CONTENTS

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

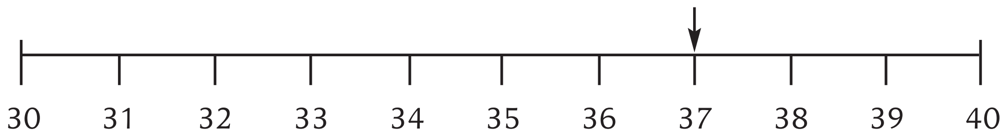
You are often required to **round** numbers.

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.

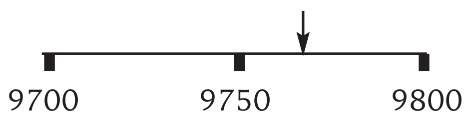


The answer as to whether 37 is nearer to 30 or 40 can be worked out by studying the unit digit. If the unit digit is 5, or more than 5, then the higher number is the answer.

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

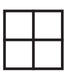
1 is not a prime number.

Square numbers

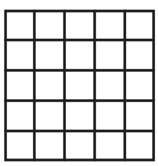
A square number is obtained when a number is multiplied by itself.

Example:	2x2 = 4	4 is a square number
	5x5 = 25	25 is a square number

This can be illustrated using squares.



2 x 2 = 4



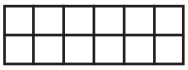
5 x 5 = 25

The instruction to square a number can be expressed as 5^2 5x5 = 25
8^2 8x8 = 64

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 (9x9 = 81)
The instruction to find the square root can be written as $\sqrt{81}$

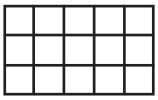
Rectangular numbers

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



2 rows, 6 columns
2 x 6 = 12

Similarly, 15 is a rectangular number.

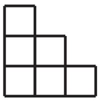


3 rows, 5 columns
3 x 5 = 15

Triangular numbers

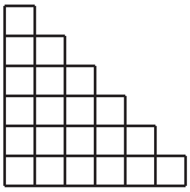
A triangular number is obtained by adding consecutive numbers starting with 1.

Thus, 6 is a triangular number.



1 + 2 + 3 = 6

Similarly, 21 is a triangular number.



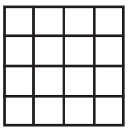
1 + 2 + 3 + 4 + 5 + 6 = 21

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

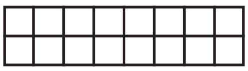
1^{+2} 3^{+3} 6^{+4} 10^{+5} 15^{+6} 21^{+7} 28^{+8} 36. . . . . .

It is possible for numbers to be square and rectangular.

For example, 16

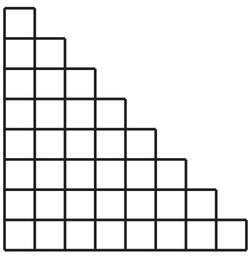


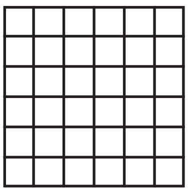
4 rows, 4 columns
4 x 4 = 16

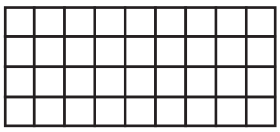


2 rows, 8 columns
2 x 8 =16

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:	6x3 = 18	18 is therefore a multiple of 6
Similarly:	3x6 = 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.