MATHEMATICS

Chapter 1: Knowing Our Numbers

KNOWING OUR NUMBERS

Natural Numbers

Counting numbers 1, 2, 3, 4, ... etc. are called Natural numbers. The smallest natural number is 1 and there is no largest natural number.

Digits and Place value

Numbers are formed using the ten symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. These symbols are called digits or figures.

To find the place value of a digit in a number, multiply the digit with the value of the place it occupies.

1. Indian place value chart for 9-digit number.

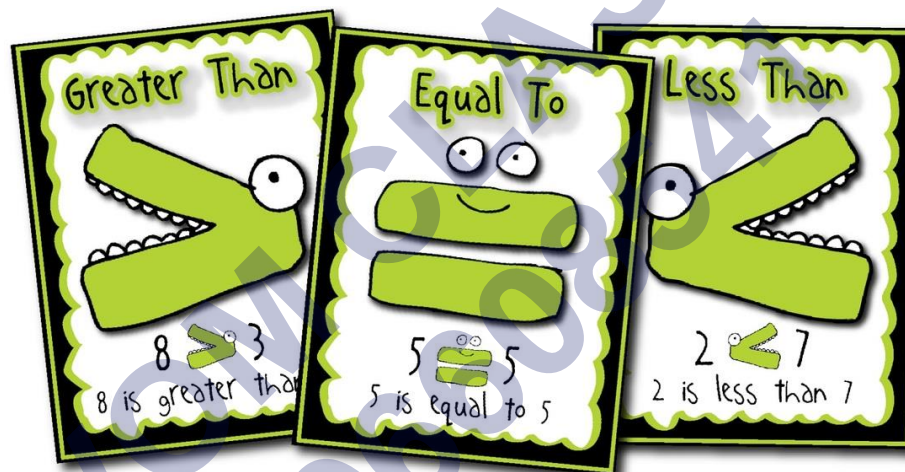| Crores	Lakhs	Thousands	Ones	Period

TC	C	TL	L	TTH	Th	H	T	O	Place

2. International place value chart for a 9 digit number.

Millions			Thousands			Ones			Period
HM	TM	M	HTh	TTh	Th	H	T	O	Place

3. Inserting commas: Inserting commas helps in reading and writing large numbers. A comma is inserted after each period in both the systems.

Comparing numbers

i. When numbers of digits are different, then the number having more number of digits is greater.

ii. When numbers of digits are the same, compare the leftmost digits in the two numbers. The number with the greater leftmost digit is greater. In case the leftmost digits are the same, then compare the next left digits in both the numbers. The number with greater digit is greater. Continue this process, until you come across unequal digits at the corresponding places. Then compare those two digits to find the greater number.

4. Place value of a digit in a number is the digit multiplied by its place.

5. Face value of a digit remains the same, whatever place it may be occupying in the place value chart. In other words, face value is the actual value of the digit.

6. Numbers can be arranged in ascending or descending order. Ascending order means arrangement from smallest to the greatest. Descending order means

arrangement from largest to smallest.

7. The number which is one more than the given number is called its successor.

8. The number which is one less than the given number is called its predecessor.

9. There are certain situations where we have to give an idea about a number without actual calculation. This is called estimation.

10. Rounding a number to nearest ten
    i.   See the ones digit of the given number.
    ii. If ones digit is less than 5, replace ones digit by 0, and keep the other digits as they are.
    iii. If ones digit is 5 or more, increase tens digit by 1, and replace ones digit by 0.

Some important terms

- The arrangements of numbers from the smallest to the greatest is called ascending order.

- The arrangement of numbers from the greatest to the smallest is called descending order.

Place Value of digit

Let's discuss the place value of digits in the number and how a number can be written in that form

Indian system of numeration

Values of the places in the Indian system of numeration are Ones, Tens, Hundreds, Thousands, Ten thousand, Lakhs, Ten Lakhs, Crores and so on.

The following place value chart can be used to identify the digit in any place in the Indian system.

Periods	Crores		Lakhs		Thousands		Ones		
Places	Tens	Ones	Tens	Ones	Tens	Ones	Hundreds	Tens	Ones

We can use below table format for easily reading and writing the Number

Number	Tens lakh	Ones lakh	Tens thousand	Ones thousand	Hundreds	Tens	Ones	Number Name

5,46,851		5	4	6	8	5	1	Five lakh forty-six thousand eight hundred fifty one
32,75,829	3	2	7	5	8	2	9	Thirty two lakh Seventy-five thousand eight hundred twenty nine

Use of Commas

Commas added to numbers help us read and write large numbers easily. As per Indian Numeration, Commas are used to mark thousands, lakhs and crores. The first comma comes after hundreds place (three digits from the right) and marks thousands. The second comma comes two digits later (five digits from the right). It comes after ten thousand place and marks lakh. The third comma comes after another two-digits (seven digits from the right). It comes after ten lakh place and marks crore

International system of numeration

Values of the places in the International system of numeration are Ones, Tens, Hundreds,

Thousands, Ten thousands, Hundred thousands, Millions, Ten millions and so on.

1 million = 1000 thousands,

1 billion = 1000 millions

Following place value chart can be used to identify the digit in any place in the International system.

Periods	Billions			Millions			Thousands			Ones		
Places	Hundreds	Tens	Ones	Hundreds	Tens	Ones	Hundreds	Tens	Ones	Hundreds	Tens	Ones

Estimation of the Numbers

Estimating a sum by rounding

$68 + 51 \approx 70 + 50$
$68 + 51 \approx 120$

$314 + 475 \approx 300 + 500$
$314 + 475 \approx 800$

$314 + 475 \approx 310 + 480$
$314 + 475 \approx 790$

A reasonable guess of the actual value is called an estimate.

A quick, rough estimate of the result of number operations can be done by rounding off the numbers is involved.

Rules of Estimation

- Estimating numbers to the nearest tens is done by rounding off numbers 1, 2, 3 and 4 to 0 and number 6, 7, 8, 9 to 10.

- Estimating numbers to the nearest hundreds is done by rounding off numbers 1 to 49 to 0 and numbers 51 to 99 to 100.

- Estimating numbers to the nearest thousands is done by rounding off numbers 1 to 499 to 0

and the numbers 501 to 999 to 1000.

Estimation involves approximating a quantity to an accuracy required. We can apply the above rules depending on the accuracy required.

We can estimate Sum, difference and Multiplication by applying the rules of estimation also. We can apply the above rules depending on the accuracy required and how quickly answer can be find out

Roman Numerals

Roman Numerals system is another system used apart of Hindu-Arabic system.

The Roman numerals are

Roman Numerals: 1 - 1000

I	V	X	L	C	D	M
1	5	10	50	100	500	1000

1	I	11	XI	200	CC
2	II	20	XX	300	CCC
3	III	30	XXX	400	CD
4	IV	40	XL	500	D
5	V	50	L	600	DC
6	VI	60	LX	700	DCC
7	VII	70	LXX	800	DCCC
8	VIII	80	LXXX	900	CM
9	IX	90	XC	1000	M
10	X	100	C	1001	MI

Rules of the system

- In Roman numerals a symbol is not repeated more than three times, but the symbols V, L

and D are never repeated.

- Roman numerals are read from left to right and the letters of Roman numerals are arranged from the largest to the smallest.

- If a symbol of smaller value is written to the right of a symbol of greater value, then its value gets added to the value of greater symbol.

  VI = 5 + 1 = 6

- If a symbol of smaller value is written to the left of a symbol of greater value, its then value is subtracted from the value of the greater symbol.

  IV = 5 – 1 = 4

- The symbol I can be subtracted from V and X only.

  The symbol X can be subtracted from L, M and C only.

Importance of Brackets

Brackets help in simplifying an expansion with more than one mathematical operation.

In an expression that includes brackets, the numbers inside the brackets must be simplified into a single.

11. Rounding a number to nearest hundred
    i. See the tens digit of the given number.
    ii. If tens digit is less than 5, replace each of tens and ones digit by 0, and keep the other digits as they are.
    iii. If tens digit is 5 or more, increase hundreds digit by 1, and replace each digit on its right by 0.

12. Rounding a number to nearest thousand
    i. See the hundreds digit of the given number.
    ii. If hundreds digit is less than 5, replace each of hundreds, tens and ones digit by 0, and keep the other digits as they are.
    iii. If hundreds digit is 5 or more, increase thousands digit by 1, and replace each digit on its right by 0.

13. Estimating sum or difference
    i. Select the smaller number.
    ii. Round off the given numbers to the highest place value of that of the smaller number.
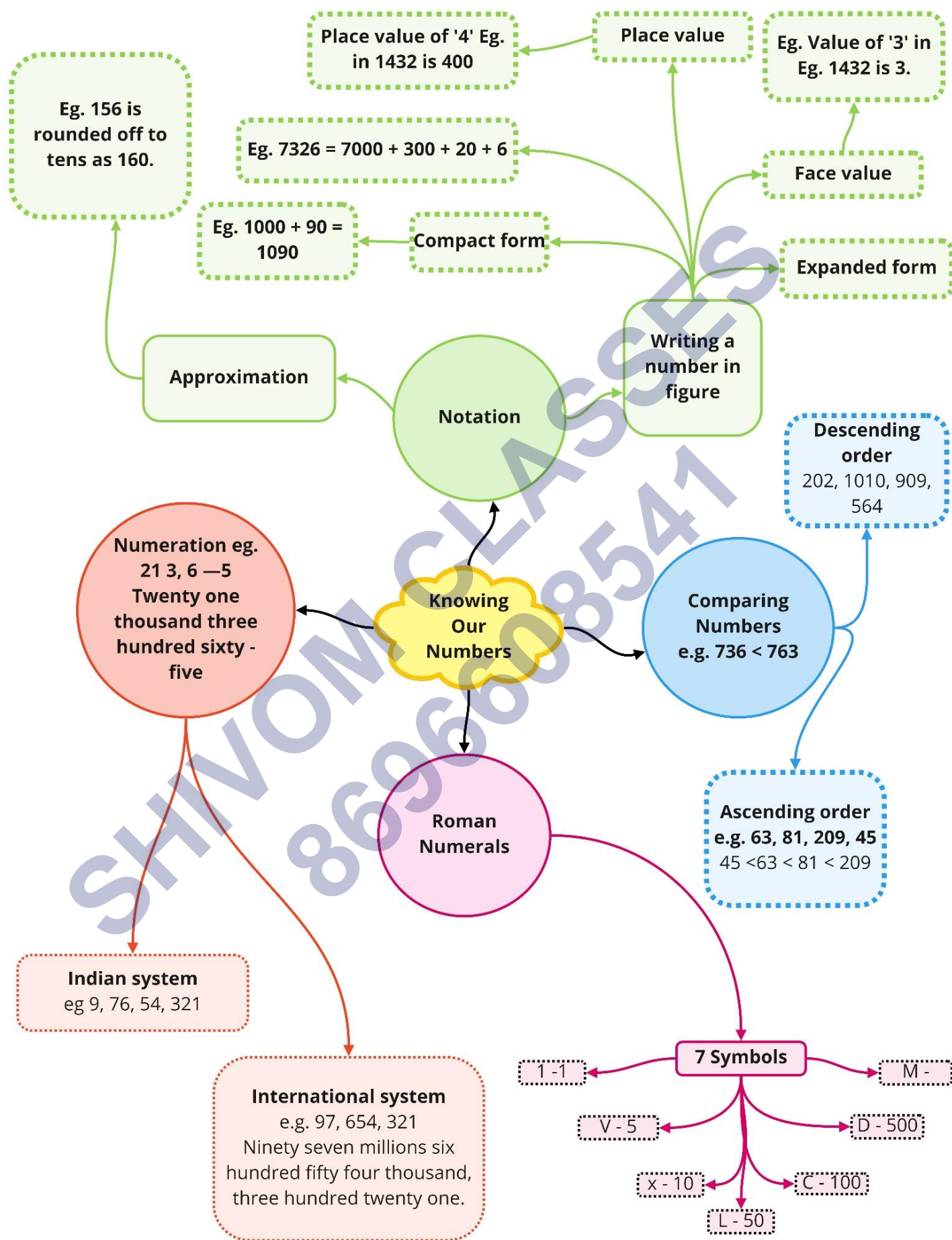   iii. Add or subtract the rounded numbers as per the question.

14. Estimating product
     i. Round off each factor to its nearest greatest value.
     ii. Multiply the rounded off factors.
15. Estimating quotient
     i. Round off the dividend to the nearest multiple of the divisor so that division becomes easy.
     ii. Divide to get the quotient.

16. Roman numeral system is one of the systems in which certain symbols are used to represent numbers. There are seven symbols to represent numbers of Hindu-Arabic system in Roman numeration.

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

17. While writing numbers in Roman system, certain rules are to be followed. They are:
     i. Repetition of a symbol in Roman numeral means addition.
     ii. A symbol is not repeated more than three times. But the symbols V, L and D are never repeated.
     iii. If a numeral of lesser value is written to the left of a greater value, the resulting value is obtained by finding their difference.
     iv. If a numeral of lesser value is written to the right of a greater value, the resulting value is obtained by finding their sum.
     v. The symbols V, L and D are never written to the left of the symbol of greater value. In other words, V, L and D are never subtracted.
     The symbol I can be subtracted from V and X only. The symbol X can be subtracted from L, M and C only.

18. For simplifying a given expression containing brackets, we strictly perform simplification in the following order (VBODMAS):
     i. Vinculum
     ii. Brackets
     iii. of
     iv. Division
     v. Multiplication
     vi. Addition
     vii. Subtraction

Place value of '4' Eg. in 1432 is 400

Place value

Eg. Value of '3' in Eg. 1432 is 3.

Eg. 156 is rounded off to tens as 160.

Eg. 7326 = 7000 + 300 + 20 + 6

Face value

Eg. 1000 + 90 = 1090

Compact form

Expanded form

Approximation

Writing a number in figure

Notation

Descending order
202, 1010, 909, 564

Numeration eg. 21 3, 6 —5 Twenty one thousand three hundred sixty - five

Knowing Our Numbers

Comparing Numbers e.g. 736 < 763

Roman Numerals

Ascending order e.g. 63, 81, 209, 45
45 <63 < 81 < 209

Indian system
eg 9, 76, 54, 321

International system
e.g. 97, 654, 321
Ninety seven millions six hundred fifty four thousand, three hundred twenty one.

7 Symbols

1 -1

M -

V - 5

D - 500

x - 10

C - 100

L - 50

Important Questions

Multiple Choice Questions:

1. The smallest 8 digit number is called:

   a) Ten lakh

   b) One lakh

   c) Ten crore

   d) One crore

2. Which of the following is not a symbol to write Roman numerals?

   a) D

   b) V

   c) M

   d) N

3. If we add 1 more to the greatest 5-digit number we get:

   a) Smallest 5-digit number

   b) Smallest 4-digit number

   c) Smallest 3-digit number

   d) Smallest 6-digit number

4. The smallest 4-digit number using any one digit twice from the numbers 2, 8, 9 is:

   a) 2889

   b) 2289

   c) 2298

   d) 2898

5. The smallest 4-digit number having three different digits is:

   a) 1000

   b) 1203

   c) 1320

   d) 1002

6. Which of the following options is equal to MMMCCLXXV − MCCCXXIV?

   a) MLMCI

   b) MMCLI

c) MCMLI

d) MCMIL

7. Which pair has same digits at hundreds place?

   a) 4232, 4341

   b) 5432, 6922

   c) 6524, 7823

   d) 2334, 2340

8. Which of the following options is true?

   a) XCVIII > MCVIII

   b) DCVIII < MCVIII

   c) DCVIII = MCVIII

   d) XCVIII < LXXXVII

9. The greatest 4-digit number using any one digit twice from the numbers 7, 1, 2 is:

   a) 7221

   b) 7721

   c) 7122

   d) 7112

10. The difference between face value and place value of 5 in 210517 is:

    a) 4995

    b) 5005

    c) 495

    d) 395

11. Make the greatest four digit number by using any one digit twice by 3, 8, 7?

    a) 8378

    b) 8873

    c) 3387

    d) 7783

12. Write the greatest 4-digit number using different digits with 6 in the tens place.

    a) 9876

    b) 9867

    c) 9687

d) 6987

13. Which of the following is the Roman numeral for the number 2765?

    a) MMDCCXLV

    b) MMDCXLXV

    c) MMDCCLXV

    d) MMCDCLXV

14. The smallest 4-digit number using the digits 2, 1, 3, 7 without repetition is:

    a) 1237

    b) 2137

    c) 2371

    d) 3217

15. Identify the greatest and the smallest in 2853, 7691, 9999, 12002, 124:

    a) 12202, 124

    b) None of these

    c) 12202, 7691

    d) 9999, 124

Match The Following:

	Column I		Column II
1.	Estimation	**A.**	International System
2.	Billion, Million	**B.**	Rough Calculation
3.	Crore	**C.**	90,030
4.	Nine Thousand Thirty	**D.**	Indian System

Fill in the blanks:

1. 1 million = _____ hundred thousand.

2. 1 crore = _____ ten lakh.

3. 1 crore = _____ million.

4. 1 million = _____ lakh.

True /False:

1. 1 thousand = 10 hundred.

2. There are many Roman Numbers.

3. You are using estimation to get rough idea.

4. Standard unit of mass is centimeter.

Very Short Questions:

1. How many crores makes a billion?

2. Find the greatest number from below number 763298 and 764298.

3. Place commas correctly and write the numerals:

    (a) Seventy three lakh seventy five thousand three hundred seven.

    (b) Nine crore five lakh forty one.

    (c) Seven crore fifty two lakh twenty one thousand three hundred two.

    (d) Fifty eight millions four hundred twenty three thousand two hundred two.

4. On Sunday 6000 people visited a zoo. Among them 2615 were children then how many adult visited zoo?

5. Kirti Bookstore sold books worth Rs.2,85,891 in the first week of June and books worth Rs.4,00,768 in the second week of the month. How much was the sale for the two weeks together? In which week was the sale greater and by how much?

6. Find the greatest and the smallest number. 42375, 42367, 42329, 42338.

7. Write and solve the expression: Thirteen multiplied by sum of four and eleven. Now reverse the result and add it to earlier result, what you obtain multiply it by 13.

8. Write the smallest three digit number whose value does not change on reversing its digits.

9. Write the greatest three digit number which does not change on reversing its digits.

10. What must be added to 203 to get a number whose digits are reversed of the given number?

11. Write 438 in its expanded form.

12. Write the greatest five-digit number using the digits 4, 2 and 0.

13. The capacity of a water tank is 300 liters. Express its capacity in milliliters.

14. What is the successor of greatest 6-digit number?

15. What is the place value of 7 in 1743?

Short Questions:

1. Of 7,12,540 and 71,25,400 which number is greater and by how much?

2. Write the smallest and the greatest 5-digit numbers using the digits 0,2,4,6,8 (Repetition of digits is not allowed).

3. Write the following numbers in ascending order. How many of them are even numbers?

   63,854, 63,584, 65,348, 68,543, 64,835

4. Round the given numbers to the nearest tens.

   (a) 48

   (b) 59

   (c) 64

   (d) 215

5. Estimate the following products:

   (a) 86 × 316

   (b) 898 × 786

6. Divide 2,63,175 by 275.

7. A student multiplied 3759 by 231 instead of multiplying by 213. How much was his product greater than the correct product?

8. Estimate: 25,148 + 7394 + 9343 + 752

9. Write all the even numbers between 90 and 100 in Roman Numerals.

Long Questions:

1. Write the missing digits in the following sums:

   (a)
   ```
        4  1  □  8  7
        1  □  4  3  2
      + 2  5  3  □  9
      ─────────────────
      □  4  6  0  □
   ```

   (b)
   ```
        8  □  4  5  □
      - 6  7  □  □  8
      ─────────────────
      □  4  7  7  5
   ```

2. Write Hindu-Arabic numerals for:

   (a) LXXXVI

   (b) LXXV

   (c) XCIX

   (d) XCI

3. The distance between the school and Reena's house is 1 km 480 m. Everyday she walks both ways. What distance does she cover in 6 days of a week?

4. Simplify: 36 ÷ [5 + {4 x 5 ÷ 2}]

5. To stitch a pant 1 m 15 cm cloth is needed. Out of 36 m cloth, how many pants can be stitched and how much cloth will remain?

6. There are two factories located at place P and the other at place Q. From these factories, a certain commodity is to be delivered to each of the depots situated at A, B and C. Weekly production of commodity by P and Q are 120 kg and 150 kg respectively. Weekly requirement of commodity by A, B and C are 80 kg, 90 kg and 100 kg respectively. P delivers 60 kg to A, 40 kg to B and 20 kg to C. How much amount of the commodity should Q deliver to A, B and C to meet their requirement? If the rate of the commodity is? 20 per kg, find the total amount to be paid to P and Q.

Assertion Reason:

1.) Assertion (A) –92 is greater number than 52.

Reason (R) – When a number is bigger or larger than the second or rest quantities or numbers it is known as greater number.

a) Both A and R are true and R is the correct explanation of A

b) Both A and R are true but R is not the correct explanation of A

c) A is true but R is false

d) A is false but R is true

2.) Assertion (A) – 59785 is the greatest number among 382, 4972, 18, 59785, 750.

Reason (R) – When a number is bigger or larger than the second or rest quantities or numbers it is known as greatest number.

a) Both A and R are true and R is the correct explanation of A

b) Both A and R are true but R is not the correct explanation of A

c) A is true but R is false

d) A is false but R is true

ANSWER KEY-

Multiple Choice questions:

1. **D.** One crore

2. **D.** N

3. **D.** Smallest 6-digit number

4. **B.** 2289

5. **D.** 1002

6. **C.** MCMLI

7. **D.** 2334, 2340

8. **B.** DCVIII < MCVIII

9. **B.** 7721

10. **C.** 495

11. **B.** 8873

12. **B.** 9867

13. **C.** MMDCCLXV

14. **C.** 1237

15. **A.** 12202, 124

Match The Following:

	Column I		Column II
1.	Estimation	**B.**	Rough Calculation
2.	Billion, Million	**A.**	International System
3.	Crore	**D.**	Indian System
4.	Nine Thousand Thirty	**C.**	90,030

Fill in the blanks:

1. 1 million = **ten** hundred thousand.

2. 1 crore = **hundred** lakh.

3. 1 crore = **ten** million.

4. 1 million = **ten** lakh.

True /False:

1. True

2. False

3. True

4. False

Very Short Answer:

1. 1 billion= 100 crore

2. 764298 is the greatest number

3. a) 73,75,307

   b) 9,05,00,041

   c) 7,52,21,302

   d) 58,423,202

4. Total number of people visited the zoo = 6000 people

   Total number of children = 2615 children

   Then number of adults = 6000 – 2615 = 3385

5. Sale of books in the first week = Rs.2,85,891.

   Sale of books in the second week = Rs.4,00,768

   ∴ Sale for the two weeks together = Rs.2,85,891 + Rs.4,00,768 = Rs.6,86,659.

   The sale was greater in the second week by Rs. 4,00,768 – Rs.2,85,891 i.e., by Rs. 1,14,877.

6. The greatest number is 42375

   The smallest number is 42329

7. Expression 13 × (4 + 11) = 13 × 15 = 195

   On reversing the answer = 591

   Adding reversing number to the result i.e., 591 + 195 = 786

   Multiplying it by 13 i.e., 786 × 13 = 10218.

8. The required number is 101.

9. The required number is 999.

10. The number obtained by reversing the digits of 203 = 302.

    ∴ Difference = 302 – 203 = 99

    Hence, the required number is 99.

11. 438 = 4 × 100 + 3 × 10 + 8.

12. The greatest five-digit number using the digits 4, 2 and 0 is 44420.

13. We know that

    1 liter = 1000 mL

    ∴ 300 liters = 300 × 1000 mL = 3,00,000 mL

    Hence, the capacity of water tank = 3 lakh milliliters.

14. Greatest 6-digit number = 999999

Successor of it = 999999 + 1 = 1000000

i. e., smallest 7-digit number.

Hence, the required successor = 10,00,000.

15. Let us write 1743 in its expanded form

1743 = 1000 + 700 + 40 +3

Place value of 7 = 700

Hence, the place value of 7 = 700.

Short Answer:

1. Since 71,25,400 is a seven-digit number and 7,12,540 is a six-digit number.

So, 71,25,400 is greater than 7,12,540.

```
Now        7125400
        (–) 712540
        ─────────
        6 4,12,860
```

Hence 71,25,400 is greater than 7,12,540 by 64,12,860.

2. Given digits are 0, 2, 4, 6, 8

5 – digit greatest number = 86420;

5 – digit smallest number = 20468.

3. The given numbers are 63,854, 63,584, 65,348, 68,543 and 64,835.

Ascending order is 63,584; 63,854; 64,835; 65,348; 68,543

Even numbers are 63,584, 63,854 and 65,348

4. Given number Rounded off to tens

(a) 48 → 50

(b) 59 → 60

(c) 64 → 60

(d) 215 → 220

5. (a) 86 × 316

∵ 86 → 90 [Rounding off to tens] and 316 → 320 [Rounding off to tens]

So, the estimated product is 90 × 320 = 28800

6. We have

```
          957
     275 ) 263175
        - 2475 ↓
          1567
        - 1375 ↓
          1925
        - 1925
          0
```

Hence, quotient = 957 and remainder = 0.

7. First Method:

(3759 x 231) - (3759 x 213) = 868329 – 800667 = 67662

Second Method: 3759 x (231 – 213) = 3759 x 18 = 67662

Hence, the product difference is 67662.

8. Estimated values are

25,148 → 25100

7394 → 7400

9343 → 9300

752 → 800

So, the estimated sum is 25100 + 7400 + 9300 + 800 = 42600

Hence, the estimated sum is 42600.

9. Even numbers between 90 and 100, we have 92, 94, 96, 98.

∴ 92 = XCII,

94 = XCIV,

96 = XCVI,

98 = XCVIII

Long Answer:

1.

(a)

$$\begin{array}{r} \textcircled{1}\ \textcircled{1}\ \textcircled{2}\ \textcircled{1}\quad \\ 4\ 1\ \boxed{7}\ 8\ 7 \\ 1\ \boxed{7}\ 4\ 3\ 2 \\ +\ 2\ 5\ 3\ \boxed{8}\ 9 \\ \hline \boxed{8}\ 4\ 6\ 0\ \boxed{8} \\ \hline \end{array}$$

(b)

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

2.   (a) LXXXVI = 50 + 30 + 6 = 86

(b) LXXV = 50 + 20 + 5 = 75

(c) XCIX = (100 – 10) + 9 = 99

(d) XCI = (100 – 10) + 1 = 91

3.   Distance covered when she walks one way = 1 km 480 m = 1480 m

Therefore, the distance covered when she walk both ways in a day = 1480 × 2 m = 2960 m

Total distance covered by Reena in 6 days = 2960 × 6 m = 17760 m or 17 km 760 m.

4.   Given:

36 ÷ [5 + {4 × 5 ÷ 2}]

Using B, O, D, M, A, S

$$= 36 \div \left[5 + \left\{4 \times \frac{5}{2}\right\}\right] = 36 \div [5 + \{2 \times 5\}]$$

$$= 36 \div [5 + 10] = 36 \div 15$$

$$= 36 \times \frac{1}{15} = \frac{12}{5} \ or \ 2\frac{2}{5}$$

$$\begin{array}{r} 31 \\ 115\overline{)3600} \\ -345 \\ \hline 150 \\ -115 \\ \hline 35 \end{array}$$

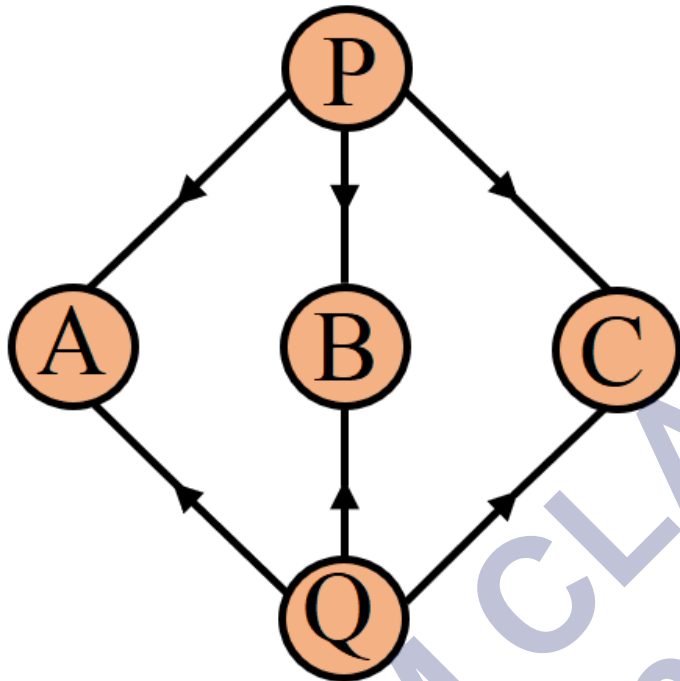Cloth required to stitch 1 pant = 1 m 15 cm

= 100 cm + 15 cm [∵ 1 m = 100 cm]

= 115 cm

Total cloth = 36 m = 36 × 100 cm = 3600 cm

Therefore number of pants stitched = $\frac{3600}{115}$

Hence, 31 pants can be stitched and cloth left over is 35 cm.

5.

Amount of commodity delivered by P to A = 60 kg

Amount of commodity delivered by Q to A = 80 − 60 = 20 kg

Amount of commodity delivered by P to B = 40 kg

Amount of commodity delivered by Q to B − 90 − 40 = 50 kg

Amount of commodity delivered by P to C = 20

Amount of commodity delivered by Q to C = 100 − 20 = 80 kg.

Now Amount of money to be paid to P by A, B and C = ₹ (60 × 20 + 40 × 20 + 20 × 20)

= ₹ (1200 + 800 + 400) = ₹ 2400

and amount of money to be paid to Q by A, B and C

= ₹ (20 × 20 + 50 × 20 + 80 × 20)

= ₹ (400 + 1000 + 1600) = ₹ 3000

Hence, the total amount

= ₹ 2400 + ₹ 3000 = ₹ 5400.

Assertion Reason Answers:

1.) a) Both A and R are true and R is the correct explanation of A

2.) a) Both A and R are true and R is the correct explanation of A