 6 \times 20 + 6 \times 5 \end{array}$$

- ▶ Multiplication of a number by 10, 100 and 1000 makes the product 10 times, 100 times and 1000 times bigger respectively.

$$\begin{array}{c} 75 \times 10 \\ \uparrow \\ 750 \end{array}$$

10 times

$$\begin{array}{c} 75 \times 100 \\ \uparrow \\ 7500 \end{array}$$

100 times

$$\begin{array}{c} 75 \times 1000 \\ \uparrow \\ 75000 \end{array}$$

1000 times

Multiplication of 3-digit Numbers by 1-digit, 2-digit and 3-digit Numbers

Let's learn with the help of examples.

- ▶ By One-digit Number

	H	T	O
①			
1 5 3			
× 2			
3 0 6			

- ▶ By Two-digit Number

	H	T	O
5 6 2			
× 3 5			
2 8 1 0			
+ 1 6 8 6 0			
1 9 6 7 0			

- ▶ By Three-digit Number

	H	T	O
6 3 8			
× 1 2 6			
3 8 2 8			
1 2 7 6 0			
+ 6 3 8 0 0			
8 0 3 8 8			

2.6 ESTIMATING THE PRODUCT

To estimate the product of two numbers, we estimate the two numbers and find the product. Let's study estimation with the help of an example.

Estimate the product 37×42

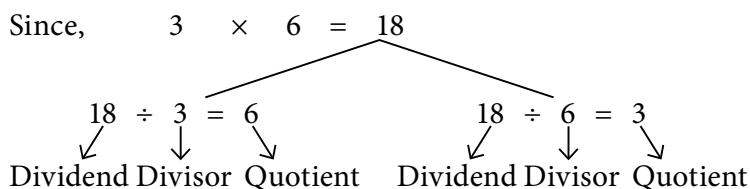
37	→	40	(Rounded off to nearest 10)
$\times 42$	→	$\times 40$	(Rounded off to nearest 10)
		<u>1600</u>	Estimated Product

Estimate the product 452×32

452	→	450	(Rounded off to nearest 10)
$\times 32$	→	$\times 30$	(Rounded off to nearest 10)
		<u>13500</u>	Estimated Product

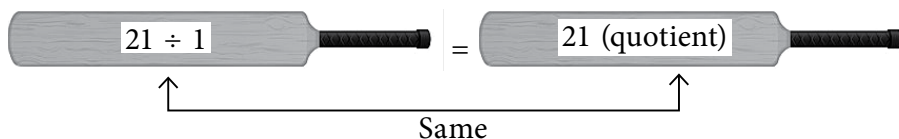
2.7 DIVISION

Division is same as equal grouping. It is also called repeated subtraction.

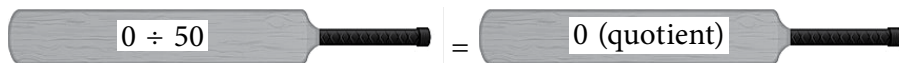


Properties of Division

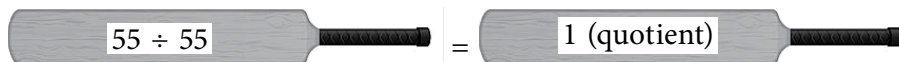
- When the number is divided by 1, the quotient is same as the dividend.



- When zero is divided by any number, the quotient is always zero.



- When a number is divided by itself, the quotient is always 1.



Division of 5-digit Numbers by 1-digit and 2-digit Numbers

- By 1-digit Number

Divisor = 3, Dividend = 68512

Quotient = 22837, Remainder = 1

$$\begin{array}{r}
 22837 \\
 3 \overline{) 68512} \\
 \underline{-6} \\
 8 \\
 \underline{-6} \\
 25 \\
 \underline{-24} \\
 11 \\
 \underline{-9} \\
 22 \\
 \underline{-21} \\
 1
 \end{array}$$

► By 2-digit Number

Divisor = 15, Dividend = 54618

Quotient = 3641, Remainder = 3

$$\begin{array}{r}
 3641 \\
 15 \overline{) 54618} \\
 \underline{-45} \\
 96 \\
 \underline{-90} \\
 61 \\
 \underline{-60} \\
 18 \\
 \underline{-15} \\
 3
 \end{array}$$

2.8 ESTIMATING THE QUOTIENT

Estimate the quotient $242 \div 22$

$$242 \longrightarrow 240 \text{ (Rounded off to nearest 10)}$$

$$22 \longrightarrow 20 \text{ (Rounded off to nearest 10)}$$

$$\text{So, } 240 \div 20 = 12$$

2.9 UNITARY METHOD

The method in which the value of a single item is calculated and then value of number of items is calculated is called unitary method.

For example :

If 7 boxes can contain 420 strawberries. How many strawberries can 12 boxes contains?

Solution : Number of strawberries in 7 boxes = 420

Number of strawberries in 1 box = $420 \div 7 = 60$

So, number of strawberries in 12 boxes = $60 \times 12 = 720$

SELF TEST - 2

1. Fill in the blank.

$415 \times 3 = 1$ thousand _____ hundreds 4 tens and 5 ones.

- (A) 5 (B) 2
(C) 3 (D) 4

2. The cost of 15 chocolates is ₹ 600. Find the cost of 1 chocolate.

- (A) ₹ 20 (B) ₹ 30
(C) ₹ 40 (D) ₹ 45

3. How many times 30 must be added to itself to get 18000?

- (A) 5000 (B) 6000
(C) 9000 (D) 600

4. Find the remainder when 5268 is divided by 15.

- (A) 5 (B) 8
(C) 0 (D) 3

5. Find the value of X + Y.

$$\begin{array}{r}
 2\boxed{X}23 \\
 12 \overline{) 25482} \\
 \underline{-24} \\
 14 \\
 \underline{-12} \\
 28 \\
 \underline{-2\boxed{Y}} \\
 42 \\
 \underline{-36} \\
 6
 \end{array}$$

- (A) 5 (B) 4
(C) 8 (D) 9

2.10 FACTORS

Factors are the numbers which are multiplied together to obtain a certain answer (product).

$$\begin{array}{c} 15 \times 7 = 105 \\ \uparrow \quad \uparrow \quad \uparrow \\ \text{Factor} \quad \text{Product} \end{array}$$

Properties of Factor

- 1 is the factor of every number.
- 1 is the smallest factor of any number.
- Greatest factor of a number is the number itself.
- Every factor of a number is less than or equal to the number.

Prime and Composite Numbers

Prime numbers

The numbers which have only two factors, 1 and the number itself.

Composite numbers

The numbers which have more than two factors.

Common Factors

Common factors of two numbers are the factors which are common to both the numbers.

For example : Find the common factors of 12 and 24.

Factors of 12 are : 1, 2, 3, 4, 6 and 12

Factors of 24 are : 1, 2, 3, 4, 6, 8, 12 and 24

So, common factors are 1, 2, 3, 4, 6 and 12

Highest Common Factor (HCF)

The greatest factor of all the common factors of two or more numbers is the **Highest Common Factor (HCF)** of those numbers.

For example : Find the HCF of 8 and 12.

Factors of 8 are 1, 2, 4 and 8

Factors of 12 are 1, 2, 3, 4, 6 and 12

Common factors of 8 and 12 are 1, 2 and 4

So, HCF of 8 and 12 = 4



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- 1 is neither a prime number nor a composite number.
- Smallest prime number is 2.
- 2 is the only even prime number.
- When one number is a factor of another number, then HCF of these numbers is equal to the smaller number.

2.11 MULTIPLES

If two or more numbers are multiplied together to obtain a product, the product obtained is a multiple of these numbers (factors).

$$\begin{array}{c} \text{For example : } 4 \times 6 = 24 \\ \uparrow \quad \uparrow \quad \uparrow \\ \text{Factors} \quad \text{Multiple} \end{array}$$

Note:

To find the multiples of a number, multiply the number by counting numbers.

For example : Multiples of 3 are

$3 \times 1, 3 \times 2, 3 \times 3 \dots\dots$

i.e., 3, 6, 9, $\dots\dots$

Properties of Multiples

- Every number is a multiple of itself.
- Smallest multiple of a number is the number itself.
- There is no largest multiple of a number.
- Every number is a multiple of 1.

Common Multiples

Common multiples of two numbers are the multiples which are common to both the numbers.

For example : Find the common multiples of 2 and 4.

Multiples of 2 are : 2, 4, 6, 8, 10, 12, $\dots\dots$

Multiples of 4 are : 4, 8, 12, $\dots\dots$

So, common multiples of 2 and 4 are : 4, 8, 12, $\dots\dots$

Least Common Multiple (LCM)

The LCM (Least Common Multiple) of two or more numbers is the smallest of all the common multiples of those numbers.

For example : Find LCM of 3 and 4.

Multiples of 3 are : 3, 6, 9, 12, 15, 18, 21, 24, $\dots\dots\dots$

Multiples of 4 are : 4, 8, 12, 16, 20, 24, $\dots\dots\dots$

Common multiples are : 12, 24, $\dots\dots\dots$

\therefore Least common multiple of 3 and 4 is 12.



Olympiad Bite

When one number is a multiple of another number, then LCM of these numbers is equal to the greater number.

SELF TEST - 3

1. Which of the following is the fourth multiple of 18?
(A) 36 (B) 72 (C) 10 (D) 3
(C) 18 (D) 90
2. The greatest factor of any number is _____.
(A) 1 (B) 0
(C) the number itself (D) None of these
3. Find the HCF of 5 and 12.
(A) 1 (B) 4 (C) 180 (D) 120
4. Product of the second multiple of 15 and the third multiple of 2 is _____.
(A) 90 (B) 60
(C) 180 (D) 120
5. I am an odd multiple of 13 between 50 and 80. Who am I ?
(A) 70 (B) 52
(C) 65 (D) 78

EXERCISE

1. The sum of 5462 and 3258 when each number is rounded off to the nearest hundreds is _____.

- (A) 9010 (B) 8800
(C) 8700 (D) 8500

2. Form the greatest five digit odd number using the given digits 7, 2, 0, 5 and 1 (without repetition) and then divide that number by 3. The result will be _____.

- (A) 24521 (B) 23152
(C) 24163 (D) 25067

3. Which of the following is NOT equal to 54×82 ?

- (A) $50 \times 82 + 4 \times 82$ (B) $54 \times 80 \times 2$
(C) $54 \times 80 + 54 \times 2$ (D) 82×54

4. What is the product of place value and face value of the digit 5 in the number 625824?

- (A) 5000 (B) 25000
(C) 0 (D) 1

5. Find the value of X and Y respectively in the given multiplication problem.

$$\begin{array}{r} \\ \\ \times \\ \hline \\ \\ + \\ \hline \end{array}$$

- (A) 2, 3 (B) 2, 1
(C) 4, 1 (D) 4, 2

6. Product of second multiple of 5 and 4 is _____.

- (A) 20 (B) 40
(C) 50 (D) 24

7. Which of the following is a common factor of 44 and 121?

- (A) 3 (B) 11
(C) 5 (D) 9

8. Sarthak's room has two chairs having 4 legs each, one table having 4 legs and three stools having 3 legs each. How many legs of the furniture are there altogether in his room?

- (A) 20 (B) 21
(C) 16 (D) 13

9. The sum of 52064 and 22534 is _____ more than the sum of 12565 and 20568.

- (A) 41450 (B) 40254
(C) 41465 (D) 42005

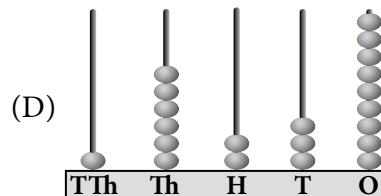
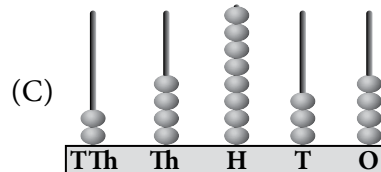
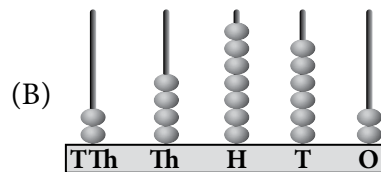
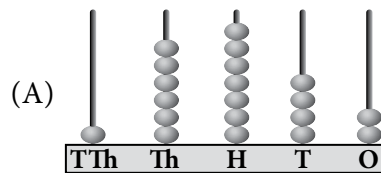
10. A transportation company has been hired to deliver new seats to the sports stadium. The company will use 41 trucks to move the seats. If each truck can hold 1025 seats, then how many seats will be delivered to the stadium?

- (A) 41825 (B) 41925
(C) 42025 (D) 42125

11. If 13050 caps are packed equally into 9 boxes, then how many caps can be packed in 45 such boxes?

- (A) 55125 (B) 65250
(C) 60350 (D) 62325

12. There are seven thousand thirty five students in city A and nine thousand two hundred and four students in school B. Which abacus shows the total number of students in both the schools?



13. Select the CORRECT option.

- (A) XXIV + XVI = 38
(B) XL + CX = 140
(C) XXXV + LXV = 100
(D) XLV + CD = 545

14. Tarun ordered 25 boxes of mangoes for his store. Each box had 40 mangoes. What was the total number of mangoes in these boxes?

- (A) 900 (B) 450
(C) 1000 (D) 800

15. Kartik earned ₹ 526384 in two years. In first year, he earned ₹ 134675. How much did he earn in the second year?

- (A) ₹ 661059 (B) ₹ 391709
(C) ₹ 297105 (D) ₹ 398250

16. Amit sold 424 cookies last month. He sold 4 times as many cookies this month than the last month. How many cookies did he sell this month?

- (A) 1696 (B) 1272
(C) 1456 (D) 1386

17. Rishabh deposited ₹ 615456 in first month. Next month he deposited ₹ 52640 more in his account. What is the total amount deposited by him in his bank account in both months?

- (A) 52406 (B) 668096
(C) 52640 (D) 668006

18. 25 thousands 70 hundreds 85 tens – 12 thousands 38 hundreds 54 tens 21 ones = ____.

- (A) 16750 (B) 15550
(C) 16489 (D) 15420

19. A number that is less than 100 is a common multiple of 6 and 8. The sum of its digit is 9 but the difference between them is 5. What is the number?

- (A) 45 (B) 72
(C) 84 (D) 96

20. If $\triangle + \star + \star + \star + \star = 120$ and $\star + \star + \star - \triangle = 55$, then $\star =$ ____.

- (A) 25 (B) 30
(C) 20 (D) 35

21. The common factors of 30 and 45 which are also multiples of 5 are ____.

- (A) 5, 10, 15 (B) 5, 15
(C) 1, 5, 10 (D) 1, 3, 5, 15

22. Find the HCF of 15 and 25.

- (A) 6 (B) 4
(C) 5 (D) 2

23. A pen manufacturing company made 42656 pens in the month of December. If equal number of pens were made everyday, then how many pens were made in one day?

- (A) 1320 (B) 1150
(C) 1376 (D) 1200

24. Cost price of a mobile phone is ₹ 52385 and that of another mobile phone is ₹ 40276. Estimate the difference in the cost of both the mobile phones.

- (A) ₹ 10000 (B) ₹ 8000
(C) ₹ 9000 (D) ₹ 11000

25. How many multiples of 20 are there between 10 and 190?

- (A) 7 (B) 9
(C) 8 (D) 6

26. If $\bigcirc + \bigcirc + \bigcirc + \bigcirc + \bigcirc = 125$ and $\bigcirc = \triangle + 4$, then find the value of $\triangle + \triangle + \bigcirc + \bigcirc$.

- (A) 25 (B) 45
(C) 50 (D) 92

27. There are ____ even factors of 40.

- (A) 4 (B) 6
(C) 5 (D) 8

28. A restaurant can accommodate 5200 guests. If there are 1205 adults and 1820 children in the restaurant, how many more guests can be accommodated in the restaurant?

- (A) 2175 (B) 2792
(C) 1854 (D) 1967


29. Arun's savings in the year 2016 was ₹ 305690. Next year, his savings exceeded the previous year's savings by ₹ 50000. How much total amount of money did he saved in both the years?










- (A) ₹ 644560 (B) ₹ 601560
(C) ₹ 611380 (D) ₹ 661380

30. Which of the following is the greatest 1-digit number that has 3 factors?

- (A) 4 (B) 8
(C) 5 (D) 9

Achievers Section (HOTS)

31. What is the number represented by  ?

			28
			40
			30
30	48	20	

- (A) 6 (B) 8
(C) 10 (D) 16

32. Read the following statements carefully and state T for true and F for false.

- (i) Every multiple of a number is greater than or equal to the number.
(ii) Every number is a factor of itself.
(iii) The smallest composite number is 4.

	(i)	(ii)	(iii)
(A)	F	F	T
(B)	T	T	T
(C)	T	F	T
(D)	F	T	F

33. Match the following and select the correct option.












- | | |
|---------------------|--|
| (a) $56824 \div 15$ | (i) Quotient = 1813
Remainder = 11 |
| (b) $42109 \div 20$ | (ii) Quotient = 3788
Remainder = 4 |
| (c) $32645 \div 18$ | (iii) Quotient = 2105
Remainder = 9 |

- (A) (a) → (ii), (b) → (iii), (c) → (i)
(B) (a) → (ii), (b) → (i), (c) → (iii)
(C) (a) → (iii), (b) → (i), (c) → (ii)
(D) (a) → (i), (b) → (ii), (c) → (iii)

34. Fill in the blanks and select the correct option

- (p) A number having more than _____ factors is called composite number.
(q) LCM of 30 and 35 is _____.
(r) Every number is a multiple of _____.

	(p)	(q)	(r)
(A)	1	140	0
(B)	2	210	1
(C)	3	140	1
(D)	2	70	0

35. If  +  = 1300,
 +  +  +  + 
= 3500 and  +  = 1200, then the value of  +  is _____.

- (A) 900 (B) 1200
(C) 1500 (D) 700

SOF IMO 2019 QUESTIONS

1. Find the sum of (3rd multiple of 11) and (the difference between common factors of 8 and 10).

- (A) 42 (B) 36
(C) 34 (D) 32 (Level-1)

2. Find the value of Y + X.

$$\begin{array}{r}
 \boxed{X} 78 \\
 15 \overline{) 14670} \\
 \underline{- 135} \\
 117 \\
 \underline{- 105} \\
 1\boxed{Y}0 \\
 \underline{- 120} \\
 0
 \end{array}$$

- (A) 5 (B) 9
(C) 6 (D) 11 (Level-1)

3. Which of the following options is INCORRECT?

- (A) XL + CVI = 146 (B) CD + LXV = 665
(C) M - DCL = 350 (D) None of these

(Level-1)

4. Payal bought 12 boxes of cold drinks for a party. There were 19 cans in each box. How many total cans of cold drinks did she buy?

- (A) 232 (B) 228
(C) 216 (D) 202 (Level-1)

5. A factory manufactures 250 cars each day. How many cars does the factory manufacture in 5 weeks?

- (A) 1250 (B) 1750
(C) 9250 (D) 8750 (Level-1)

6. Saksham has 925 balls. 580 were basketballs and rest were cricket balls. He sold some cricket balls and found that he had 125 cricket balls left. How many cricket balls were sold?

- (A) 176 (B) 240
(C) 125 (D) 220 (Level-1)

7. Match the following and select the correct option.

Column A

Column B



- | | |
|------------------|----------------|
| P. $CDV + CLX$ | (i) DXX |
| Q. $DLXV - XLV$ | (ii) $CCCXCVI$ |
| R. $CCCXI + DCL$ | (iii) $DLXV$ |
| S. $CMX - DXIV$ | (iv) $CMLXI$ |



- (A) $P \rightarrow$ (iii); $Q \rightarrow$ (i); $R \rightarrow$ (iv); $S \rightarrow$ (ii)
 (B) $P \rightarrow$ (iv); $Q \rightarrow$ (ii); $R \rightarrow$ (iii); $S \rightarrow$ (i)
 (C) $P \rightarrow$ (iii); $Q \rightarrow$ (iv); $R \rightarrow$ (i); $S \rightarrow$ (ii)
 (D) $P \rightarrow$ (ii); $Q \rightarrow$ (i); $R \rightarrow$ (iii); $S \rightarrow$ (iv) (Level-1)

8. Identify the number using the given clues.

- ▶ Its hundreds digit is 4th multiple of its ones digit.
- ▶ Its ones digit is the smallest prime number.
- ▶ Its tens digit is seven more than its ones digit.
- ▶ Its thousands digit is three less than its tens digit.

- (A) 5481 (B) 6892
(C) 6993 (D) 5372 (Level-1)

9. If  \times  = 49 and

 -  = 12, then what is the value

of  +  ?

- (A) 36 (B) 20
(C) 26 (D) 19 (Level-1)

10. Select the CORRECT match.

- (A) $XIV + XXXVI = 66$
 (B) $XX - XVIII = 3$
 (C) $XXXV + XXIX = 64$
 (D) $LX - XXXIX = 23$ (Level-1)

11. How many multiples of 10 lie between 125 and 225?

- (A) 13 (B) 14
(C) 11 (D) 10 (Level-1)

12. 4250 pens were to be packed in 50 packets. How many pens could 1 packet contain, if each packet contains equal number of pens?

- (A) 60 (B) 46
(C) 500 (D) 85 (Level-1)

13. In a parking lot, there are 27 bikes and some cars. If there are 194 wheels altogether, then how many cars are there?

- (A) 36 (B) 18
(C) 16 (D) 35 (Level-1)

14. Read the following statements carefully and state 'T' for true and 'F' for false.

- (i) There are 24 thousands in 24058.
 (ii) Every number is a factor of itself.
 (iii) $78402 = 78 \text{ thousands} + 4 \text{ tens} + 2 \text{ ones}$.

- | | | |
|-------|------|-------|
| (i) | (ii) | (iii) |
| (A) T | T | F |
| (B) T | F | F |
| (C) F | T | T |
| (D) F | F | T |
- (Level-1)

15. Find the value of $\frac{P+Q+R}{5}$.

$$\begin{array}{r}
 13\boxed{Q}52 \\
 \hline
 25 \overline{) 328819} \\
 \underline{- 25} \\
 7\boxed{P} \\
 \underline{- 75} \\
 38 \\
 \underline{- 25} \\
 131 \\
 \underline{- 1\boxed{R}5} \\
 69 \\
 \underline{- 50} \\
 19 \\
 \hline \hline
 \end{array}$$

- (A) 2
(C) $\frac{12}{5}$
- (B) $\frac{11}{5}$
(D) None of these
- (Level-1)*

16. Which of the following numbers has the greatest number of factors?

- (A) 81
(C) 32
- (B) 45
(D) 24
- (Level-2)*

17. Find the sum of 8th multiple of 12 and 6th multiple of 9.

- (A) 150
(C) 159
- (B) 129
(D) 180
- (Level-2)*

18. A bus carries 65 passengers in each trip. How many passengers will the bus carry in the months of July, August and September, if it makes 12 trips a day?

- (A) 70980
(C) 70200
- (B) 72540
(D) 71760
- (Level-2)*

19. Consider the following numbers.

MCXLIII, MCDIV, MMCD
MCDXXIV, MCCLV, MCDXV

Find the difference between the digits at hundreds place of the greatest and the smallest number.

- (A) 3
(C) 5
- (B) 6
(D) 0
- (Level-2)*

20. If + + + +

= 35 and = + , then

find the value of + .

- (A) 10
(C) 20
- (B) 18
(D) 15
- (Level-2)*

21. Find the value of $(P + T + Q) - (R + S)$.

$$\begin{array}{rcccccc} & \boxed{P} & 7 & 5 & 2 & \boxed{T} \\ - & 4 & \boxed{S} & 6 & \boxed{R} & 3 \\ \hline & 2 & 1 & \boxed{Q} & 3 & 1 \end{array}$$

- (A) 8
(C) 3
- (B) 0
(D) 4
- (Level-2)*

22. A farmer plucked 13598 tea leaves from his garden. 98 were found rotten. He packed the good ones in packets each containing 150 tea leaves. How many packets did he use?

- (A) 80
(C) 85
- (B) 90
(D) 95
- (Level-2)*

23. Kapil has 2205 candies and muffins altogether. If the number of candies is 6 times the number of muffins, then find the number of candies.

- (A) 315
(C) 1890
- (B) 1580
(D) 270
- (Level-2)*

24. Read the given statements carefully and state T for true and F for false.

P : 4 is the smallest composite number.

Q : A prime number has only 1 factor.

R : All prime numbers are odd.

- | | P | Q | R |
|-----|----------|----------|----------|
| (A) | F | T | T |
| (B) | T | F | T |
| (C) | F | T | F |
| (D) | T | F | F |
- (Level-2)*

25. Select the correct match.

- (A) MDCXXX + MXLVIII = MMDCLVIII
(B) MCCLXV + MDCIX = MDCCCLXIV
(C) MMDLXIV + DCVI = MMMCLX
(D) MCDVII + MCDIX = MMDCCCXVI
- (Level-2)*

HINTS & EXPLANATIONS

SELF TEST - 1

- (A): Required number = $20555 - 2055 = 18500$
- (C): $43652 - 1000 = 42652$
- (C):

$$\begin{array}{r} 7\ 0\ 0\ 0\ 0 \\ - 5\ 0\ 0\ 0\ 0 \\ \hline 2\ 0\ 0\ 0\ 0 \end{array}$$
 Estimated value = 20000
- (B): Sum = $140 + 51692 = 51832$
Rounding off 51832 to nearest hundreds gives 51800.
- (A): $CDXXV + CCV - LXV = 425 + 205 - 65 = 565$

SELF TEST - 2

- (B): $415 \times 3 = 1245$
= 1 thousand 2 hundreds 4 tens 5 ones
- (C): Cost of 15 chocolates = ₹ 600
⇒ Cost of 1 chocolate = $600 \div 15 = ₹ 40$
- (D): $18000 \div 30 = 600$
Hence, 30 must be added 600 times to itself to get 18000.

4. (D):

$$\begin{array}{r} 3\ 5\ 1 \\ 15 \overline{) 5\ 2\ 6\ 8} \\ \underline{- 4\ 5} \\ 7\ 6 \\ \underline{- 7\ 5} \\ 1\ 8 \\ \underline{- 1\ 5} \\ 3 \end{array} \rightarrow \text{Remainder}$$

5. (A):

$$\begin{array}{r} 2\ \boxed{1}\ 2\ 3 \\ 12 \overline{) 2\ 5\ 4\ 8\ 2} \\ \underline{- 2\ 4} \\ 1\ 4 \\ \underline{- 1\ 2} \\ 2\ 8 \\ \underline{- 2\ \boxed{4}} \\ 4\ 2 \\ \underline{- 3\ 6} \\ 6 \end{array}$$

So, $X = 1$, $Y = 4$
⇒ $X + Y = 1 + 4 = 5$

SELF TEST - 3

- (B): Fourth multiple of 18 = $18 \times 4 = 72$
- (C)

3. (A): Factors of 5 are 1, 5
Factors of 12 are 1, 2, 3, 4, 6, 12
Common factors of 5 and 12 is 1
∴ HCF of 5 and 12 = 1

4. (C): Second multiple of 15 = $15 \times 2 = 30$
Third multiple of 2 = $2 \times 3 = 6$
∴ Required product = $30 \times 6 = 180$

5. (C): Multiples of 13 between 50 and 80 are 52, 65, 78. Out of these, only 65 is odd.

EXERCISE

- (B): 5462 when rounded off to the nearest hundreds gives 5500.
3258 when rounded off to the nearest hundreds gives 3300.
∴ Required sum = $5500 + 3300 = 8800$
- (D): Greatest five digit odd number formed by given digits is 75201.
∴ Required number = $75201 \div 3 = 25067$
- (B)
- (B): Required product = $5000 \times 5 = 25000$

5. (B):

$$\begin{array}{r} 3\ 5\ 6 \\ \times \quad \boxed{2}\ 6 \\ \hline 2\ 1\ 3\ 6 \\ + 7\ \boxed{1}\ 2\ 0 \\ \hline 9\ 2\ 5\ 6 \end{array}$$

Hence, $X = 2$, $Y = 1$

- (B): Second multiple of 5 = 10
∴ Required product = $10 \times 4 = 40$
- (B): Factors of 44 are 1, 2, 4, 11, 22, 44
Factor of 121 are 1, 11, 121
Common factors of 44 and 121 are 1 and 11.
- (B): Number of legs of 1 chair = 4
So, number of legs of 2 chairs = $2 \times 4 = 8$
Number of legs of 1 table = 4
Number of legs of 1 stool = 3
So, number of legs of 3 stools = $3 \times 3 = 9$
Hence, total number of legs of the furniture = $8 + 4 + 9 = 21$

9. (C): Sum of 52064 and 22534 = 74598
 Sum of 12565 and 20568 = 33133
 Required difference = 74598 - 33133 = 41465
 \therefore Sum of 52064 and 22534 is 41465 more than the sum of 12565 and 20568.

10. (C): Number of seats 1 truck can hold = 1025
 \therefore Number of seats 41 trucks can hold
 $= 1025 \times 41 = 42025$

11. (B): Number of caps packed in 9 boxes = 13050
 Number of caps packed in 1 box = $13050 \div 9 = 1450$
 Number of caps packed in 45 such boxes = $45 \times 1450 = 65250$

12. (D) :
 Number of students in school A = 7035
 Number of students in school B = 9204
 \therefore Total number of students in both the schools
 $= 7035 + 9204 = 16239$

13. (C): (A) $XXIV + XVI = 24 + 16 = 40 \neq 38$
 (B) $XL + CX = 40 + 110 = 150 \neq 140$
 (C) $XXXV + LXV = 35 + 65 = 100$
 (D) $XLV + CD = 45 + 400 = 445 \neq 545$

14. (C): Number of mangoes in 1 box = 40
 \therefore Number of mangoes in 25 boxes = $40 \times 25 = 1000$

15. (B): Total money earned in two years
 $= ₹ 526384$
 Money earned in first year = ₹ 134675
 So, money earned in second year
 $= 526384 - 134675 = ₹ 391709$

16. (A): Number of cookies sold in last month
 $= 424$
 \therefore Number of cookies sold in this month
 $= 424 \times 4 = 1696$

17. (B): Money deposited by Rishabh in first month
 $= ₹ 615456$
 Money deposited by Rishabh in next month
 $= ₹ 52640$
 So, total amount deposited in two months
 $= ₹ (615456 + 52640) = ₹ 668096$

18. (C): 25 thousands 70 hundreds 85 tens -
 12 thousands 38 hundreds 54 tens 21 ones
 $= (25000 + 7000 + 850) - (12000 + 3800 + 540 + 21)$
 $= 32850 - 16361 = 16489$

19. (B): Multiples of 6 less than 100 are 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90, 96
 Multiples of 8 less than 100 are 8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96

So, common multiples are 24, 48, 72 and 96
 Sum of digits of 72 = $7 + 2 = 9$
 Difference of digits of 72 = $7 - 2 = 5$
 So, required number = 72

20. (A): We have,
 $\triangle + \star + \star + \star + \star = 120$ (1)

Also, $\star + \star + \star - \triangle = 55$ (2)

Adding (1) and (2), we get

$$\begin{aligned} \triangle + \star + \star + \star + \star + \star + \star + \star - \triangle &= 120 + 55 \\ \star - \triangle &= 120 + 55 \end{aligned}$$

$$\Rightarrow 7 \star = 175$$

$$\Rightarrow \star = 25$$

21. (B): Factors of 30 are 1, 2, 3, 5, 6, 10, 15, 30
 Factors of 45 are 1, 3, 5, 9, 15, 45
 Common factors of 30 and 45 are 1, 3, 5, 15
 So, common factors of 30 and 45 which are also multiples of 5 are 5 and 15.

22. (C): Factors of 15 are 1, 3, 5, 15
 Factors of 25 are 1, 5, 25
 Common factors of 15 and 25 are 1 and 5.
 So, HCF of 15 and 25 = 5

23. (C): Number of days in the month of December = 31
 So, number of pens manufactured in 31 days = 42656
 \therefore Number of pens manufactured in 1 day
 $= 42656 \div 31 = 1376$

24. (A): Cost price of a mobile phone = ₹ 52385
 Estimated cost = ₹ 50000
 Cost price of another mobile phone = ₹ 40276
 Estimated cost = ₹ 40000
 Required difference = ₹ 50000 - ₹ 40000 = ₹ 10000

25. (B): Multiples of 20 (between 10 and 190) are 20, 40, 60, 80, 100, 120, 140, 160, 180
 So, total number of multiples = 9

26. (D): We have,
 $\bigcirc + \bigcirc + \bigcirc + \bigcirc + \bigcirc = 125$

$$\Rightarrow 5 \bigcirc = 125$$

$$\Rightarrow \bigcirc = 125 \div 5 = 25$$

Also, $\bigcirc = \triangle + 4$

$$\Rightarrow 25 = \triangle + 4$$

$$\Rightarrow \triangle = 25 - 4 = 21$$

$$\text{So, } \triangle + \triangle + \bigcirc + \bigcirc = 21 + 21 + 25 + 25 = 92$$

27. (B): Factors of 40 are 1, 2, 4, 5, 8, 10, 20, 40

Even factors of 40 are 2, 4, 8, 10, 20, 40

So, total number of even factors = 6

28. (A): Number of guests a hotel can accommodate = 5200

Number of adults in hotel = 1205

Number of children in hotel = 1820

So, number of more guests that can be accommodated = $5200 - 1205 - 1820 = 2175$

29. (D): Arun's savings in 2016 = ₹ 305690

Arun's savings in 2017 = ₹ 305690 + ₹ 50000
= ₹ 355690

So, total amount of money saved in two years

= ₹ 305690 + ₹ 355690 = ₹ 661380

30. (D): (A) Factors of 4 are 1, 2, 4

(B) Factors of 8 are 1, 2, 4, 8

(C) Factors of 5 are 1, 5

(D) Factors of 9 are 1, 3, 9

31. (A): We have,

$$\text{Banana} + \text{Banana} + \text{Banana} = 48$$

$$\Rightarrow 3 \text{ Bananas} = 48$$

$$\Rightarrow \text{Banana} = 48 \div 3 = 16$$

$$\text{Also, Banana} + \text{Banana} + \text{Apple} = 40$$

$$\Rightarrow 16 + 16 + \text{Apple} = 40$$

$$\Rightarrow \text{Apple} = 40 - 32 = 8$$

$$\text{Also, Apple} + \text{Banana} + \text{Apple} = 30$$

$$\Rightarrow \text{Apple} + 16 + 8 = 30$$

$$\Rightarrow \text{Apple} = 30 - 24 = 6$$

32. (B)

33. (A)

34. (B): (p) A number having more than two factors is called composite number.

(q) Multiples of 30 are 30, 60, 90, 120, 150, 180, 210, 240, 270,

Multiples of 35 are 35, 70, 105, 140, 175, 210, 245, 280,.....

Common multiples of 30 and 35 are 210, 420, 630,...

So, LCM of 30 and 35 = 210

(r) Every number is a multiple of 1.

$$35. (C): \text{Car} + \text{Car} + \text{Car} + \text{Car}$$

$$+ \text{Car} = 3500$$

$$\Rightarrow 5 \text{ Cars} = 3500$$

$$\Rightarrow \text{Car} = 3500 \div 5 = 700$$

$$\text{And, Car} + \text{Bus} = 1200$$

$$\Rightarrow 700 + \text{Bus} = 1200$$

$$\Rightarrow \text{Bus} = 1200 - 700 = 500$$

$$\text{Also, Motorcycle} + \text{Bus} = 1300$$

$$\Rightarrow \text{Motorcycle} + 500 = 1300$$

$$\Rightarrow \text{Motorcycle} = 1300 - 500 = 800$$

$$\text{So, Motorcycle} + \text{Car} = 800 + 700 = 1500$$

SOF IMO 2019 QUESTIONS

1. (C): 3rd multiple of 11 = $11 \times 3 = 33$

Factors of 8 are 1, 2, 4 and 8.

Factors of 10 are 1, 2, 5 and 10

Common factors of 8 and 10 are 1 and 2.

Their difference = $2 - 1 = 1$

So, required sum = $33 + 1 = 34$

$$2. (D): \begin{array}{r} \boxed{9} \overline{)78} \\ 15 \overline{)14670} \\ \underline{-135} \\ 117 \\ \underline{-105} \\ 120 \\ \underline{-120} \\ 0 \end{array}$$

So, X = 9, Y = 2

$\therefore Y + X = 2 + 9 = 11$

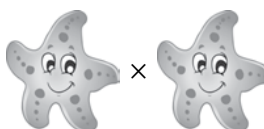
3. (B): (A) XL + CVI = $40 + 106 = 146$ (Correct)

(B) CD + LXV = $400 + 65 = 465 \neq 665$ (Incorrect)

(C) M - DCL = $1000 - 650 = 350$ (Correct)



4. (B): Number of boxes = 12
 Number of cans in 1 box = 19
 So, number of cans in 12 boxes = $19 \times 12 = 228$
5. (D): Number of days in 5 weeks = $5 \times 7 = 35$
 Number of cars manufactures in 1 day = 250
 So, total number of cars manufacture in 35 days
 $= 250 \times 35 = 8750$
6. (D): Total number of balls Saksham had = 925
 Number of basketballs = 580
 So, number of cricket balls = $925 - 580 = 345$
 Number of cricket balls left with him = 125
 So, number of cricket balls, he sold
 $= 345 - 125 = 220$
7. (A): (P) $CDV + CLX = 405 + 160 = 565$ i.e., DLXV
 (Q) $DLXV - XLV = 565 - 45 = 520$ i.e., DXX
 (R) $CCCXI + DCL = 311 + 650 = 961$ i.e., CMLXI
 (S) $CMX - DXIV = 910 - 514 = 396$ i.e., CCCXCVI

8. (B)


9. (C):  $\times = 49$

or $7 \times 7 = 49$

\Rightarrow  $= 7$

And,  $-$  $= 12$

\Rightarrow  $- 7 = 12$

\Rightarrow  $= 12 + 7 = 19$

So,  $+$  $= 7 + 19 = 26$

10. (C): (A) $XIV + XXXVI = 14 + 36 = 50 \neq 66$
 (B) $XX - XVIII = 20 - 18 = 2 \neq 3$
 (C) $XXXV + XXIX = 35 + 29 = 64$
 (D) $LX - XXXIX = 60 - 39 = 21 \neq 23$

11. (D): Multiples of 10 lie between 125 and 225 are 130, 140, 150, 160, 170, 180, 190, 200, 210, 220, i.e., 10 in number.

12. (D): Number of pens in 50 packets = 4250
 \therefore Number of pens in 1 packet = $4250 \div 50 = 85$

13. (D): Number of wheels of 1 bike = 2
 Number of wheels of 27 bikes = $2 \times 27 = 54$
 Total number of wheels of bikes and cars = 194
 $\Rightarrow 54 +$ Number of wheels of cars = 194
 \Rightarrow Number of wheels of cars = $194 - 54 = 140$
 Since, a car has 4 wheels.

So, number of cars = $140 \div 4 = 35$

14. (A): True: (i) $24058 = 24 \times 1000 + 5 \times 10 + 8 \times 1$
 $= 24$ thousands + 5 tens + 8 ones

\therefore There are 24 thousands in 24058

(ii) True

(iii) False, $78402 = 78 \times 1000 + 4 \times 100 + 2 \times 1$
 $= 78$ thousands + 4 hundreds + 2 ones

15. (B):
$$\begin{array}{r} 13\boxed{1}52 \\ - 25\boxed{8} \\ \hline 7\boxed{8} \\ - 75 \\ \hline 38 \\ - 25 \\ \hline 131 \\ - 1\boxed{2}5 \\ \hline 69 \\ - 50 \\ \hline 19 \end{array}$$

$\therefore P = 8, Q = 1$ and $R = 2$

So, $\frac{P+Q+R}{5} = \frac{8+1+2}{5} = \frac{11}{5}$

16. (D): (A) Factors of 81 are 1, 3, 9, 27, 81
 (B) Factors of 45 are 1, 3, 5, 9, 15, 45
 (C) Factors of 32 are 1, 2, 4, 8, 16, 32
 (D) Factors of 24 are 1, 2, 3, 4, 6, 8, 12, 24
 Hence, 24 has greatest number of factors.

17. (A): 8th multiple of 12 = $12 \times 8 = 96$
 and 6th multiple of 9 = $9 \times 6 = 54$
 \therefore Required sum = $96 + 54 = 150$

18. (D): Number of trips made by bus in 1 day = 12
 Number of days in July, August and September
 $= 31 + 31 + 30 = 92$
 \therefore Number of trips made by bus in July, August and September = $92 \times 12 = 1104$

Now, number of passengers carried by bus in 1 trip = 65


∴ Number of passengers carried by bus in 1104 trips = $65 \times 1104 = 71760$

19. (A): MCXLIII = 1143, MCDIV = 1404,
MMCD = 2400, MCDXXIV = 1424,
MCCLV = 1255, MCDXV = 1415

Greatest number is 2400 and its hundreds place digit is 4.

Smallest number is 1143 and its hundreds place digit is 1.

∴ Required difference = $4 - 1 = 3$

20. (D):  +

 = 35 ... (1)

and  =  ... (2)


∴ From (1) & (2), we have



 = 35

⇒ $7 \times \text{flower} = 35$

⇒ $\text{flower} = 35 \div 7 = 5$

Now,  = $5 + 5 = 10$

∴  = $5 + 10 = 15$

$$\begin{array}{r} \boxed{6} \quad 7 \quad 5 \quad 2 \quad \boxed{4} \\ - \quad 4 \quad \boxed{5} \quad 6 \quad \boxed{9} \quad 3 \\ \hline \quad 2 \quad 1 \quad \boxed{8} \quad 3 \quad 1 \end{array}$$

∴ P = 6, Q = 8, R = 9, S = 5 and T = 4

So, $(P + T + Q) - (R + S) = (6 + 4 + 8) - (9 + 5)$
= $18 - 14 = 4$

22. (B): Total number of leaves plucked = 13598

Number of rotten leaves plucked = 98

∴ Number of good leaves plucked = $13598 - 98$
= 13500

Number of packet used to pack 150 leaves = 1

∴ Number of packets used to pack 13500 leaves
= $13500 \div 150 = 90$

23. (C): Number of candies = $6 \times$ Number of muffins

Also, number of candies + number of muffins = 2205

⇒ $6 \times$ number of muffins + number of muffins
= 2205

⇒ $7 \times$ number of muffins = 2205

⇒ Number of muffins = $2205 \div 7 = 315$

∴ Number of candies = $315 \times 6 = 1890$

24. (D): P : True

Q : False; A prime number has two factors 1 and the number itself.

R : False; All prime number are not odd as 2 is the even prime number.

25. (D): (A) MDCXXX + MXLVIII = $1630 + 1048$
= 2678 = MMDCLXXVIII \neq MMDCLVIII

(B) MCCLXV + MDCIX = $1265 + 1609 = 2874$
= MMDCCCLXXIV \neq MDCCCLXIV

(C) MMDLXIV + DCVI = $2564 + 606 = 3170$
= MMMCLXX \neq MMMCLX

(D) MCDVII + MCDIX = $1407 + 1409 = 2816$
= MMDCCCXVI