

# CONTENTS

## CHAPTER 1

### NUMBERS

Place Value	1
Approximation	3
Even, Odd, Prime, Square, Rectangular and Triangular Numbers	5
Multiples and Factors	7
How to Find a Number Halfway Between Two Numbers	9
Negative Numbers	10
Mathematical Signs	11

## CHAPTER 2

### FOUR RULES

Addition	13
Subtraction	15
Multiplication	17
Division	21

## CHAPTER 3

### FRACTIONS

Definitions	25
• Denominators	
• Numerators	
• Proper and Improper Fractions	
• Mixed Numbers	
Making Mixed Numbers into Improper Fractions; Improper Fractions into Mixed Numbers	26
Finding the Value of a Fraction	27
Equivalent Fractions	27
Cancelling	28
Common Denominators	29
Expressing Quantities as Fractions	29

## CHAPTER 4

### DECIMALS

Place Value	31
Converting Decimals to Fractions	32
Comparing the Value of Two Decimal Numbers	32
Converting Fractions to Decimals	33
Mid-point between Two Decimals	33
Rounding Decimals to Nearest Whole Number, One Decimal Place, Two Decimal Places	34
Addition	34
Subtraction	35
Multiplication	35
Division	37
Multiplying by 10, 100, 1000	39
Dividing by 10, 100, 1000	40

## CHAPTER 5

### PERCENTAGES

Converting Percentages into Fractions	43
Converting Fractions into Percentages	44
Finding the Value of a Percentage	44

<b>CHAPTER 6</b>	<b>MONEY</b>	47
<b>CHAPTER 7</b>	<b>TIME</b>	49
<b>CHAPTER 8</b>	<b>LENGTH</b>	53
<b>CHAPTER 9</b>	<b>WEIGHT</b>	57
<b>CHAPTER 10</b>	<b>CAPACITY</b>	59
<b>CHAPTER 11</b>	<b>EQUIVALENT MEASURES</b>	61
<b>CHAPTER 12</b>	<b>PERIMETER</b>	63
<b>CHAPTER 13</b>	<b>AREA</b>	65
<b>CHAPTER 14</b>	<b>VOLUME</b>	69
<b>CHAPTER 15</b>	<b>AVERAGES</b>	71
<b>CHAPTER 16</b>	<b>UNEQUAL SHARING</b>	73
<b>CHAPTER 17</b>	<b>RATIO</b>	75
<b>CHAPTER 18</b>	<b>PROBABILITY</b>	77
<b>CHAPTER 19</b>	<b>SYMMETRY</b>	79
<b>CHAPTER 20</b>	<b>REFLECTION</b>	83
<b>CHAPTER 21</b>	<b>CO-ORDINATES</b>	85
<b>CHAPTER 22</b>	<b>TRANSLATION</b>	87
<b>CHAPTER 23</b>	<b>SHAPES</b>	89
<b>CHAPTER 24</b>	<b>HANDLING DATA</b>	95
<b>CHAPTER 25</b>	<b>ANGLES AND BEARINGS</b>	103
<b>CHAPTER 26</b>	<b>USING A CALCULATOR</b>	107

# CHAPTER 1: NUMBERS

## PLACE VALUE

All numbers are composed of the digits 0 to 9.

Numbers are sometimes referred to as integers. *To simplify, throughout the chapter, the word “number” is used.*

Thus, 7 is a one digit number.  
28 is a two digit number.  
376 is a three digit number.

The **value** of a digit depends on its **place** in the number. That is why it is said that the position of a digit is its **place value**. For example, the value of 7 in 72 is different to the value of 7 in 27.

When numbers consist of more than one digit, the value of each digit increases ten times reading from right to left. The first digit on the right (in the first column) represents ones (units). The second digit represents tens, the third digit, hundreds and the fourth digit, thousands.

Study the following number: 8742

The **place value** can be put over each digit.

Thousands	Hundreds	Tens	Units
8	7	4	2

The number can be put in columns.

	Th	H	T	U	
				2	
			4	0	(4 groups of 10)
		7	0	0	(7 groups of 100)
+	8	0	0	0	(8 groups of 1000)
	8	7	4	2	

Notice the value of the following digits underlined.

Th	H	T	U	
<u>7</u>	6	5	4	= 7000
7	4	<u>9</u>	7	= 90

After the thousands, the columns indicating place value continue to increase ten times; tens of thousands, hundreds of thousands and millions.

For example: 3 764 211

3 represents three million (3 000 000)

7 represents seven hundred thousand (700 000)

6 represents sixty thousand (60 000)

When putting words into figures, the word 'thousand' is often represented by a space or, in some cases, by a comma.

For example: twenty thousand six hundred and forty nine in figures is

20 649      or      20,649

three hundred and forty nine thousand six hundred and nine

349 609      or      349,609

The word 'million' is often represented by a space or, in some cases, by a comma.

For example: nine million

9 000 000      or      9,000,000

six million seventy thousand four hundred and seventy four

6 070 474      or      6,070,474

**Note:** *There are always three digits after the space (comma) representing thousand.  
There are always six digits after the space (comma) representing million.*

# APPROXIMATION

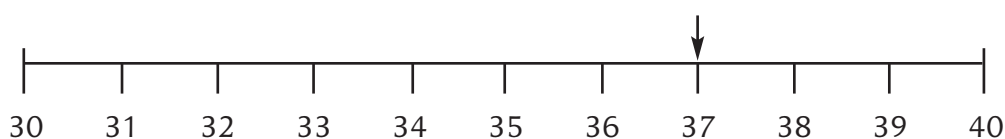
You are often required to **round** numbers.

For example: **round** 37 to the nearest 10.

Two groups of 10 are possible because 37 lies between 30 and 40.

37 is nearer to 40 than 30, so the answer is 40.

This can be illustrated on a number line.



The answer as to whether 37 is nearer to 30 or 40 can be worked out by studying the unit digit. If the unit digit is 5, or more than 5, then the higher number is the answer.

To **round** 33 to the nearest 10, the answer would be 30 because the unit digit is less than 5. The lower number, therefore, is the answer.

You may be required to **round** numbers to the nearest hundred.

For example: **round** 9 768 to the nearest hundred.



The answer can also be worked out by studying the digit in the hundreds column, ignoring any digit on its left.

There are two groups of hundred possible since 768 lies between 700 and 800.

The rule is that, if the tens digit is below 5 you move to the lower of the two groups.

In this case, because the tens digit is greater than 5 you move to the higher of the two groups which is 800.

The final answer is 9 800. Note: the 9 digit representing 9 000 remains unchanged throughout.

In some instances, more than one column is affected when rounding to the nearest 10, 100, 1000 etc.

For example:            796 **rounded** to the nearest 10

The answer lies between two groups of 10: 790 and 800. The unit digit is more than 5 and, therefore, the higher number is the answer.

In the same way, 4 976 **rounded** to the nearest 100

The answer lies between two groups of 100: 4 900 and 5 000. The tens digit is more than 5 and, therefore, the higher number is the answer.

**Note:**

*When rounding to the nearest 10, 100, 1 000 etc., if the digit to the right of those columns is 5, then the number rounds up.*

Example:            **T U**  
                      7 5 to the nearest ten is 80

**Th H T U**  
1 4 5 2 to the nearest hundred is 1 500

*246 509 to the nearest thousand is 247 000.*

(Approximation to the nearest 10, 100 or 1 000 will be used in the next chapter when estimating answers in multiplication and division.)

# ***EVEN, ODD, PRIME, SQUARE, RECTANGULAR AND TRIANGULAR NUMBERS***

## **Even numbers**

A number is said to be even when it can be divided by 2, leaving no remainder.

All even numbers end in 0, 2, 4, 6 or 8.

Examples:            78    672    34 694

## **Odd numbers**

All numbers that are not even are said to be odd.

All odd numbers end in 1, 3, 5, 7 or 9.

Examples:            31    977    46 795

## **Prime numbers**

A number is said to be prime when only one and itself will divide into it without leaving a remainder. *“It is only divisible by itself and one.”*

Examples:            31    43    101


1 is not a prime number.

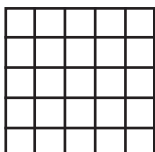
## **Square numbers**

A square number is obtained when a number is multiplied by itself.

Example:     $2 \times 2 = 4$                     4 is a square number  
               $5 \times 5 = 25$                     25 is a square number

This can be illustrated using squares.

  $2 \times 2 = 4$

  $5 \times 5 = 25$

The instruction to square a number can be expressed as  $5^2$   $5 \times 5 = 25$   
 $8^2$   $8 \times 8 = 64$

= 5 =

If you are given a square number, the original number (the number which has been multiplied by itself) is called the square root.

The square root of 81 is 9 ( $9 \times 9 = 81$ )

The instruction to find the square root can be written as  $\sqrt{81}$

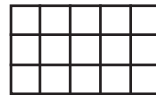
## Rectangular numbers

A rectangular number is obtained by multiplying two different numbers together.



2 rows, 6 columns  
 $2 \times 6 = 12$

Similarly, 15 is a rectangular number.



3 rows, 5 columns  
 $3 \times 5 = 15$

## Triangular numbers

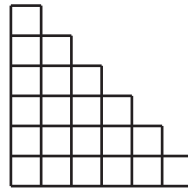
A triangular number is obtained by adding consecutive numbers starting with 1.

Thus, 6 is a triangular number.



$$1 + 2 + 3 = 6$$

Similarly, 21 is a triangular number.



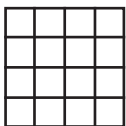
$$1 + 2 + 3 + 4 + 5 + 6 = 21$$

Triangular numbers, starting with 1, can be worked out using the following number pattern:

1+2   3+3   6+4   10+5   15+6   21+7   28+8   36.....

It is possible for numbers to be square and rectangular.

For example, 16

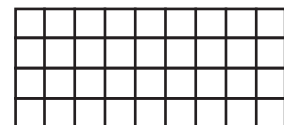
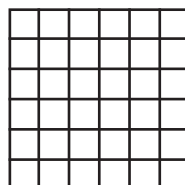
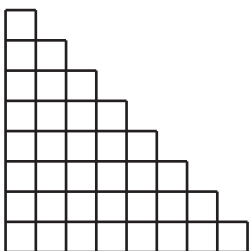


4 rows, 4 columns  
 $4 \times 4 = 16$



2 rows, 8 columns  
 $2 \times 8 = 16$

Few numbers, however, are square, rectangular and triangular. The lowest number which is all three is 36.



# **MULTIPLES AND FACTORS**

## **Multiples**

Multiples of a number are obtained when that number is multiplied by any other number.

For example:  $6 \times 3 = 18$      18 is therefore a multiple of 6

Similarly:      $3 \times 6 = 18$      18 is therefore a multiple of 3

You may be asked to determine whether one number is a multiple of another.

For example:     Is 90 a multiple of 6?

To find the answer divide 90 by 6.

If there is no remainder, 90 is a multiple of 6. ( $90 \div 6 = 15$ )

In the same way, 595 is a multiple of 17 ( $595 \div 17 = 35$ )

## **Common Multiples**

The multiples of 4 include 24, 28 and 32.

The multiples of 7 include 21, 28 and 35.

As 28 is a multiple of both 4 and 7, it is said to be a common multiple of 4 and 7.

In the same way, 40 is a common multiple of 5 and 8.

## **Factors**

When a number divides exactly into a second number, it is said to be a factor of the second number.

Thus, 5 is a factor of 30 because 5 divides exactly into 30.

30 has a number of factors: 1, 2, 3, 5, 6, 10, 15, 30 because they all divide exactly into 30.

## **Common Factors**

24 has the following factors: 1, 2, 3, 4, 6, 8, 12, 24

32 has the following factors: 1, 2, 4, 8, 16, 32

8 is a factor of both 24 and 32. Thus 8 is said to be a common factor of 24 and 32. That is, the factor is common to both numbers.