Chapter 1

Number sense counting and place value

Learn the ideas below, follow each worked example, then attempt the practice before checking the answers.

1.1 Counting and grouping

Counting tells us how many objects are in a collection. Match each object to one number word and count every object once. The final number gives the total. Count forwards to add objects and backwards to remove them. Grouping in twos, fives or tens makes a large collection easier to count.

Worked example There are 6 groups of 10 counters and 4 single counters. The total is 60 + 4 = 64. Counting by tens gives 10, 20, 30, 40, 50, 60, followed by 61, 62, 63, 64.

1.2 Digits and place value

The ten digits are 0 to 9. A digit has a face value and a place value. In a base ten system, each place is ten times the place to its right. Zero holds an empty place. From the right, whole number places are ones, tens, hundreds, thousands, ten thousands, hundred thousands and millions.

Worked example In 407,253, the digit 7 represents 7,000. Expanded form is 400,000 + 7,000 + 200 + 50 + 3. The zero shows that there are no ten thousands.

1.3 Reading and writing large numbers

Separate digits into groups to read large numbers. International grouping uses groups of three digits from the right. Indian grouping uses three digits at the right and then groups of two. The value stays the same whichever grouping system you use.

Worked example 1,234,567 is one million two hundred and thirty four thousand five hundred and sixty seven. The same number is written 12,34,567 in Indian grouping and read as twelve lakh thirty four thousand five hundred and sixty seven.

1.4 Decimal place value

The decimal point separates whole parts from parts smaller than one. The first three places to its right are tenths, hundredths and thousandths. Each step to the right divides the value by ten. Zeros at the end of a decimal do not change its value.

Worked example $32.405 = 30 + 2 + \frac{4}{10} + \frac{0}{100} + \frac{5}{1000}$. The 5 represents five thousandths. Also, 3.5 = 3.50 because both describe the same amount.

1.5 Partitioning and regrouping

Partitioning breaks a number into useful parts. Regrouping exchanges one unit for ten smaller units without changing the total. These ideas explain carrying in addition and exchanging in subtraction. A number can have several correct partitions.

Worked example 326 can be 300 + 20 + 6 or 200 + 120 + 6. For subtraction, 52 can be regrouped as 4 tens and 12 ones. Both representations still equal 52.

Chapter 1 practice

Work in your notebook. Show your method and include units where needed.

1. Write the value of 8 in 582,416.
2. Write 60,000 + 900 + 7 as one number.
3. Write 4.072 in expanded form.
4. How many counters are in 9 groups of 10 and 6 singles?
5. Regroup 71 as tens and ones so that there are 11 ones.

Answers with methods

1. 8 is in the ten thousands place, so its value is 80,000.

2. 60,907. Zeros hold the thousands and tens places.

3. $4 + \frac{7}{100} + \frac{2}{1000}$.

4. 90 + 6 = 96 counters.

5. 6 tens and 11 ones, because 60 + 11 = 71.

Common mistake to avoid

A zero inside a number cannot usually be removed. 3,042 and 342 have different values. Say the place name before deciding the value of a digit.