Philip Carter & Ken Russell

Maximize Your Brainpower

1000 New Ways to Boost Your Mental Fitness

THE IQ WORKOUT SERIES

MAXIMIZE YOUR BRAINPOWER

Titles in *The IQ Workout Series*

Psychometric Testing: 1000 ways to assess your personality, creativity, intelligence and lateral thinking 0-471-52376-3

Increase Your Brainpower: Improve your creativity, memory, mental agility and intelligence 0-471-53123-5

IQ Testing: 400 ways to evaluate your brainpower 0-471-53145-6

More IQ Testing: 400 new ways to release your IQ potential 0-470-84717-4

The IQ Workout Series

MAXIMIZE YOUR BRAINPOWER

1000 new ways to boost your mental fitness

Philip Carter and Ken Russell

JOHN WILEY & SONS, LTD

Published in 2002 by John Wiley & Sons Ltd,
Baffins Lane, Chichester,
West Sussex PO19 1UD, England

National 01243 779777
International (+44) 1243 779777
e-mail (for orders and customer service enquiries):
cs-books@wiley.co.uk
Visit our Home Page on http://www.wiley.co.uk
or http://www.wiley.com

Reprinted March 2003

Other Wiley Editorial Offices

John Wiley & Sons, Inc., 605 Third Avenue,
New York, NY 10158-0012, USA

WILEY-VCH Verlag GmbH, Pappelallee 3,
D-69469 Weinheim, Germany

John Wiley & Sons Australia Ltd, 33 Park Road, Milton,
Queensland 4064, Australia

John Wiley & Sons (Asia) Pte Ltd, 2 Clementi Loop #02-01,
Jin Xing Distripark, Singapore 129809

John Wiley & Sons (Canada) Ltd, 22 Worcester Road,
Rexdale, Ontario M9W 1L1, Canada

British Library Cataloguing in Publication Data

A catalogue record for this book is available from the British Library

ISBN 0-470-84716-6

Typeset in 11/14 pt Garamond Book by Dorwyn Ltd, Rowlands Castle, Hants.
Printed and bound in Great Britain by Biddles Ltd, Guildford and King's Lynn.

This book is printed on acid-free paper responsibly manufactured from sustainable forestry, in which at least two trees are planted for each one used for paper production.

Contents

This page intentionally left blank

Introduction

> There is no man living who isn't capable of doing more than he thinks he can do.
>
> Henry Ford
>
> Every production of genius must be the production of enthusiasm.
>
> Benjamin Disraeli

Despite the enormous capacity of the human brain, we only use on average 2% of our potential brainpower. This is the amount of information available to us consciously, and the rest is locked within our subconscious mind. There is, therefore, the potential for each of us to expand our brainpower considerably.

This book sets out to show that by regular practice on different types of tests and puzzles each one of us has the capacity to maximize our brainpower and strengthen our performance at different types of brain activity. Just as gymnasts are able to improve their performance, and increase their chances of success, at whatever level they are competing, by means of punishing training schedules and refinement of technique, in the same way this book provides the reader with a series of mental workouts covering areas of creative thinking, problem solving, memory, logical thought and mental agility.

Most of us take our brain for granted, believing there is little we can do to improve the brain we have been born with. Also, because we know so little about the human brain, there is the fear factor – the fear of the unknown that we do not even like to think about, let alone talk about – however, the brain is the most vital organ in the human body and our most valuable asset. It gives rise to our perceptions and memory, and it shapes our speech, skills, thoughts and feelings, yet it is perhaps the part of our body which we tend to neglect the most.

In the past few decades we have become much more aware of the importance of the human brain, its functioning and its relationship to our body, in fact, we have learned more about the brain in the past decade or so than in all of the previous centuries.

We are now becoming more aware than ever that we all have the capacity to put our brain to even more use by exploring new avenues, experiences and learning adventures. It is our hope that this book, a follow-up to our earlier volume, *Increase Your Brainpower*, will go some way to boosting the brain potential, increasing the confidence and unleashing much untapped creativity of many of our readers.

About the brain

Study of other animals suggests a relationship exists between brain size and intelligence levels. The dolphin, for example, has an unusually large brain and is considered one of our planet's most highly intelligent creatures. Human brain size levelled off about 100,000 years ago. Unlike animals, there is no relationship between brain size and intelligence level in humans. When it comes to human brain size, therefore, bigger is not necessarily better. In fact, scientists believe bigger could be worse, because increased size may impede rapid communication between nerve cells within the brain.

In vertebrates the brain is the portion of the central nervous system within the skull. Often referred to as *grey matter* it is, in humans, a mass of pink-grey tissue and weighs approximately 1.3 kg (3 lb).

The brain is the control centre for virtually every vital activity necessary for survival including movement, sleep, hunger and thirst. In addition, all human emotions including love, hate, anger, elation and sadness are controlled by the brain. It also receives and processes signals that are sent to it from other parts of the body and from sources external to the body.

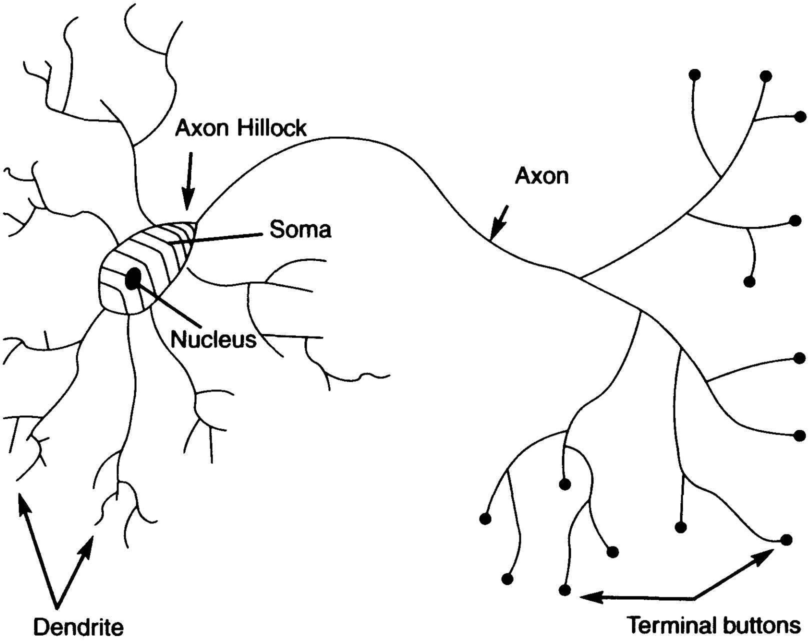
The brain comprises three distinct but connected parts: the cerebrum, the cerebellum and the brain stem. The largest part of the brain is the cerebrum which makes up approximately 85% of the brain's weight. It has a large surface area called the cortex and is divided by a fissure into identical right and left hemispheres. The cerebrum is responsible for many vital functions including speech, smell, hearing, behaviour, vision and memory.

The cerebellum lies at the back part of the cranium and is composed of two hemispheres connected by white fibres called the vermis. The cerebellum is essential to the control of movement and acts as a reflex centre for co-ordination and maintenance of equilibrium.

The brain stem is made up of all the structures lying between the cerebrum and the spinal cord and is divided into several components which regulate, or are involved in, many vital activities necessary for survival. These include, for example, eating, drinking, temperature regulation, sleep, emotional behaviour, sexual activity and cardiac and respiratory functions.

Oxygen and glucose are supplied to the brain by two sets of cranial arteries known as the vascular system. Of all the blood pumped by the heart, 25% is circulated within the brain tissue by a large network of cerebral and cerebellar arteries.

Communication in the brain takes the form of electrical impulses which run along pathways connecting the various sectors. These connections are formed by a group of dendroids which are threadlike extensions that grow out of neurons, the specialized cells of the nervous system. As well as dendroids, neurons have extensions called axons. Dendrites bring information to the cell body and axons take information away from the cell body.



Composition of a neuron

Each neuron is a cell that uses biochemical reactions to receive, process and transmit information, or messages, through an electrochemical process.

The branches of a neuron's dendrite (the dendritic tree) are connected to a thousand neighbouring neurons. It is when one of these neurons fire that a positive or negative charge is received by one of the dendrites. The strengths of all the charges are added together and the aggregate input is then passed to the soma, the cell body. The primary function of the soma and its nucleus is not the processing of incoming and outgoing data but is to perform the continuous maintenance required to keep the neuron functional. It is the axon hillock which is the part of the soma that concerns itself with the signal. If the aggregate input is greater than the axon hillock's threshold, this causes the neuron to fire and an output signal is transmitted down the axon.

Neurons are the oldest and longest cells in the body and we have many of the same neurons for our whole life. Although other cells die and are replaced, many neurons are never replaced when they die, therefore, we have fewer neurons when we are old compared to when we are young. On the other hand data published in the late 1990s shows that in at least one area, the hippocampus, new neurons can grow in adult humans.

The more connections there are between the brain's hundred billion neurons, the more efficiently it will work. Connections form as a result of two elements: inherited growth patterns, and in response to external and internal stimuli.

Large amounts of brain activity, the kind that goes on in a healthy and active brain, can stimulate growth of new dendroids, fostering further connections between neurons and improving overall brain functioning.

In addition to 100 billion neurons, there are about 10 to 50 times that many glial cells in the brain, in fact, these small cells account for about half the brain's weight and are now sometimes referred to as the brain's housekeepers.

Traditionally, glia has been thought of as mere support for the brain's neural network, however, scientists are now discovering that glial cells may play a much greater role in the brain's communication than previously thought. Although glial cells do not carry nerve impulses, they do have many important functions without which neurons would not work properly. These include providing physical and nutritional support for neurons by cleaning up brain debris, transporting nutrients to neurons, holding neurons in place, digesting parts of dead neurons, providing insulation to neurons in the central nervous system and peripheral nervous system and providing physical support to neurons in the peripheral nervous system.

Although research into the importance of glial cells is still in its infancy, neurobiologists have demonstrated that, by themselves, pure populations of nerve cells and glia connect together poorly, however, the combination of the two cell types result in strong connections between nerve cells. In the brain such connections allow nerve cells to transmit messages about activities such as thought, memory and movement, however, the weakening of these connections could be responsible for memory loss, symptoms of strokes and Alzheimer's disease.

The human brain is an infinitely complex subject and these complexities are, and will continue to be, the subject of much debate. As technological methods become more advanced, and our knowledge of the functions of the brain increases, these issues will be increasingly revealed, as will treatments for abnormal diseases of the brain such as strokes, brain disorders, Parkinson's disease and cerebral palsy.

If you have any questions about the tests included in this, or any of the other books in the IQ Workout Series, please email us at: iqworkoutseries@wiley.co.uk.

1

Creativity

If we were to remove a brain from the skull we would see that it is made up of two almost identical hemispheres. These two hemispheres are connected by a bridge, or interface, of millions of nerve fibres called the corpus callosum which allows them to communicate with each other. Thus, the human brain consists of three main parts, the left hemisphere, the right hemisphere and the all-important interface between these two hemispheres.

In order to work to its full potential, each of these hemispheres must be capable of analysing its own input first, only exchanging information with the other half, by means of the interface, when a considerable amount of processing has taken place.

Because both hemispheres are capable of working independently, human beings are able to process two streams of information at once. The brain then compares and integrates the information to obtain a broader and more in-depth understanding of the concept under examination.

In the early 1960s the American psychologist Roger Sperry showed by a series of experiments, first using animals whose corpus callosum had been severed, and then on human patients whose corpus callosum had been severed in an attempt to cure epilepsy, that each of the two hemispheres has developed specialized functions and has its own private sensations, perceptions, ideas and thoughts, all separate from the opposite hemisphere. As their experiments continued, Sperry, who won the 1981 Nobel Prize for medicine for his work in this area, and his team were able to reveal much more about how the two hemispheres were specialized to perform different tasks.

For most people the left side of the brain is analytical and functions in a sequential and logical fashion and is the side which controls language, academic studies and rationality. On the other hand, the right side is *creative* and intuitive and leads, for example, to the birth of ideas for works of art and music.

This is where the interface between the two halves of the brain becomes so important. In order for the subconscious of the right-hand hemisphere to function, it needs the fuel, in other words data, which has been fed into, collated and processed by the left-hand hemisphere.

The real danger is the overburdening of the left-hand hemisphere with too much data, and too quickly, to the extent that the creative side of the brain is unable to function to its full potential. On the other hand, lack of data fed into the left-hand hemisphere could result in the creative side, or right-hand hemisphere, drying up. It is, therefore, desirable to strike the right balance between right and left hemispheres in order for the brain to work to its full potential. The term *creativity* refers to mental processes that lead to solutions, ideas, concepts, artistic expression, theories or products that are unique and novel. Because it is such a diverse subject in which there are so many different ways in which creativity manifests itself, and because in so many people it is to a great extent unexplored, creativity is very difficult, if not impossible, to measure.

The French mathematicians Poincaré and Hadamard defined the following four stages of creativity:

1 Preparation – the attempt to solve a problem by normal means.
2 Incubation – when you feel frustrated that the above methods have not worked and as a result you then move on to other things.
3 Illumination – the answer suddenly comes to you in a flash via your subconscious.
4 Verification – your reasoning powers take over as you analyse the answer which has come to you, and you assess its feasibility.

The right-hand hemisphere of the human brain, which controls the creative functions, is the side of the brain which is under-used by the majority of people. Because it is under-used, much creative talent in many people remains untapped throughout their life. Until we try, most of us never know what we can achieve, for example, one in three people in Britain have the desire to write a novel, yet only a very small percentage of these people progress any further than the initial stage of just thinking about it.

We all have a creative side to our brain, therefore we all have the potential to be creative. However, because of the pressures of modern living and the need for specialization, many of us never have the time or opportunity, or indeed are given the encouragement, to explore our latent talents, even though most of us have sufficient ammunition to realize this potential in the form of data which has been fed into, collated and processed by the brain over many years.

Writers, indeed all artists, must, therefore, use both halves of the brain. They must use the right side of the brain to create things, and the left side of the brain to organize things. The creative and intuitive right side is able to cope with complexity and this is where insights originate, whilst the left side controls language, academic studies and rational intellectual work. The problem is, especially as in so many people the left half of the brain is possessively dominant, getting these two halves of the brain to pass information back and forth and work together.

In order to perform any creative task it is necessary to encourage your right side to start its creative juices flowing, in other words, move your mental processes, albeit temporarily, from the dominant left side across to the creative right side. This may sound an easy enough task in theory, but not so easy to put into practice.

Like many other tasks, or pleasures, the majority of us never know what we can achieve until we try. Having then tried, we instinctively know whether we find it enjoyable or whether we have a talent or flair for it. Then, if these signs are positive, we persevere. By cultivating new leisure activities and pursuing new pastimes it is possible for each of us to exploit the potential and often vastly under-used parts of the human brain.

The following exercises, while different in themselves, are all designed with the object of improving or recognizing your own powers of mental productivity, generation of ideas and artistic skills.

Tests of creativity

Progressive matrices test (Answers, see pp. 167–8)

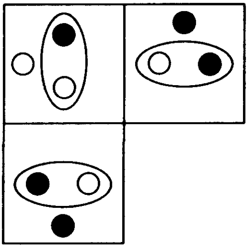
The ten questions here are designed to test and exercise your appreciation of pattern and design, your ability to think laterally and to explore with an open mind the various possibilities that might lead to a correct solution.

In tests of intelligence, a matrix is an array of squares in which one of the squares has been omitted, and where you must choose the correct missing square from a number of options. It is, therefore, necessary to study the matrix to decide what pattern is occurring, either by looking across each line and down each column, looking at the array as a whole or looking at the relationship between different squares within the array.

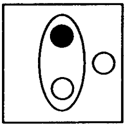
The test that follows consists of ten questions which gradually increase in difficulty as the test progresses, first starting with 2 × 2 arrays, then 3 × 3 arrays and finally 4 × 4 arrays. The tests call for a great deal of creative right-brain thinking and you must apply your mind to each set of diagrams in order to appreciate the patterns and sequences that are occurring.

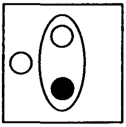
You have 45 minutes in which to solve the ten questions.

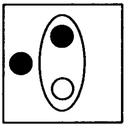
1 (i)

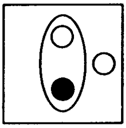


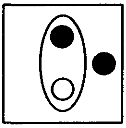
Which is the missing square?

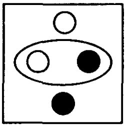

A

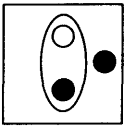

B

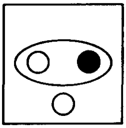

C


D

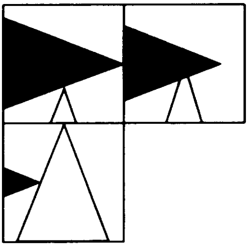

E


F

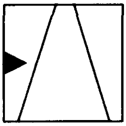

G

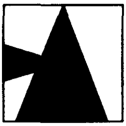

H

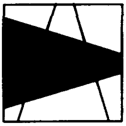
(ii)

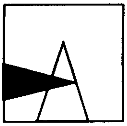


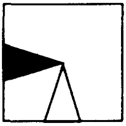
Which is the missing square?


A

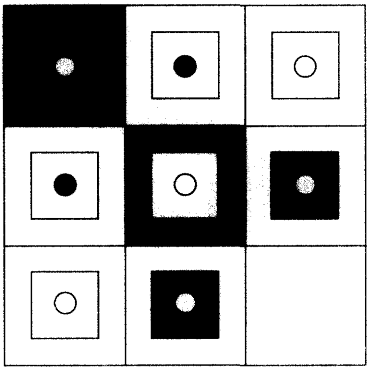

B


C

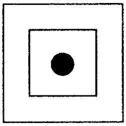

D


E

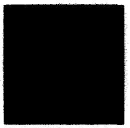
(iii)



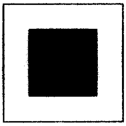
Which is the missing square?



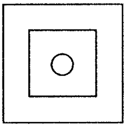
A



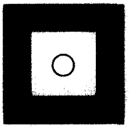
B



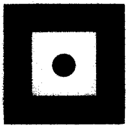
C



D

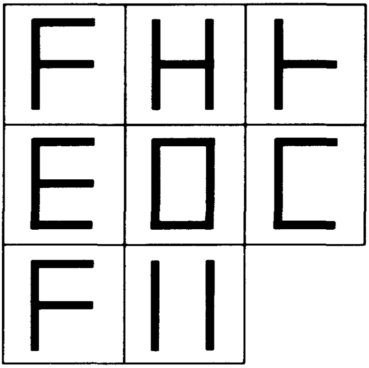


E

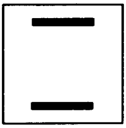


F

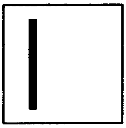
(iv)



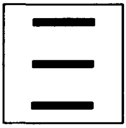
Which is the missing square?



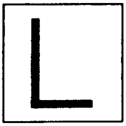
A



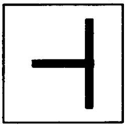
B



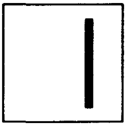
C



D

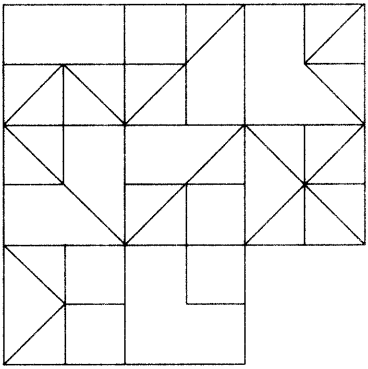


E

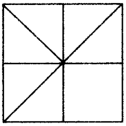


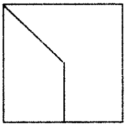
F

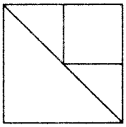
(v)

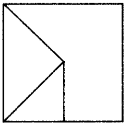


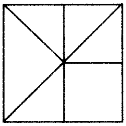
Which is the missing square?

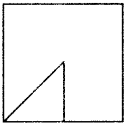

A


B

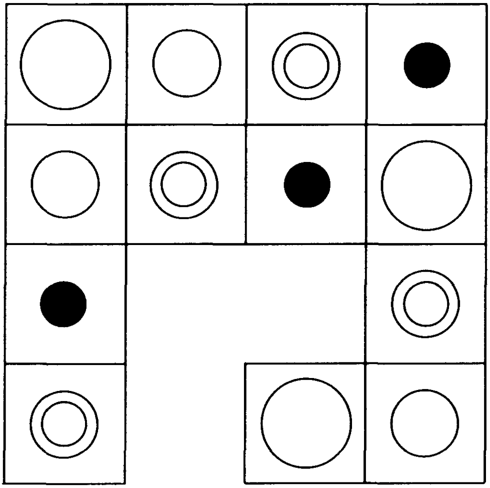

C


D

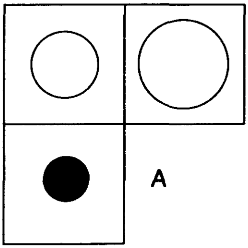

E


F

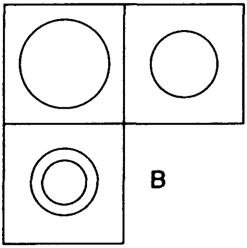
(vi)



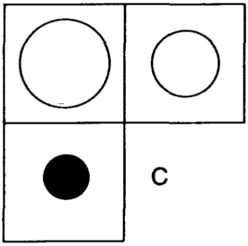
Which is the missing section?



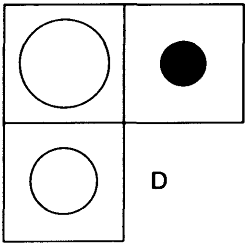
A



B

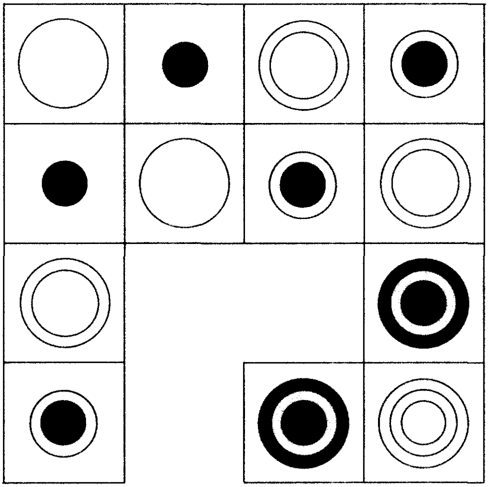


C

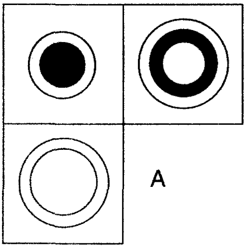


D

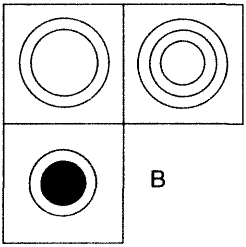
(vii)



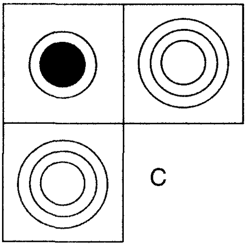
Which is the missing section?



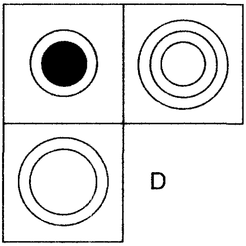
A



B

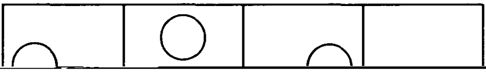


C



D

(viii)

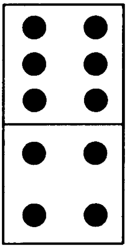


24 Make both ends meet.

Explanation:

Take the first letters of the words in the top row, the second letter of the words in the second row, the third letter of the words in the third row and the fourth letter of the words on the fourth row to spell out the message.

25



Explanation:

In each row and column alternate pips add up to the same, for example, in the first row, 1 + 6 = 5 + 2.

Numerical problem solving

1 4

Explanation:

If half of 5 = 3
Then $2\frac{1}{2}$ = 3
Then 10 = 12
Then $\frac{1}{3} \times 12$ = 4

2 No

Explanation:

$0 + 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 = 45$

Since Jimmy has only 44 the answer is No.

3 18

Explanation:

Latin	10
French	29
German	17
Latin/French	8 L/F
French/German	9 F/G
Latin/German	6 L/G
Latin/French/German	3 L/F/G
	82

100 less than 82 means that 18 students studied none of the three languages.

4

Hole		Geoff	Harry	
		£100		£0
1	WIN	£150	LOSE	–£50
2	WIN	£225	LOSE	–£125
3	LOSE	£112	WIN	–£13
4	TIE	£112	TIE	–£13
5	LOSE	£56	WIN	+£43
6	WIN	£84	LOSE	+£15
7	WIN	£126	LOSE	–£27
8	LOSE	£63	WIN	+£36
9	LOSE	£32	WIN	+£68
10	WIN	£48	LOSE	+£52
11	WIN	£72	LOSE	+£28
12	TIE	£72	TIE	+£28
	LOSES	£28	WINS	£28

The reason is that if Geoff won every hole he would win thousands of pounds but Harry could only win the £100 in Geoff's wallet. So Harry would win even if he lost by a few holes, to balance the books.

5 As suggested in the hint, if you needed to use it, first, consider numbers between 200 and 300 that have different factors. For example, 240 fingers that could be:

20 aliens with 12 fingers
or 12 aliens with 20 fingers
or 10 aliens with 24 fingers
or 24 aliens with 10 fingers

Not a unique answer, so all numbers having different factors are eliminated.

Now try prime numbers (a prime number is a number which has no factors except 1 and itself). For example, 233. That could be:

1 alien with 233 fingers (but there is more than 1 alien)
or 233 aliens with 1 finger (but each alien has at least 2 fingers)

Not a unique answer, so all prime numbers in the range are eliminated. That leaves only the square of a prime number.

There is only one between 200 and 300 and that is 289 = 17 × 17, so the answer is 17 aliens each with 17 fingers.

6 July

	Alan	Barbara	Carol	David	Edward	Fiona
JAN	✓			✓	✓	✓
FEB					✓	✓
MAR		✓		✓		
APR		✓	✓			
MAY				✓		✓
JUN	✓		✓			
JUL	✓			✓		✓
AUG				✓		
SEP			✓		✓	
OCT				✓	✓	
NOV			✓		✓	
DEC				✓	✓	

As it is the only month with three ticks, the circus must be coming to town in July.

7 Answer: 5–1

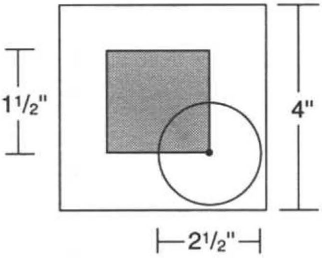
Explanation:

HORSE	ODDS	STAKE(£)
SANDS OF TIME	2–1	33.3
LITTLE BEN	3–1	25.0
MOONSHINE	4–1	20.0
PHIL'S FOLLY	8–1	11.1
ABANDON ALL HOPE	10–1	9.1
CATCH KEN	5–1	16.7
		115.2

Therefore, as he pays out £100, he collects £115 and gives himself a 15% margin.

8 For a coin to fall within a square, its centre must fall within the shaded area. If it falls outside, it will touch a line. Therefore:

	successful	$1\frac{1}{2} \times 1\frac{1}{2} =$	$2\frac{1}{4}$
	unsuccessful	$16 - 2\frac{1}{4}$	$= 13\frac{3}{4}$
	odds	$13\frac{3}{4} : 2\frac{1}{4}$	
or	odds of	55:9 against	



9 12

Explanation:

The numbers are obtained by adding the *digits*, not the *numbers*, so the missing number is 12:

$7 + 2 + 9 + 9 = 27$
$2 + 7 + 4 + 5 = 18$
$1 + 8 + 3 + 9 = 21$
$2 + 1 + 3 + 6 = 12$

10 56

13	1 × 13
8	2 × 2 × 2
7	~~1~~ × 7
4	~~2~~ × ~~2~~

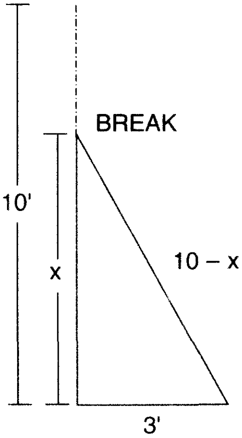
Cross out the repeats, which completely eliminates the smallest cog from the equation.

$$13 \times 8 \times 7 = \frac{728}{13} = 56$$

11 64 diamonds and 8 sons

$$\begin{array}{rr}
 & 64 \\
- & \underline{1} \\
 & 63 \\
\div 9 & \underline{7} \\
 & 56 \\
- & \underline{2} \\
 & 54 \\
\div 9 & \underline{6} \\
 & 48 \\
- & \underline{3} \\
 & 45 \\
\div 9 & \underline{5} \\
 & 40 \\
- & \underline{4} \\
 & 36 \\
\div 9 & \underline{4} \\
 & 32 \\
- & \underline{5} \\
 & 27 \\
\div 9 & \underline{3} \\
 & 24 \\
- & \underline{6} \\
 & 18 \\
\div 9 & \underline{2} \\
 & 16 \\
- & \underline{7} \\
 & 9 \\
\div 9 & \underline{1} \\
 & 8 \\
- & \underline{8} \\
 & 0
\end{array}$$

12 $4\,{}^{11}/_{20}$ ft



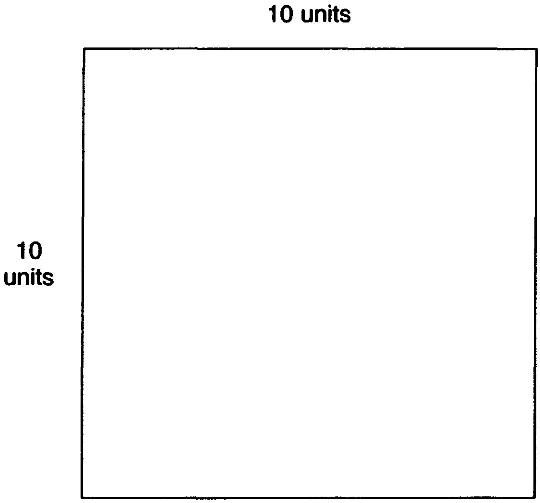
Explanation:

If the height of the break is x:
then
$x^2 + 3^2 = (10 - x)^2$

$$\begin{array}{l}
10 - x \\
\underline{10 - x} \\
100 - 10x + x^2 \\
\underline{- 10x}
\end{array}$$

$$\begin{array}{rl}
100 - 20x + x^2 & = x^2 + 3^2 \\
-20x & = -100 + 9 \\
20x & = 100 - 9 \\
x & = 5 - \dfrac{9}{20} \\
x & = 4\,\dfrac{11}{20}\text{ ft}
\end{array}$$

13



Explanation:

1	9½	14	3
2	9	15	3
3	9	16	2
4	8	17	2
5	8	18	1
6	7	19	1½
7	7		
8	6		
9	6		
10	5		
11	5		
12	4		
13	4		

100 units = $10\ \text{units}^2$

Formula length of walk = side^2

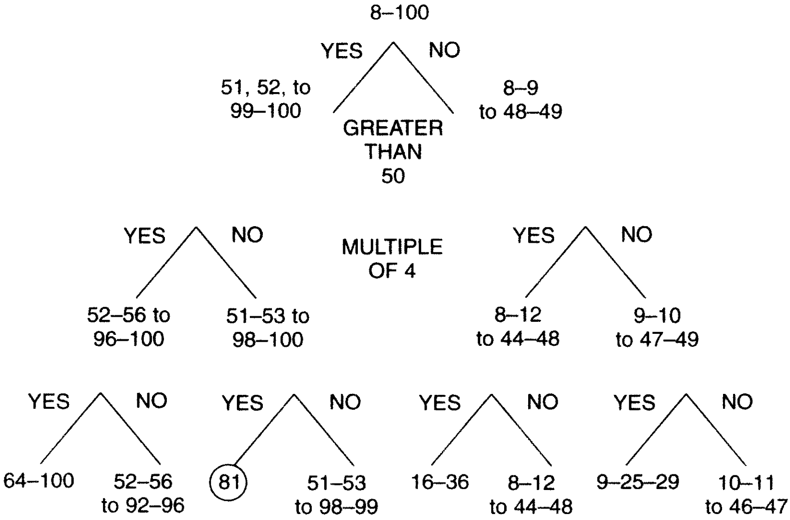
Answer = 60 ft = 3600 ft

14 1,111,111 = 239 × 4649

Therefore, 239 cats each caught 4649 mice.

15 81

Explanation:



Thus, 81 is the only unique number.

16 $1 \times 1 \times 1 \times 3 \times 13 \times 13 \times 13 = 6591$

Including 2 sets of triplets.

17 To divide by 2.236 is tedious. Avoid this as follows:

$$\frac{3}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}} = \frac{3 \times \sqrt{5}}{5}$$

$$= \frac{3 \times 2.236}{5}$$

$$= \frac{6.708}{5}$$

$$= 1.342$$

18 8

The left-hand side of the equation is divisible by 9 (3^2), so the right-hand side must also be so.

The sum of the digits on the right-hand side is therefore divisible by 9, making ? = 8.

Note: a number is divisible by 9 exactly only when the sum of its digits is exactly divisible by 9.

19 $$\frac{49 \times 48 \times 47 \times 46 \times 45 \times 44}{1 \times 2 \times 3 \times 4 \times 5 \times 6}$$

$$= \frac{1006834752}{720}$$

$$= 13{,}983{,}815 \text{ to } 1$$

20 19.2 sq yds

Let x = total area

Then $\frac{x}{3} + \frac{x}{4} + 8 = x$

$\times 12 = 7x + 96 = 12x$

$5x = 96$

$x = 19\frac{1}{5}$ sq yds

Agility of mind

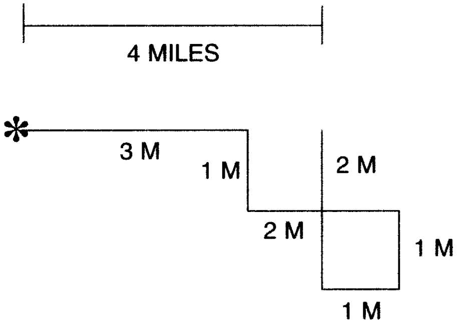
1 (i) leading/aligned

(ii) COG and TOP

(iii) 28 (7 × 4)

(iv) N

(v) 4 miles



(vi) £40

(vii) moose

(viii) 6 May.

(ix) gambol

(x) 90°

It is a right-angled triangle: 8^2(81) + 12^2 (144) = 15^2 (225)

(xi) 50mph (length of journey = 2 hours)

(xii) 70% (percentage of consonants)

(xiii) a square meal (breakfast)

(xiv) 25 minutes

1 p.m. less 25 minutes = 12.35
12.35 less 20 minutes = 12.15
12.15 less 75 minutes (3 x 25) = 11 a.m.

(xv) 8

(xvi) China and Chile

(xvii) 162 (9 × 18)

(xviii) £120

(xix) engulf

The words begin and end with consecutive letters of the alphabet ABCDEFGH.

(xx) 36 29 35

(xxi) academic, accompany, accordion, acropolis, address, adept, admission, adoration

(xxii) $\frac{4}{5}$ of 190 = 152

$\frac{3}{9}$ of 450 = 150

(xxiii) athletic

(xxiv) P

ABcDefGhijKlmnoP

(xxv) 3

Looking across the sequence is +4, –3.
Looking down the sequence is +3, –2.

(xxvi)

$$\begin{array}{r} 13000 \\ 1300 \\ 13 \\ \hline 14313 \end{array} \qquad \begin{array}{r} 14000 \\ 400 \\ 4 \\ \hline 14404 \end{array}$$

(xxvii) Angela

(xxviii) 70

Deduct 2, then 4, then 8, then 16.

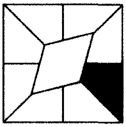
(xxix) Ann 28, Carol 35, Bill 42

(xxx) 14 + 25 = 16 + 23

Rating:

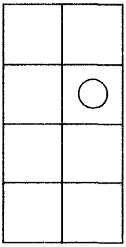
27–30	superb effort
24–26	excellent
20–23	very good
16–19	good
12–15	above average
9–11	average

2 (i)



The diamond moves round a notch at a time as does the black segment.

(ii)

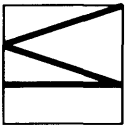


The white dot moves four segments round the rectangle anti-clockwise at each stage.

(iii)

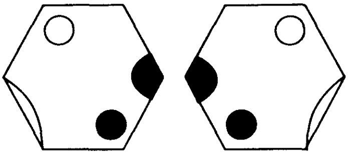
Add a white dot to the bottom, then a white dot to the top, then a black to the bottom and finally a black to the top.

(iv)



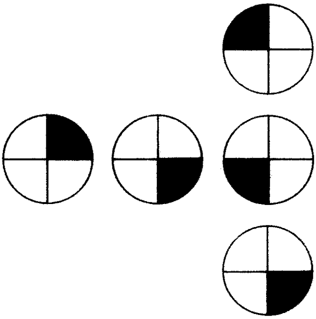
The Roman numerals I, II, III, IV, V, VI appear turning 90° clockwise at each stage.

(v)



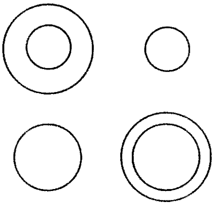
The figures alternate mirror image then black/white reversal.

(vi)



In each row the black segment is moving one segment clockwise.

(vii)

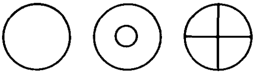


The circles are moving from top to bottom in turn.

viii)

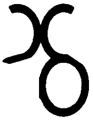
At each stage the figure next to top drops to the bottom.

(ix)



Every alternate circle contains a white dot, every third circle contains a vertical line and every fourth circle contains a horizontal line.

(x)



The first figure 8 appears a quarter at a time, and a second figure 8 appears a quarter at a time as soon as the first figure 8 starts to disappear.

Rating:

10	very impressive
9	exceptional
7–8	excellent
6	very good
5	good
4	average

3 Some suggested short cuts are indicated for several of the calculations.

(i) 84

(ii) 48

(iii) 143 (10 × 13 = 130 + 13 = 143)

(iv) $^{7}/_{10}$

(v) 14 (divide 8 by 4 and multiply by 7).

(vi) 22

(vii) 4 (10% of 60 is 6, therefore 20% is 12 and 12 divided by 3 is 4).

(viii) 496

(ix) 101

(x) 84

(xi) 228 (15 divided by 13 is 1 and 2 carried. 26 divided by 13 = 2, therefore 156 divided by 13 = 12. 70 × 3 = 210 plus 2 × 3 = 6, therefore 72 × 3 = 216. 216 + 12 = 228).

(xii) 1092 (52 × 10 = 520 × 2 = 1040. Therefore 20 × 52 = 1040 plus the other 52 = 1092).

(xiii) 108

(xiv) 192

(xv) 58

(xvi) 91

(xvii) 49

(xviii) 70% of 140 = 98, 45% of 200 = 90

(xix) 216

(xx) 37

(xxi) 975 (2 × 75 = 150, therefore 4 × 75 = 300, therefore 12 × 75 = 900, then add the remaining 75 = 975).

(xxii) 330 (10% of 550 = 55. 55 × 6 = 330).

(xxiii) 862 (273 + 600 = 873 less 11 = 862).

(xxiv) 559

(xxv) 864

(xxvi) 616 (56 × 10 = 560 plus the remaining 56 = 616).

(xxvii) 44

(xxviii) 117

(xxix) 2

(xxx) 42

Rating:

28–30	excellent
25–27	very good
22–24	good
19–21	above average
14–18	average

4

1 R	■	2 R	■	3 C	■	4 S	■	5 A	6 R	E	N	7 A
8 E	L	E	V	E	N	T	H	■	A	■	■	X
P	■	S	■	M	■	A	■	■	9 I	D	O	L
10 O	R	C	H	E	S	T	R	A	L	■	■	E
R	■	U	■	N	■	U	■	■	R	■	11 A	■
12 T	13 H	E	14 A	T	R	E	■	15 T	O	U	G	H
■	O	■	P	■	■	■	■	■	A	■	O	■
16 S	L	E	P	T	■	17 P	R	18 O	D	19 I	G	20 Y
■	D	■	L	■	■	R	■	R	■	N	■	E
21 E	■	■	22 A	S	P	I	D	I	S	T	R	A
23 M	E	N	U	■	■	Z	■	G	■	O	■	R
I	■	■	S	■	24 R	E	G	I	O	N	A	L
25 T	O	K	E	N	■	D	■	N	■	E	■	Y

5 (i) JLPT2689
(ii) KLST3479
(iii) BKTUW3479
(iv) EGLPZ2569
(v) DFGKLPZ24689
(vi) BDJMNTZ23489
(vii) TSLJDB56789
(viii) WPKJFED2379

(ix) VTSQPMK2479
(x) XUQNJHG23469
(xi) YXTPHFC9743
(xii) QPMKJCB875432
(xiii) ZRPNKJFBA9732
(xiv) WVRMLHGE987532
(xv) AEUTKJF2579
(xvi) EUZTSJGB5679
(xvii) AEUWTQJHF2349
(xviii) DJKMPT9753UA24
(xix) BDQRTWZ9753EA246
(xx) CJKLMPS9753UEA26

6 (i) ostrich
(ii) yielded
(iii) florist
(iv) jittery
(v) someday
(vi) tabloid
(vii) foreign
(viii) crusade
(ix) gourmet
(x) iceberg

(xi) hundred

(xii) upgrade

(xiii) verdant

(xiv) dilemma

(xv) irksome

(xvi) obscure

(xvii) grandad

(xviii) fuchsia

(xix) enchant

(xx) tiniest

(xxi) undergo

(xxii) literal

(xxiii) winsome

(xxiv) finance

(xxv) cordial

Cryptic crossword

7	(i)	A	ACCENT (A/C CENT)	15D
		B	SUICIDAL (ANAGRAM) IS A LUCID	18A
		C	PROBES	4D
		D	TEETERING	23A
		E	ERODE (ANAGRAM) DEER + O	19A
		F	REED PIPES (REED – RIVER BANK)	1A
		G	SMOTE (ANAGRAM) TOMES	11A
		H	ALMS HOUSES (ANAGRAM) SLAM	9D
		I	SPROUT	5D
		J	SADDLE (ANAGRAM) DES + LAD	16D
		K	OBI (G – OBI)	20D
		L	BEAN	22A
		M	EGG	21D
		N	CHEATS (ANAGRAM) SACHET	14A
		O	POOL	7A
		P	DANCE (ANAGRAM) CANED	8A

Replace the vowels

(ii) THE MAN WHO KNOWS HOW WILL ALWAYS HAVE A JOB.
THE MAN WHO KNOWS WHY WILL ALWAYS BE HIS BOSS.

Trackaround

(iii) Chequered flag

7 (iv)

			V				H
	Q	U	I	C	K	L	Y
			Z	■	■	■	M
				J	■	■	N
			W	A	R	T	S
	F			P			
B	O	D	G	E			
	X						

Enigmagram

(v) SYNTAX
SCROLL
SYSTEM
CODING

KEY ANAGRAM = TERMINAL

Anagrams

(vi) A SATURNINE
B CAFETERIA
C CHEVALIER
D DOCTORATE

IQ test one

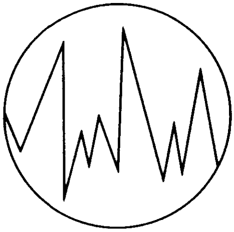
Spatial ability test

1 F: In each row and column the triangle alternates black/white. In each row the dot moves two corners clockwise and alternates black/white. In each column the dot moves two corners anti-clockwise and alternates black/white.

2 B: the rest are the same figure rotated.

3 E: in each row a new circle is building up a quarter at a time.

4 D



5 E: the four blocks are rearranged as in the example, i.e. left to middle right, second to top, third to bottom, right to middle left.

6 D: split the pyramid into two halves vertically. The left-hand side is a mirror image of the right-hand side.

7 C: so that each connected line of three circles contains four white and four black dots.

8 E: in all the others the part with curved lines is white and the part with straight lines is black.

9 E: it contains a string which is black/white/black, and a string which is white/white/black.

10 B: looking across, the top circle within the large circle alternates white/black, the left-hand circle alternates horizontal stripe/white, the right-hand circle alternates horizontal stripe/white/white, the bottom circle alternates white/white/dot.

Logic test

1 The letter E.

2 No-one over 30 has a degree in bio-chemistry.

3 4918237

Reverse the 4th, 5th and 6th digits from the previous number followed by the 1st, 2nd, 3rd and 7th digits in reverse.

4 It stopped at 15.50.

Explanation:

12 noon = 12 noon
1 p.m. = 12.46
2 p.m. = 13.32
3 p.m. = 14.18
4 p.m. = 15.04
5 p.m. = 15.50 stopped
plus 5 hours = 10 p.m.

5

82	28	54
73	37	36
95	59	36

In each line reverse the numbers then take the difference, i.e. 95 – 59 = 36.

6

		G						
								L
B								

Start at A then work up the first column then down the second, etc., first omitting no space, then 1 space, then 2, etc. before adding successive letters of the alphabet.

7 vacillate

Increase each word by one letter. First letter is two after the last letter of previous word in the alphabet.

8 £3.65:

.10
2.00
.50
.05
1.00
3.65

9 872

174 + 698 = 873. Similarly, 283 + 658 = 941 and 368 + 419 = 787.

10 ARRK

Explanation:

When TWO is inserted into ARRK, the word AR*TWO*RK is produced.

All the other combinations produce other words when ONE is inserted into them i.e. bay**one**t, col**one**l, cor**one**t, h**one**sty, pi**one**er, so**one**st, swo**one**d and thr**one**s.

Verbal ability test

1 dilemma

2 banal

3 style, fashion

4 shameful, laudable

5 TACT NAIL = Atlantic

The countries are:
Portugal – gulp rota
Norway – or yawn
Bulgaria – big Laura
Argentina – regain tan

6 abeyance

slab/able, they/eyed, moan/anon, pace/cell

7 OLNEF = felon

8 erudite, ignorant

9 escalate, heighten

10 no strings attached

Numerical ability test

1 566

Multiply each number by 3 and add 2,
i.e. 188 × 3 + 2 = 566.

2 35 minutes i.e. 11.25

9 a.m.+ (4 × 35 = 140) or 2 hours 20 minutes = 11.20.

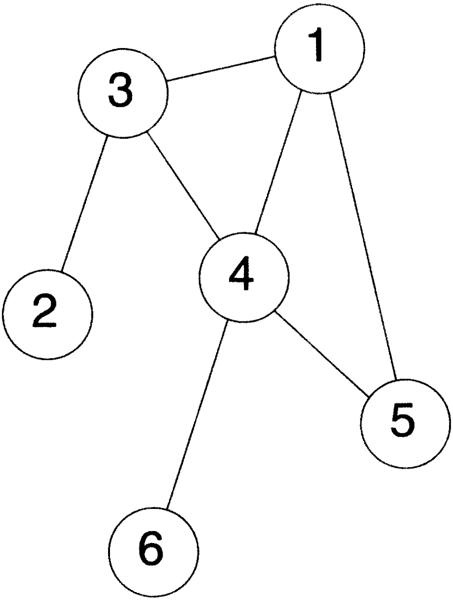
3 Tom 60, Dick 80, Harry 100

4 9

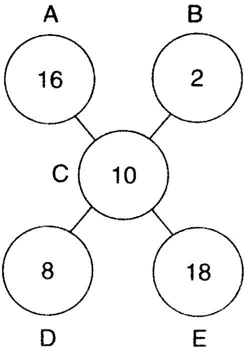
12 × 8 = 96. Similarly, 27 × 3 = 81 and 19 × 4 = 76.

5 6

6



7



$A/B = D$

$A + B = E$

$E - D = C$

8 63

Explanation:

12 innings at 288 runs = 24 average
13 innings at 299 runs = 23 average (+ 11 runs)
13 innings at 351 runs = 27 average (+ 63 runs)

9 87 75 94 85 77

Explanation:

Each row is formed by adding numbers in the row above.

Column A + Column C = Column B, D + E = A, C + D = E, B + E = C, A + E = D

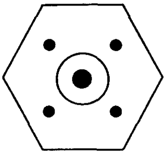
10 13 33

There are two alternating sequences both starting at 1. The first progresses + 3 and the second progresses + 8.

IQ test two

Spatial ability test

1



Explanation:

A is added to B to make C
C is added to D to make E
E is added to F to make G
G is added to H to make A

Similar symbols disappear.

2 B

3 2B

4 C

Explanation:

1 is added to 2 to make 3
4 is added to 5 to make 6
Similar symbols disappear.

5 G

Explanation:

A is the same as F
C is the same as D
B is the same as E

6 D

Explanation:

□ square is completed
○ ● centre circle alternates white/black
○ right-hand circle remains

changes 90° clockwise

7 C

Explanation:

1 is added to 2 to form 3
4 is added to 5 to form 6
Similar symbols disappear.

8 B

Explanation:

◇ moves 60° anti-clockwise
↖ moves 60° clockwise
— moves 60° anti-clockwise
● moves 60° clockwise

9 I

Explanation:

A is the same as L
B is the same as G
C is the same as J
D is the same as K
E is the same as H
F is the same as M

10 A

Explanation:

RH● changes to ○ and moves across to left
⬭ changes to ◊
○ central circle changes colour to white
● bottom circle stays the same
(moves across to right and reverses

Verbal ability test

1 chamois; it is an animal, the rest are colour shades.

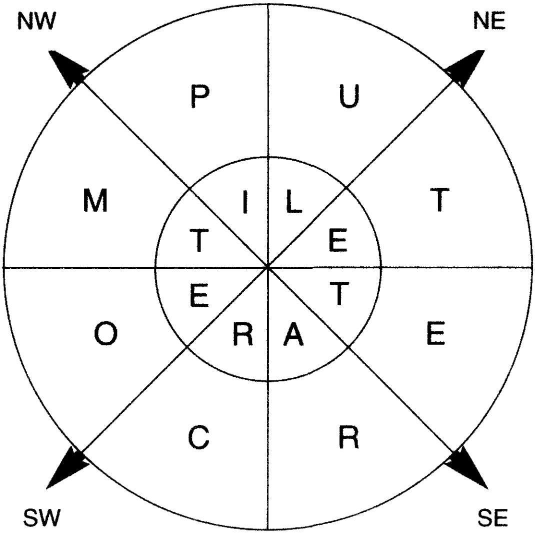
2 graceful, elegant

3 tin bin

4 mayonnaise

5 torpid, uplifted

6 computer literate



7 unmitigated, consummate

8 succinct

9 shell

10 meddle, medal

Numerical ability test

1 Infinity

2

Clarence	61
Harold	26
Peter	14

3

Notebook	55p
Pencil	1p
Book	160p
Pen	80p
	296p

4 XII = VII
XIII = VIII

5 8¼

Explanation:

5 × 4 = 33 so 20 has been increased to 33.

$$\frac{33}{20} \times 5 = 8\frac{1}{4}$$

6 64

7 $\left(\frac{7}{.7} \times \frac{7}{.7}\right) = 100$

8 At 1 $1\frac{1}{11}$ hrs, 2 $2\frac{2}{11}$ hrs, 3 $3\frac{3}{11}$ hrs, 4 $4\frac{4}{11}$ hrs, etc.

9 $\frac{35}{70} + \frac{148}{296} = \frac{1}{2} + \frac{1}{2} = 1$

10 864 – 72 = 792

Logic test

1 If they had won in 1930 I would have said, they won 6 times out of 10 times.

2

$$\frac{16}{22} \div \frac{56}{28} \div \frac{68}{17} \div \frac{26}{13} = x$$

$$\frac{16}{22} \times \frac{28}{56} \times \frac{17}{68} \times \frac{13}{26} = x$$

$$\frac{16}{22} \times \frac{1}{2} \times \frac{1}{4} \times \frac{1}{2} = x$$

$$\frac{16}{22} \times \frac{1}{16} = \frac{1}{22}$$

Explanation:

To solve problems with multiple divisions, change the division sign to a multiplication sign and reverse the numbers top on bottom, bottom on top.

3 66

$$\begin{array}{r} 66 \\ 33 \\ 22 \\ 9 \\ \hline 130 \end{array} = 6 \text{ score} + 10$$

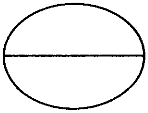
4 7343

Explanation:

$$\text{1st digit}\left\{\begin{array}{l} (2) + 2^3 = 208 \\ (3) + 3^3 = 327 \\ (4) + 4^3 = 464 \\ (5) + 5^3 = 5125 \\ (6) + 6^3 = 6216 \\ (7) + 7^3 = 7343 \end{array}\right.$$

Remaining digits

5



Explanation:

2 × 6 sides
2 × 5 sided
2 × 4 sided
2 × 3 sided
2 × 2 sided (missing)
2 × 1 sided

6 3

Explanation:

$$\begin{array}{lll} 18 \times 9 = \underline{162} = 2 & 24 \times 6 = \underline{144} = 2 & 30 \times 2 = \underline{60} = 3 \\ 9 \times 9 = 81 & 36 \times 2 = 72 & 5 \times 4 = 20 \end{array}$$

7

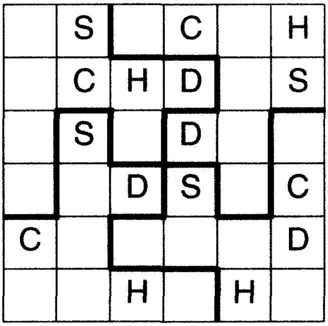
	ODD	EVEN	PRIME	SQUARE	CUBE
1	✓			✓	✓
2		✓	✓		
3	✓		✓		
4		✓		✓	
5	✓		✓		
6		✓			
7	✓		✓		
8		✓			✓

Only No. 6 has one tick means that the answer is 6.

8 Certainty.

9 74 kgs.

10



	S		C		H
	C	H	D		S
	S		D		
		D	S		C
C					D
		H		H	

The way forward

By now, even if you have only tackled some of the tests and puzzles in the preceding chapters, you will have given your brain a thorough work-out.

Our brain is undoubtedly our greatest asset, yet for most of us it is the part of the body that we most take for granted.

Our brain needs exercise and care in the same way as other parts of the body. We eat the right foods to keep our heart healthy, we moisturize our skin to keep it from drying out and, just as gymnasts train to improve their performance, there are exercises, or mental gymnastics, we can do to increase the performance of our brain.

Many people still have an outdated belief that there is little they can do to improve the brain they are born with and that brain cells continually degenerate with age, but, in fact, the opposite is true as cells continually develop new and stronger connections and adult brains can grow new cells, irrespective of age.

While the exercises which are contained in this book may not turn you into a genius overnight, hopefully this will be something on which you can build. If from reading this book you are convinced that it is possible to increase and maximize your brainpower, then there is a need to constantly work out your brain in order to strengthen its performance even more.

In addition to special care with nutrition and diet – the eating of a balanced diet rich in vitamins and minerals is desirable – there are several ways in which you can do this. Several of the exercises in this book are repeatable, such as thinking up different uses for everyday objects such as an elastic band or a milk bottle, and creating drawings from geometric lines. These exercises may seem trivial, but anything which puts your brain to work in a different and novel way can only be having the overall beneficial effect of activating your brain cells.

There are also other practical exercises you can carry out. Try, for example, to write out a series of instructions for performing an everyday task like boiling an egg. You might be surprised how much you need to write down to record every detail of the process. It may seem trivial, but again you are getting your mind to work in a different or novel way, in the same way that taking a different form of physical exercise stretches muscles which you did not even know existed.

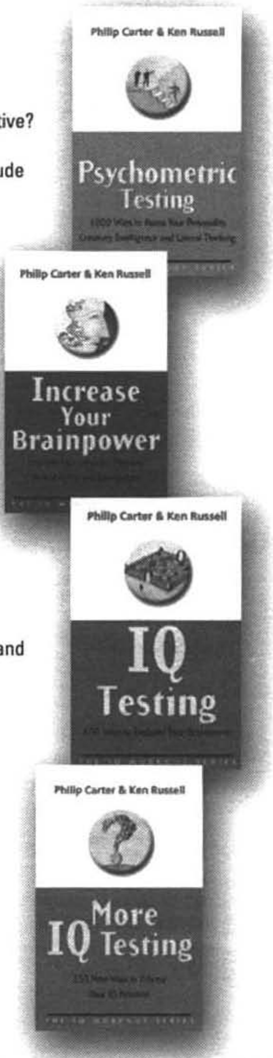
In addition to the exercises suggested in Chapter 3, there are many other things you can do to improve your memory. It is essential, for example, to allow the brain to have enough sleep and rest in order for the memory to function efficiently. Also, the intake of alcohol is one of the main causes of memory loss, as alcohol interferes with short-term memory in particular, which impairs the retention of new information.

Studies have also revealed that smoking lowers the amount of oxygen reaching the brain, and this has a detrimental effect on the efficiency of memory, as well as increasing the risk of strokes and other brain-related diseases. In recent years studies among elderly smokers in Europe have revealed that they lost their ability to think, perceive and remember sooner than non-smokers, or even those who had already quit smoking.

Over the past forty years we are fortunate in that we have obtained a much greater understanding of the huge complexities of the workings of the human brain and we should be able to use this new-found knowledge considerably to our advantage. By continuously exploiting the enormous potential of our most precious asset we all have the ability to increase and maximize our brainpower, whatever our age or lifestyle. We have the ability, not just to ward off neurodegeneration, but to make more and stronger connections between our nerve cells, with the result that not only our mental but also our physical well-being will improve.

Further reading

Philip Carter and Ken Russell, *Increase Your Brainpower*, John Wiley & Sons, Chichester, 2001.
Philip Carter and Ken Russell, *IQ Testing*, John Wiley & Sons, Chichester, 2001.
Philip Carter and Ken Russell, *Psychometric Testing*, John Wiley & Sons, Chichester, 2001.
Arthur S. Reber, *The Penguin Dictionary of Psychology*, Penguin Books, Harmondsworth, 1985.
Philip Carter and Ken Russell, *Workout for a Balanced Brain*, Reader's Digest Books, London, 2001.
Peter Evans and Geoff Deehan, *The Keys to Creativity*, Grafton Books, London, 1988.
Philip Carter and Ken Russell, *More IQ Testing*, John Wiley & Sons, Chichester, 2002.


Philip Carter & Ken Russell
Psychometric Testing
Philip Carter & Ken Russell
Increase Your Brainpower
Philip Carter & Ken Russell
IQ Testing
Philip Carter & Ken Russell
More IQ Testing