MAKING USE OF PHYSICS

for GCSE

MAKING USE OF PHYSICS

for GCSE

R. Kibble

© R. Kibble 1989

All rights reserved. No reproduction, copy or transmission of this publication may be made without written permission.

No paragraph of this publication may be reproduced, copied or transmitted save with written permission or in accordance with the provisions of the Copyright Act 1956 (as amended), or under the terms of any licence permitting limited copying issued by the Copyright Licensing Agency, 33–4 Alfred Place, London WC1E 7DP.

Any person who does any unauthorised act in relation to this publication may be liable to criminal prosecution and civil claims for damages.

First published 1989

Published by
MACMILLAN EDUCATION LTD
Houndmills, Basingstoke, Hampshire RG21 2XS
and London
Companies and representatives
throughout the world

British Library Cataloguing in Publication Data
Kibble, R.

Making use of physics for GCSE

1. Physics.

I. Title

530

ISBN 978-0-333-46926-2 ISBN 978-1-349-10328-7 (eBook)

DOI 10.1007/978-1-349-10328-7

CONTENTS

<i>Preface</i>	vii
<i>Acknowledgements</i>	ix
Introduction – GCSE, Physics and You	1
1. Speed, force, acceleration	5
2. Gravity	17
3. Atoms, molecules and models	29
4. Stretching solid materials	39
5. Modern materials	51
6. Work, energy and power	61
7. Heating things	71
8. Pressure	81
9. Practical work	93
10. Mathematical skills	103
11. Investigations	115
12. Vibrations and waves	125
13. The Electromagnetic Spectrum	135
14. Radioactivity	141
15. Electrons and electricity	153
16. Electromagnetism	163
17. Supplying electrical energy	173
18. At home with electricity	179
19. The energy business	187
20. Introducing electronics	197
21. Electronic systems	205
22. Assessments	215
23. Practice assessment questions	221
<i>Appendix I: Answers to all numerical questions</i>	231
<i>Appendix II: Formulae and relationships</i>	235
<i>Index</i>	237

PREFACE

This book has been written during a period of considerable change and innovation in education. Two changes are particularly relevant. The first is the principle of *science for all*. As embodied in the National Curriculum, ‘science for all’ will result in more students studying science but probably fewer students studying physics as a single subject before the age of 16. For many students, physics will be a subject studied for the first time in the sixth form or in college. The second change concerns assessment. There has been a gradual move towards school-based methods of assessment ever since I started teaching. Initiatives such as BTEC Science, CPVE, and GCSE have incorporated the notion of ‘*coursework*’ into their patterns of assessment.

This book responds to both the changes outlined above. It provides students, many meeting physics for the first time, with a useful support text. As well as covering the basic subject matter, the book has been written in a style which is designed to appeal to the more mature student who has grown out of cartoons and crosswords but who still needs a sympathetic first physics textbook. It also gives advice and helpful hints on how to cope with a physics course involving coursework assessments with a greater emphasis on processes and practical skills.

This is not a book to be read from cover to cover, nor is it a course in itself. The units are unlikely to follow any one particular teaching sequence. Some Units, particularly the first two, will require a considerable amount of practical assistance in order to clarify such difficult concepts as force, acceleration, mass and weight. Others may serve as useful revision Units. The Units on mathematical and practical skills and on assessments will prove helpful early on in the course. The practice assessment questions are probably best left until shortly before the time for written assessments. Each Unit ends with progress questions which tend to be of graded degrees of difficulty. These questions, together with the related reading passages, might form the basis of work to be done at home.

I should like to thank those people who helped with the book. In particular, Jean Cook for the coffee and Nigel Duffin, for his watchful eye and professional advice.

Bob Kibble

ACKNOWLEDGEMENTS

The author and publishers wish to acknowledge, with thanks, the following photographic sources:

Aerofilms: page 128 (bottom)

BBC Hulton Picture Library: pages 11 and 141 (bottom right)

Camera Press: pages 48, 57 and 82

Mary Evans Picture Library: page 141 (top)

ICI Mond Division: page 59

Science Photo Library: pages 24 (NASA), 36 (photograph Lawrence Berkeley) and 151 (bottom) (CNRI)

Technigraph Studio, Inc.: page 151 (top)

Alan Thomas: pages 5, 52, 67, 128 (top) and 128 (bottom left).

All other photographs courtesy of the author.

The publishers have made every effort to trace the copyright holders, but if they have inadvertently overlooked any, they will be pleased to make the necessary arrangement at the first opportunity.