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Philip Carter & Ken Russell

The Complete Book of Fun Maths

250 Confidence Boosting Tricks, Tests and Puzzles

THE IQ WORKOUT SERIES

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The IQ Workout Series

THE COMPLETE BOOK OF FUN MATHS

250 confidence-boosting tricks, tests and puzzles

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Introduction

I'm very well acquainted too with matters mathematical,
I understand equations, both the simple and quadratical.

W. S. Gilbert

Bertrand Russell once said that 'Mathematics may be defined as the subject in which we never know what we are talking about, nor whether what we are saying is true'.

The subject of mathematics can be challenging, fascinating, confusing and frustrating, but once you have developed an interest in the science of numbers, a whole new world is opened up as you discover their many characteristics and patterns.

We all require some numerical skills in our lives, whether it is to calculate our weekly shopping bill or to budget how to use our monthly income, but for many people mathematics is a subject they regard as being too difficult when confronted by what are considered to be its higher branches. When broken down and analysed, and explained in layman's terms, however, many of these aspects can be readily understood by those of us with only a rudimentary grasp of the subject.

The basic purpose of this book is to build up readers' confidence with maths by means of a series of tests and puzzles, which become progressively more difficult over the course of the book, starting with the gentle 'Work out' of Chapter 1 to the collection of 'Complexities and curiosities' of Chapter 8. There is also the opportunity, in Chapter 3, for readers to test their numerical IQ. For many of the puzzles

throughout the book, hints towards finding a solution are provided, and in all cases the answers come complete with full detailed explanations.

Many of the problems in this book are challenging, but deliberately so, as the more you practise on this type of puzzle, the more you will come to understand the methodology and thought processes necessary to solve them and the more proficient you will become at arriving at the correct solution. Of equal importance, we set out to show that dealing with numbers can be great fun, and to obtain an understanding of the various aspects of mathematics in an entertaining and informative way can be an uplifting experience.

Section 1

Puzzles, tricks and tests

Chapter 1

The work out

All intellectual improvement arises from leisure.
Samuel Johnson

Every work out, be it physical or mental, involves a limbering up session.

The puzzles in this chapter are such a limbering up session. They have been specially selected to get you to think numerically and to increase your confidence when working with numbers or faced with a situation in which a mathematical calculation is required, and, like all the puzzles in this book, they are there to amuse and entertain.

When looking at a puzzle, the answer may hit you immediately. If not, your mind must work harder at exploring the options. Mathematics is an exact science, and there is only one correct solution to a correctly set question or puzzle; however, there may be different methods of arriving at that solution, some more laborious than others.

As you work through this first chapter you will find that there are many different ways of tackling this type of puzzle and arriving at a solution, whether it be by logical analysis or by intelligent trial and error.

1. Two golfers were discussing what might have been after they had played a par 5.

Harry said ‘if I had taken one shot less and you had taken one shot more, we would have shared the hole’.

Geoff then countered by saying ‘yes, and if I had taken one shot less and you had taken one shot more you would have taken twice as many shots as me’.

How many shots did each take?

2. A number between 1 and 50 meets the following criteria:

   it is divisible by 3
   when the digits are added together the total is between 4 and 8
   it is an odd number
   when the digits are multiplied together the total is between 4 and 8.

   What is the number?

3. On arriving at the party the six guests all say ‘Hello’ to each other once.

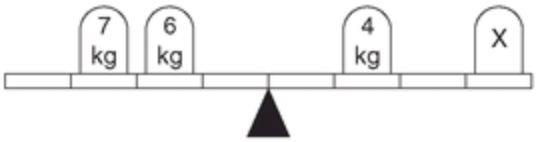
   On leaving the party the six guests all shake hands with each other once.

   How many handshakes is that in total, and how many ‘Hello’s?

4. What two numbers multiplied together equal 13?
5. Working at the stable there are a number of lads and lasses looking after the horses. In all there are 22 heads and 72 feet, including all the lads and lasses plus the horses.

If all the lads and lasses and all the horses are sound in body and limb, how many humans and how many horses are in the stable?

6. How many boxes measuring 1 m × 1 m × 50 cm can be packed into a container measuring 6 m × 5 m × 4 m?
7. By what fractional part does four-quarters exceed three-quarters?

8. 

What weight should be placed on x in order to balance the scale?

9. My house number is the lowest number on the street that, when divided by 2, 3, 4, 5 or 6, will always leave a remainder of 1.

However, when divided by 11 there is no remainder.

What is my house number?

10. My brother is less than 70 years old.

The number of his age is equal to five times the sum of its digits. In 9 years time the order of the digits of his age now will be reversed.

How old is my brother now?

11. A greengrocer received a boxful of Brussels sprouts and was furious upon opening the box to find that several had gone bad.

    He then counted them up so that he could make a formal complaint and found that 114 were bad, which was 8 per cent of the total contents of the box.

    How many sprouts were in the box?

12. If seven men can build a house in 15 days, how long will it take 12 men to build a house assuming all men work at the same rate?
13. At the end of the day one market stall has eight oranges and 24 apples left. Another market stall has 18 oranges and 12 apples left.

    What is the difference between the percentages of oranges left in each market stall?

14. Peter is twice as old as Paul was when Peter was as old as Paul is now.

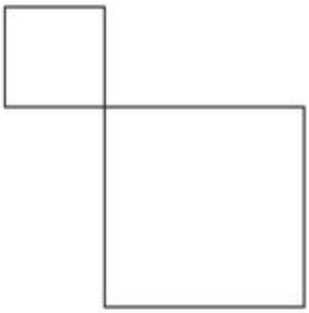
    The combined ages of Peter and Paul is 56 years.

    How old are Peter and Paul now?

    The next two puzzles are of a very similar nature.

15. A bag of potatoes weighs 25 kg divided by a quarter of its weight. How much does the bag of potatoes weigh?
16. One bag of potatoes weighed 60 kg plus one-quarter of its own weight and the other bag weighed 64 kg

plus one-fifth of its own weight.Which is the heavier bag?

17. 

An area of land, consisting of the sums of the two squares, is 1000 square metres.

The side of one square is 10 metres less than two-thirds of the side of the other square.

What are the sides of the two squares?

18. Find four numbers, the sum of which is 45, so that if 2 is added to the first number, 2 is subtracted from the second number, the third number is multiplied by 2 and the fourth number is divided by 2, the four numbers so produced, i.e. the total of the addition, the remainder of the subtraction, the product of the multiplication and the quotient of the division, are all the same.
19. Jack gave Jill as many sweets as Jill had started out with. Jill then gave Jack back as many as Jack had left. Jack then gave Jill back as many as Jill had left. The final exchange meant that poor Jack had none left, and Jill had 80.

How many sweets each did Jack and Jill start out with?

There is a hint to solving this puzzle on page 52.

20. Brian and Ryan are brothers. Three years ago Brian was seven times as old as Ryan. Two years ago he was four times as old. Last year he was three times as old and in two years time he will be twice as old.

How old are Brian and Ryan now?

21. *Sums are not set as a test on Erasmus*

Palindromes have always fascinated Hannah. Her boyfriend's name is Bob, she lives alone at her cottage in the country named Lonely Tylenol, and drives her beloved car, which is a Toyota.

A few days ago Hannah was driving along the motorway when she glanced at the mileage indicator and happened to notice that it displayed a palindromic number; 13931.

Hannah continued driving and two hours later again glanced at the odometer, and to her surprise it again displayed another palindrome.

What average speed was Hannah travelling, assuming her average speed was less than 70 mph?

22. The average of three numbers is 17. The average of two of these numbers is 25.What is the third number?

23. You have 62 cubic blocks.What is the minimum number that needs to be taken away in order to construct a solid cube with none left over?
24. I bought two watches, an expensive one and a cheap one. The expensive one cost £200 more than the cheap one and altogether I spent £220 for both. How much did I pay for the cheap watch?
25. If

    6 apples and 4 bananas cost 78 pence
    and 7 apples and 9 bananas cost 130 pence
    what is the cost of one apple and what is the cost of one banana?

26. The cost of a three-course lunch was £14.00.

    The main course cost twice as much as the sweet, and the sweet cost twice as much as the starter.

    How much did the main course cost?

27. My watch was correct at midnight, after which it began to lose 12 minutes per hour, until 7 hours ago it stopped completely. It now shows the time as 3.12.

    What is now the correct time?

28. A photograph measuring 7.5 cm by 6.5 cm is to be enlarged.

    If the enlargement of the longest side is 18 cm, what is the length of the smaller side?

29. A statue is being carved by a sculptor. The original piece of marble weighs 140 lb. On the first week 35% is cut away. On the second week the sculptor chips off

26 lb and on the third week he chips off two-fifths of the remainder, which completes the statue.

What is the weight of the final statue?

30. The ages of five family members total 65 between them.

Alice and Bill total 32 between them

Bill and Clara total 33 between them

Clara and Donald total 28 between them

Donald and Elsie total 7 between them.

How old is each family member?

31. Five years ago I was five times as old as my eldest son. Today I am three times his age.

How old am I now?

32. At my favourite store they are offering a discount of 5% if you buy in cash (which I do), 10% for a long-standing customer (which I am) and 20% at sale time (which it is).

In which order should I claim the three discounts in order to pay the least money?

33. Add you to me, divide by three,

The square of you, you'll surely see,

But me to you is eight to one,

One day you'll work it out my son.