

Number Sense

Learning objectives

1.1 Number Names

1.3 Numbers on Abacus

1.5 Comparing and Ordering of Numbers

1.7 Estimation

1.2 Place Value and Face Value

1.4 Expanded Form and Short Form

1.6 Formation of Numbers

1.8 Roman Numerals

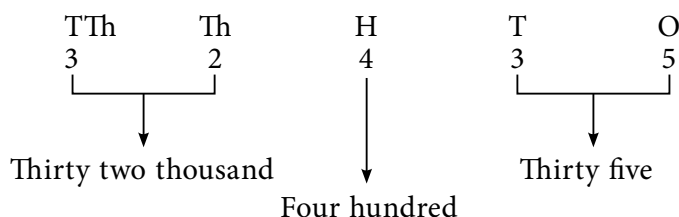
LET'S RECALL

We know that if we add 1 to the largest three digit number, we get the smallest four digit number.

999	+	1	=	1000
Largest three digit number		One more		Smallest four digit number
9999	+	1	=	10000
Largest four digit number		One more		Smallest five digit number
99999	+	1	=	100000
Largest five digit number		One more		Smallest six digit number

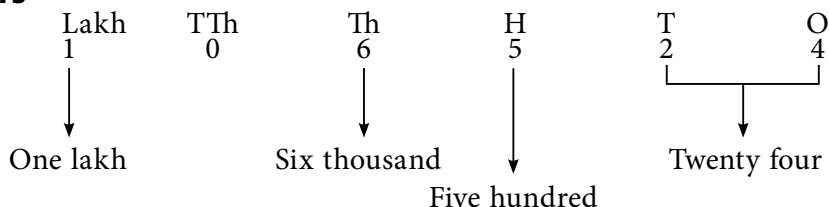
1.1 NUMBER NAMES

5-Digit Numbers



∴ Number name for 32435 is Thirty two thousand four hundred thirty five.

6-Digit Numbers



∴ Number name for 106524 is one lakh six thousand five hundred twenty four.

1.2 PLACE VALUE AND FACE VALUE

Place Value

The place value of a digit depends on its place in the number. Place value is obtained by multiplying the digit and the value of the place it occupies in the number.

For example : Place value of 3 in 42310 is $3 \times 100 = 300$.

Face Value

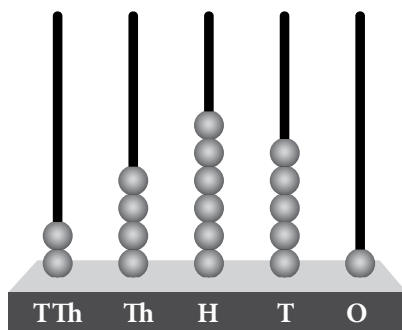
The face value of a digit is the value of the digit itself. Face value of a digit does not change according to the digit's place.

For example : Face value of 5 in 65416 is 5.

1.3 NUMBERS ON ABACUS

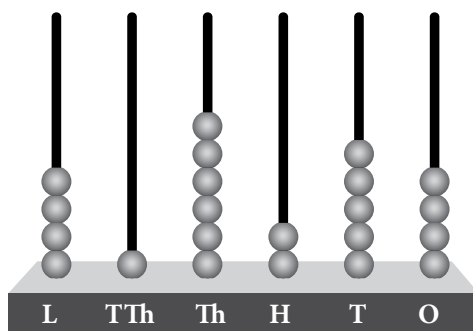
Let's learn to represent large numbers on an abacus with the help of examples.

1. Let us read the number 24651 on abacus.



Twenty four thousand six hundred fifty one.

2. Let us read the number 416254 on abacus.



Four lakh sixteen thousand two hundred fifty four.

1.4 EXPANDED FORM AND SHORT FORM

In expanded form, the number is written as the sum of the place values of its digits.

Number = 32435					
	Ten Thousand (TTh)	Thousand (Th)	Hundred (H)	Tens (T)	Ones (O)
Digits	3	2	4	3	5
Place value	$3 \times 10000 = 30000$	$2 \times 1000 = 2000$	$4 \times 100 = 400$	$3 \times 10 = 30$	$5 \times 1 = 5$

So, $32435 = 30000 + 2000 + 400 + 30 + 5$

Short form Expanded form

Number = 106524						
	Lakh (L)	Ten Thousand (TTh)	Thousand (Th)	Hundred (H)	Tens (T)	Ones (O)
Digits	1	0	6	5	2	4
Place value	1×100000 $= 100000$	$0 \times 10000 = 0$	6×1000 $= 6000$	$5 \times 100 = 500$	2×10 $= 20$	$4 \times 1 = 4$

So, $106524 = 100000 + 6000 + 500 + 20 + 4$

Short form

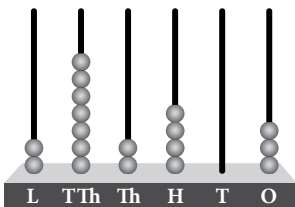
Expanded form



Olympiad Bite

- Empty places in a place value chart are filled by zeros.
- Place value and face value of 0 is always 0.
- Place value and face value of a digit are same at ones place.

SELF TEST - 1

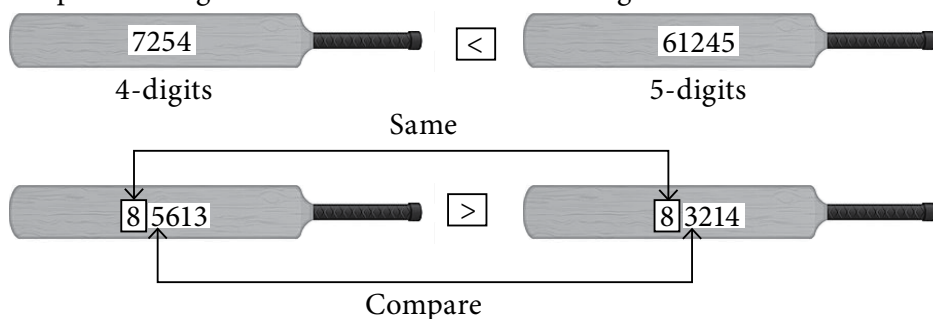
- The short form of $20000 + 2000 + 700 + 50 + 2$ is _____.
(A) 27252 (B) 22075
(C) 22752 (D) 22572
- Which of the following digits of the number 60451 has same place value and face value?
(A) 6 (B) 4
(C) 0 (D) 1
- The number shown on the abacus is _____.

- The numeral form of Eight lakh forty three thousand five hundred nine is _____.
(A) 843590 (B) 272403
(C) 600, 600 (D) 282413
- The face value and place value of digit 6 in the number 52624 are _____ and _____ respectively.
(A) 6, 6 (B) 600, 600
(C) 6, 600 (D) 600, 6
- The numeral form of Eight lakh forty three thousand five hundred nine is _____.
(A) 843590 (B) 843509
(C) 804359 (D) 843059

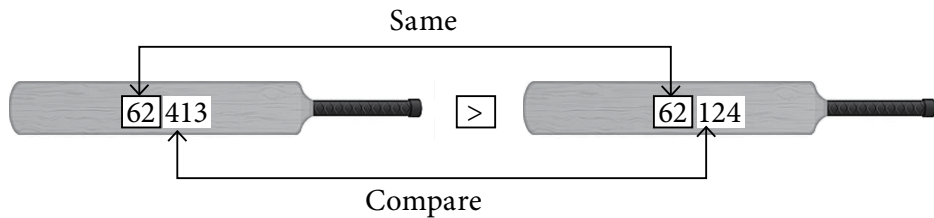
1.5 COMPARING AND ORDERING OF NUMBERS

Comparison of Numbers

- To compare numbers with unequal number of digits, the number with the least number of digits is the smallest.
- To compare numbers having equal number of digits, start by comparing the digits from the left most place until you have two different digits.

Now, we can compare the digits to decide the smaller and larger of two numbers.

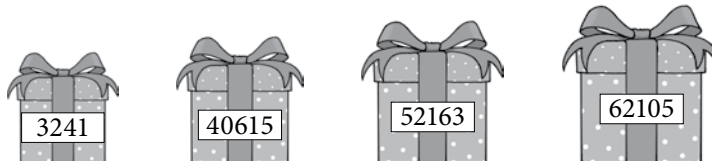




Ordering of Numbers

Ascending order

Arranging the numbers 62105, 52163, 3241 and 40615 from the smallest to the largest.



Descending order

Arranging the numbers 62105, 52163, 3241 and 40615 from the largest to the smallest.



1.6 FORMATION OF NUMBERS

► Without Repetition

The greatest five digit number that can be formed from the digits 4, 2, 1, 3, 5 without repetition is 54321.

The smallest five digit number that can be formed from the digits 4, 2, 1, 3, 5 without repetition is 12345.

► With Repetition

The greatest five digit number that can be formed from the digits 4, 2, 1, 3, 5 with repetition is 55555.

The smallest five digit number that can be formed from the digits 4, 2, 1, 3, 5 with repetition is 11111.



Olympiad Bite

While forming a number, digit '0' cannot take the first place from the left in the number.

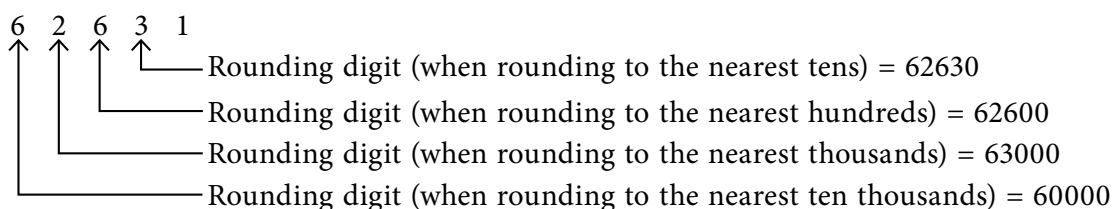
1.7 ESTIMATION

Estimated values are rounding off numbers to the nearest tens, hundreds and thousands.

Rounding off a number means making a number simpler to use. The number obtained after rounding off is very close to the actual value.

Note : If the digit to the right of rounding digit is greater than or equal to '5', then the number is rounded to the higher tens/hundreds/thousands.

Consider the number 62631



1.8 ROMAN NUMERALS

Roman numerals, the numeric system of ancient Rome uses combinations of letters to signify values i.e., I, V, X, L, C, D, M and do not have a zero.

Letters used to write Roman numerals are:

Roman numeral	I	V	X	L	C	D	M
Hindu-Arabic number	1	5	10	50	100	500	1000

Notes :

- Repeating a letter means addition. The letters can be repeated upto three times only.

For example : $XXX = 10 + 10 + 10 = 30$

- If one or more letters are placed after a letter of bigger value, it means addition.

For example : $CXVI = 100 + 10 + 5 + 1 = 116$

- If a letter is placed before a letter of bigger value, it means subtraction.

For example : $CD = 500 - 100 = 400$

- When a Roman numeral of smaller value is placed between two numerals of greater value, it is subtracted from the numeral on its right.

For example : $DXL = 500 + 50 - 10 = 540$



Olympiad Bite

- Symbol V can never be repeated.
- I can be subtracted from V and X only.

SELF TEST - 2

1. Compare and fill in the box.

Three lakh fifty
four thousand five
hundred twenty

Three lakh twenty
four thousand three
hundred fifty

- (A) <
(B) >
(C) =
(D) Can't be determined

2. The greatest five digit number formed from the digits 6, 2, 1, 4, 0 without repetition is _____.

- (A) 64421 (B) 21046
(C) 64210 (D) 66666

3. The number 826432 rounded off to the nearest hundreds gives _____.

- (A) 826400 (B) 826500
(C) 827000 (D) 826430

4. Which of the following is same as CDLXV?

- (A) 415 (B) 465
(C) 615 (D) 665

5. Which of the following set of numbers are arranged in correct descending order?

- (A) 62510, 64103, 52131, 42560
(B) 42106, 45600, 52311, 65432
(C) 75410, 70321, 65300, 64232
(D) 52160, 54100, 50622, 55321

EXERCISE





1. Face value of 4 in 54895 is _____.

- (A) 4 (B) 4000
(C) 400 (D) 40

2. The descending order of 41235, 31468, 25134, 43256, 61324 is _____.

- (A) (41235), (25134), (31468), (61324), (43256)
(B) (43256), (61324), (25134), (31468), (12345)
(C) (61324), (43256), (41235), (31468), (25134)
(D) (43256), (61324), (31468), (25134), (12345)

3. Which of the following is equivalent to “Thirty two thousand nine hundred and forty five”?

- (A)  (B) 
(C)  (D) 

4. Identify the number Kirti is thinking about.



My number has :

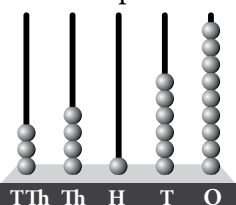
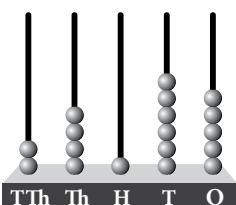
- 2 tens
- 2 ones
- 3 hundreds
- 1 thousand
- 7 ten thousands

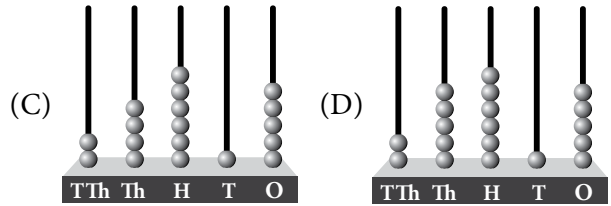
- (A) 71322 (B) 73122
(C) 37212 (D) 37122

5. Select the CORRECT option.

- (A) CXVI = 104 (B) DCV = 605
(C) CLXV = 170 (D) DIX = 511

6. Which of the following abacuses shows the CORRECT representation of 24165?

- (A)  (B) 



7. Which of the following is the smallest five digit even number?

- (A) 10001 (B) 10002
(C) 10003 (D) 10000

8. Mayank was solving a Mathematics question. He calculated that there are ten thousand and eighty minutes in a week. Help him to write this number in numeral form.

- (A) 10008 (B) 10800
(C) 10080 (D) 18000

Direction (9 and 10) : Consider the rate list of some items given below and answer the following questions.

Items	Cost (in ₹)
Ruler	XXV
Book	LXXX
Paint Brush	XLVIII
Packet of Crayons	LXXV

9. _____ is the costliest item and _____ is the cheapest item amongst all.

- (A) Paint brush, Ruler
(B) Book, Ruler
(C) Packet of Crayons, Book
(D) Ruler, Book

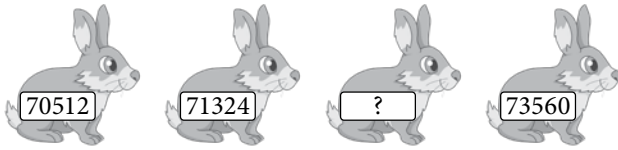
10. _____ is cheaper than _____ by ₹ 5.

- (A) Paint Brush, Ruler
(B) Book, Ruler
(C) Paint Brush, Book
(D) Packet of Crayons, Book

11. The numeral for ninety five thousand seven hundred and twenty is _____.

- (A) 9575 (B) 95702
(C) 90572 (D) 95720

12. Which number CANNOT be placed in the box to have the numbers in order from the least to the greatest?



- (A) 71423 (B) 72501
(C) 71250 (D) 72058

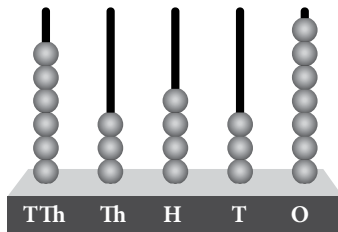
13. The largest 5-digit even number that can be formed from the digits 2, 5, 6, 9 using each digit at least once is _____.

- (A) 96592 (B) 96522
(C) 99652 (D) 69529

14. Find the sum of place values of 3 and 9 in the number 36987.

- (A) 30900 (B) 12
(C) 39000 (D) 120

15. The number shown on the abacus is read as _____.



- (A) Sixty three thousand four hundred and thirty seven.
(B) Sixty three thousand forty four hundred seven.
(C) Six thousand four hundred thirty seven.
(D) Six thousand five hundred thirty seven.

16. The number 52876 when rounded off to the nearest thousands gives _____.

- (A) 52000 (B) 53000
(C) 60000 (D) 52900

17. Expanded form of 92645 is _____.

- (A) $9000 + 200 + 600 + 40 + 5$
(B) $90000 + 2000 + 600 + 40 + 5$
(C) $9000 + 200 + 60 + 5$
(D) $9000 + 200 + 60 + 400 + 5$

18. Which of the following options can complete the given number sentence?

$86458 = 86 \text{ thousands} + \underline{\hspace{2cm}} \text{ tens} + 8 \text{ ones}$

- (A) 45 (B) 40
(C) 450 (D) 4

19. Which of the following options is CORRECT?

- (A) $8214 = 8000 + 10 + 4$
(B) $21425 = 20000 + 1000 + 400 + 50$
(C) $32104 = 30000 + 2000 + 100 + 4$
(D) $4146 = 4000 + 100 + 60 + 4$

20. In 34526, the place value of the digit '4' is how many times as much as the place value of the digit '2'?

- (A) 2 (B) 20
(C) 200 (D) 2000

21. 12546 when rounded off to the nearest _____ gives 12500.

- (A) Tens (B) Hundreds
(C) Thousands (D) Ten thousands

22. Compare and fill in the box.

CDXI DCLX

- (A) > (B) <
(C) = (D) Can't be determined

23. When rounded off to the nearest 1000, the population of Sikkim become 608000. Which of the following could be the actual population of Sikkim?

- (A) 607688 (B) 607488
(C) 617695 (D) 608988

24. Which of the following is the smallest?

- (A) Sixty five thousand four hundred thirty two
(B) Sixty seven thousand five hundred twenty one.
(C) Sixty seven thousand three hundred five.
(D) Sixty seven thousand two hundred fifty one.

25. Fill in the blanks and select the correct option.
 $99998 = \underline{\hspace{2cm}} \text{ thousands} + \underline{\hspace{2cm}} \text{ hundreds} + \underline{\hspace{2cm}} \text{ tens} + \underline{\hspace{2cm}} \text{ ones}.$

- (A) 99, 9, 9, 8 (B) 9, 9, 9, 8
(C) 99, 90, 9, 8 (D) 9, 9, 9, 80

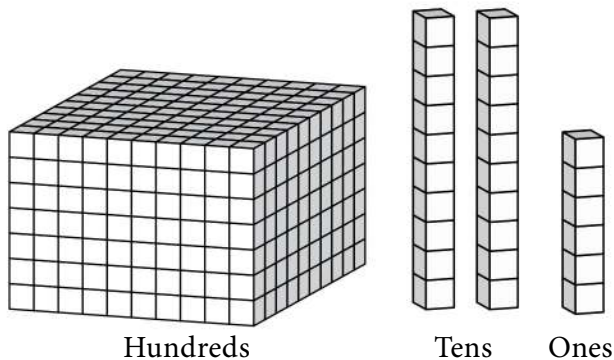
26. I have 5 at the tens place. I have 3 at the ones place. I am less than 900 but greater than 800. Who am I?

- (A) 935 (B) 853
(C) 953 (D) 835

27. The smallest five digit number that can be formed from the digits 4, 0, 7 using each digit at least once is _____.

- (A) 40700 (B) 04007
(C) 00407 (D) 40007

28. Which number does the place value of model shows?



- (A) 715 (B) 726
(C) 126 (D) 736

29. Which of the following is the least?

- (A) M (B) DCCCX
(C) CMLX (D) CDLXX

30. Priya changed 6 in the number 42684 by 8. How much did the value change?

- (A) Increased by 20 (B) Decreased by 20
(C) Increased by 200 (D) Decreased by 200

Achievers Section (HOTS)

31. Study the following statements and select the correct option?

Statement 1 : 5466 when rounded off to the nearest tens gives 5500.

Statement 2 : 41464 when rounded off to the nearest hundreds gives 41000.

- (A) Statement 1 is true but Statement 2 is false.
(B) Statement 2 is true but Statement 1 is false.
(C) Both Statement 1 and Statement 2 are true.
(D) Both Statement 1 and Statement 2 are false.

32. Which of the following statements is CORRECT?

- (A) There are seven basic symbols in the Roman numerals.
(B) When a symbol of greater value is written to the right of a symbol of smaller value, the smaller value is subtracted from the larger value.

- (C) Symbol I can be subtracted from V and X only.
(D) All of these

33. Identify the number by using the given clues.

Clues :

- It is a five digit number.
- Its ones place digit is 1.
- Its hundreds place digit is twice of tens place digit.
- Its tens place digit is 3 more the ones place digit.
- Its thousands place digit is 5 less than digit at hundreds place.
- Its ten thousands place digit is greatest one digit number.

- (A) 83941 (B) 93841
(C) 96481 (D) 99482

34. Fill in the blanks and select the correct option.

(p) Short form for $80000 + 7000 + 500 + 70 + 5$ is _____.

(q) Face value of 7 in 72543 is _____.

(r) The number 65498 has _____ digit at tens place.

(s) The smallest four digit number that can be formed from the digits 2, 5, 6 using each digit at least once is _____.

(p)	(q)	(r)	(s)
(A) 87575	70000	9	2526
(B) 87565	700	90	2222
(C) 87575	7	9	2256
(D) 87565	7	90	2265

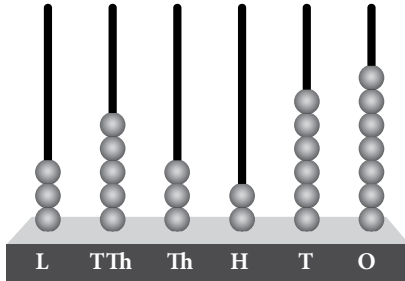
35. Which of the following statements is CORRECT?

- P. 4157 become 4200 when rounded off to the nearest hundreds.
Q. The Roman number DCCV is written as 715 in the Hindu-Arabic numeral system.
R. Smallest 4-digit number that can be formed by using the digits 2, 3, 1 and 0 without repetition is 1023.

- (A) Only P (B) Only P and R
(C) Only Q and R (D) All P, Q and R

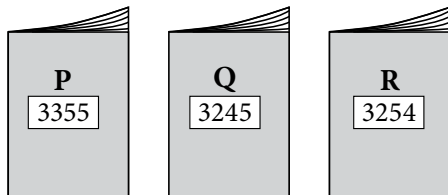
SOF IMO 2019 QUESTIONS

1. The number shown on the abacus is written as _____.



- (A) Three hundred fifty three hundred two hundred and sixty seven
 (B) Three ten thousand fifty three hundred thousand two hundred sixty seven
 (C) Three lakh fifty three thousand two hundred and sixty seven
 (D) Thirty five thousand three thousand two hundred sixty seven. (Level-1)

2. Which of the following books will shows the number greater than 3280 but less than 3390, if the numbers are rounded off to the nearest hundreds?



- (A) P
 (B) R
 (C) Q

(D) None of these

(Level-1)

3. In the number 46328, if the digits at hundreds place and ten thousands place interchange, then find the sum of place values of all the digits in the new number formed.

- (A) 43628
 (B) 36428
 (C) 23
 (D) 34628

(Level-2)

4. Who am I?



I am a four digit number.
 I have 4 in the hundreds place. I am greater than 1000. I have 6 in the tens place. Sum of my digits is 12. My thousands place and ones place digits are same.

- (A) 1641
 (B) 1461
 (C) 2462
 (D) 2460

(Level-2)

HINTS & EXPLANATIONS

SELF TEST - 1

- (C)
- (D): Place value and face value of 1 is 1 i.e., same.
- (B): The number shown on the abacus is 272403.
- (C): In the number 52624, we have
Face value of digit 6 = 6
Place value of digit 6 = 600
- (B)

SELF TEST - 2

- (B): Three lakh fifty four thousand five hundred twenty = 354520
Three lakh twenty four thousand three hundred fifty = 324350
 $\Rightarrow 354520 > 324350$
- (C): Greatest five digit number formed from the digits 6, 2, 1, 4, 0 (without repetition) = 64210
- (A): 8 2 6 4 3 2
 ↓
 Rounding digit
Digit right of 4 is $3 < 5$, hence 826432 when rounded to nearest hundreds gives 826400.
- (B): $CDLXV = 400 + 50 + 10 + 5$
 $= 400 + 60 + 5 = 465$
- (C)

EXERCISE

- (A)
- (C): $61324 > 43256 > 41235 > 31468 > 25134$
- (A): Thirty two thousand nine hundred and forty five = 32945
- (A)
- (B): (A) $CXVI = 100 + 10 + 6 = 116 \neq 104$
(B) $DCV = 500 + 100 + 5 = 605$
(C) $CLXV = 100 + 50 + 10 + 5 = 165 \neq 170$
(D) $DIX = 500 + 9 = 509 \neq 511$
- (B)
- (D): Smallest 5-digit even number = 10000

8. (C): Ten thousand and eighty = 10080
(9-10) :

Items	Cost (in ₹)
Ruler	$XXV = 10 + 10 + 5 = 25$
Book	$LXXX = 50 + 10 + 10 + 10 = 80$
Paint Brush	$XLVIII = 40 + 5 + 1 + 1 + 1 = 48$
Packet of Crayons	$LXXV = 50 + 10 + 10 + 5 = 75$

- (B)
- (D): Cost of packet of crayons + ₹ 5 = ₹ 75 + ₹ 5 = ₹ 80 i.e., Cost of book
- (D)
- (C): $71250 < 71324$
- (C): Largest 5-digit even number that can be formed from the digits 2, 5, 6, 9 using each digit at least once is 99652.
- (A): Place value of 3 in 36987 = 30000
Place value of 9 in 36987 = 900
So, required sum = $30000 + 900 = 30900$
- (A)
- (B): 52876 when rounded off to nearest thousands gives 53000.
- (B): Expanded form of 92645
 $= 9 \times 10000 + 2 \times 1000 + 6 \times 100 + 4 \times 10 + 5 \times 1$
 $= 90000 + 2000 + 600 + 40 + 5$
- (A): $86458 = 80000 + 6000 + 400 + 50 + 8$
 $= 86000 + 450 + 8$
 $= 86 \text{ thousands} + 45 \text{ tens} + 8 \text{ ones}$
- (C): (A) $8000 + 10 + 4 = 8014 \neq 8214$
(B) $20000 + 1000 + 400 + 50 = 21450 \neq 21425$
(C) $30000 + 2000 + 100 + 4 = 32104$
(D) $4000 + 100 + 60 + 4 = 4164 \neq 4146$
- (C): Place value of digit 4 in 34526 = 4000
Place value of digit 2 in 34526 = 20
So, $4000 = 20 \times 200$
- (B)
- (B): $CDXI = 400 + 10 + 1 = 411$
and $DCLX = 500 + 100 + 50 + 10 = 660$
And, $411 < 660$

23. (A): 6 0 ⑦ 6 8 8

↓
Rounding digit

Digit right of 7 is 6 > 5, hence 607688 rounded to nearest thousands gives 608000.

24. (A): (A) Sixty five thousand four hundred thirty two = 65432

(B) Sixty seven thousand five hundred twenty one = 67521

(C) Sixty seven thousand three hundred five = 67305

(D) Sixty seven thousand two hundred fifty one = 67251

As, $65432 < 67251 < 67305 < 67521$

25. (A): $99998 = 99000 + 900 + 90 + 8 = 99 \text{ thousands} + 9 \text{ hundreds} + 9 \text{ tens} + 8 \text{ ones}$

26. (B): $800 < 853 < 900$

Tens place ← | → Ones place

27. (D): The smallest five digit number that can be formed from the digits 4, 0, 7 using each digit atleast once is 40007.

28. (B): Model shows $700 + 10 + 10 + 6 = 726$.

29. (D): (A) M = 1000

(B) DCCCX = $500 + 100 + 100 + 100 + 10 = 810$

(C) CMLX = $900 + 50 + 10 = 960$

(D) CDLXX = $400 + 50 + 10 + 10 = 470$

As, $470 < 810 < 960 < 1000$

So, 470 is the least number.

30. (C): Given number = 42684

After changing digit 6 to 8,

New number formed = 42884

So, change in value = $42884 - 42684 = 200$

Hence, the value is increased by 200.

31. (D): **Statement 1** : Rounded off digit = 6

Digit right to 6 is $6 > 5$

So, 5466 when rounded off to nearest tens gives 5470.

Statement 2 : Rounded off digit = 4

Digit right to 4 is $6 > 5$

⇒ 41464 when rounded off to nearest hundreds gives 41500.

32. (D)

33. (B): Ones place digit = 1

Tens place digit = $3 + 1 = 4$

Hundreds place digit = $2 \times 4 = 8$

Thousands place digit = $8 - 5 = 3$

Ten thousands place digit = 9

So, the required number is 93841.

34. (C): (p) $80000 + 7000 + 500 + 70 + 5 = 87575$

(q) Face value of 7 in 72543 is 7.

(r) $65498 = 60000 + 5000 + 400 + 90 + 8$

= 65 thousands + 4 hundreds + 9 tens + 8 ones

(s) Smallest 4-digit number formed using digits 2, 5, 6 each atleast once = 2256

35. (B): P. 4 ① ⑤ 7

└─→ rounding digit

Since, digit right to 1 is 5.

So, 4157 when rounded off to nearest hundreds gives 4200.

Q. DCCV = $500 + 100 + 100 + 5$

= 705 ≠ 715

R. Smallest 4-digit number formed = 1023

SOF IMO 2019 QUESTIONS

1. (C): The number shown on the abacus is 353267, which is written in words as three lakh fifty three thousand two hundred and sixty seven.

2. (B): Rounded off to the nearest hundreds,

P. 3355 becomes 3400

Q. 3245 becomes 3200

R. 3254 becomes 3300

As, $3280 < 3300 < 3390$

3. (B): After interchanging digits at hundreds place and ten thousands place, new number formed is 36428.

Required sum = $30000 + 6000 + 400 + 20 + 8 = 36428$

4. (B): Digit at hundreds place = 4

Digit at tens place = 6

Digit at thousands place = Digit at ones place

Also, sum of digits is 12.

So, from options required number is 1461.