

Key Stage 3

National Strategy

SPRINGBOARD

7

Mathematics catch-up
programme for Year 7

Summer Numeracy Schools
follow-up programme

We would like to thank
Barbara Young
for her contributions to
Springboard 7

The National Numeracy Strategy (NNS) is designed to raise standards in mathematics for all pupils in Key Stages 1 and 2. The Government has set a target of 75% of 11-year-olds to achieve Level 4 in mathematics by 2002.

Some pupils do not achieve Level 4 in mathematics at the end of Key Stage 2 but need to do so as soon as possible. A high proportion of them have the potential to catch up, given a well-planned programme and targeted teaching. Springboard 7 helps to provide such a programme. The mathematical knowledge and skills that it addresses are crucial to pupils' success in secondary education and beyond.

Springboard 7 is designed for teaching in the autumn and spring terms of Year 7. It complements but does not replicate the teaching materials for summer numeracy schools, which are based on the same set of teaching objectives. This means that pupils who would benefit from a catch-up programme in Year 7 but who did not attend a summer school will not be disadvantaged, while those who did attend a summer school should not feel that they are repeating lessons.

This guidance is for heads of mathematics departments and other teachers who are involved directly with teaching the Springboard programme. It is organised in four parts:

PART 1

- Introductory notes on planning and teaching the Springboard 7 programme.
- Essential teaching objectives.

PART 2

- How to organise the Springboard 7 teaching units to form a course linked to the main Year 7 programme.

PART 3

- Units of work: 15 units to form a two-term programme, with teaching notes, teaching materials, pupil materials and corresponding answer sheets.
- Tests: examples of half-termly 'Assess and Review' tests to check pupils' progress.

PART 4

- Revision guidance, including an analysis of what pupils find most difficult in the Key Stage 2 tests.

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PART 1 INTRODUCTION

THE TARGET PUPILS

Springboard 7 is for use in Year 7. It is intended specifically for pupils who attained Level 3 in mathematics at the end of Key Stage 2. Its aims are:

- to support pupils by identifying and tackling their weaknesses in mathematics and to raise the standards that they are attaining to Level 4 as soon as possible;
- to set expectations that extend from the *Framework for teaching mathematics from Reception to Year 6* to the *Framework for teaching mathematics: Years 7, 8 and 9*;
- to help teachers to prepare a teaching programme that enables the pupils to enter the main teaching programme for Year 7 as soon as they are ready;
- to encourage schools to build a whole-school programme to raise standards in mathematics across the curriculum.

THE SPRINGBOARD 7 MATERIALS

Because schools organise mathematics lessons in Year 7 in a variety of ways, including banding, setting and mixed-ability classes, Springboard 7 has been designed to be used flexibly. The materials can be taught as a stand-alone course or programme for a particular set of the target pupils (for example, Set 5 out of 6). They are also designed so that they can be used in mixed-ability classes alongside the main Year 7 teaching programme. Support can also be provided for groups of pupils experiencing difficulties with a particular topic.

Springboard 7 consists of 15 units of work for a two-term programme of mathematics for approximately 3 hours a week. These units cover the teaching objectives essential to moving pupils from Level 3 to Level 4 in mathematics (see page 19 for a summary of essential teaching objectives). The objectives have been organised into teaching units that can be matched to and integrated with the yearly teaching programme for Year 7 from the *Framework for teaching mathematics: Years 7, 8 and 9* (see Part 2). You will find the complete set of 15 units in Part 3.

Each unit has some introductory notes for the teacher. These suggest a time allocation and highlight teaching objectives and teaching points. Key vocabulary is listed in each unit. The units are arranged in sections so that you could base a set of one hour lessons on them but they are easily rearranged to fit lessons that are shorter or longer than one hour.

The materials include practice exercises and some more demanding tasks called Star Challenges. If your school has a reward or merit system, pupils' success on the Star Challenges could form part of this system. Answers to Star Challenges are given at the end of the unit. Suggestions are made in the teachers' notes of ways of using the materials both in class and as homework. Examples of half-termly tests are included.

Of course, pupils are not necessarily at the same level of attainment in all their mathematical work. Some of the pupils who achieved Level 4 overall at the end of Key Stage 2 could also benefit from using parts of the Springboard 7 programme. Similarly, some or all of the pupils who achieved Level 3 may be able to work from some parts of your main Year 7 teaching programme. Where they are capable of doing so it is important that they do this. For this reason, you will need to plan the use of Springboard 7 carefully so that easy interchange is possible between the main teaching programme and the Springboard 7 support.

Your existing scheme of work may offer many of the ideas and approaches being promoted by the Springboard 7 programme. In this case, incorporating the units into your scheme of work will be relatively straightforward. Where this is not the case, you will need to ensure that work on the Springboard 7 units links closely with and reflects the main mathematics programme for Year 7 so that pupils can progress to it at a later stage.

EXTRA TEACHING TIME

The success of the Springboard 7 programme is not necessarily dependent on extra teaching time. However, where schools are able to offer pupils who are part of a catch-up programme extra teaching time beyond the usual timetabled lessons, their progress towards Level 4 is generally much faster.

Some of the forms of extra support that you could consider are:

- extra mathematics teaching beyond the usual timetabled lessons, for example in tutorial time, at lunch-time, in a breakfast club or homework club;
- cross-curricular provision to support mathematical skills in other subjects;
- extra mathematics homework or holiday study packs, prepared to provide pupils with the support they will need;
- opportunities to work independently, perhaps at lunchtime, using ICT resources.

Parts of Springboard 7 may be suitable for pupils who are below Level 3 in mathematics. These pupils will need extra support and some adaptations to the materials if they are to benefit fully from them. Extra support for them is normally provided in class but sometimes it might be possible to provide extra teaching outside timetabled mathematics lessons in a small withdrawal class. The advantage can be the opportunity to provide some brief intensive mathematics teaching in a smaller group; the disadvantage can be the disruption to the pupils' learning. Where withdrawal work is arranged:

- it should last no longer than half a term before being reviewed, and be for no more than about half an hour on three occasions each week;
- the selected pupils should have clearly defined short-term targets to achieve, and regular assessment to identify the progress they are making;
- the support should precede the work in the pupils' usual mathematics class(es), so as to provide a real catch-up element;
- the subjects from which the pupils are withdrawn should be chosen carefully to ensure that their entitlement to a broad, balanced curriculum is maintained.

MANAGING CATCH-UP PROVISION

While Springboard 7 is a mathematics programme, it should be seen as part of a whole-school development to raise standards. Other departments will benefit from pupils' improved skills and confidence and it is important that they feel part of the initiative. A good way to do this is to set up a Key Stage 3 management group, chaired by a senior member of staff, with representatives from all departments. A key task for this group is to help to bring about improvements in standards, particularly in English and mathematics. This will involve interpreting baseline data on pupils' attainment at Key Stage 2, setting the school's targets and planning how to achieve them by supporting the programme across the school.

For example, the group may need to:

- define staff roles and responsibilities for raising standards in English and mathematics, and in literacy and numeracy skills across the curriculum;
- coordinate summer school and Year 7 catch-up programmes;
- secure effective, coordinated arrangements for catch-up programmes for timetabled teaching time, use of rooms and deployment of staff, including support staff;
- ensure that planned action in subject departments is coordinated with the school's overall drive to raise standards;
- ensure that teachers are supported in their efforts to raise standards and that proper provision is made to identify and provide for their professional development needs;
- plan and lead INSET for the whole staff on developing literacy and numeracy skills across the curriculum;
- explain and promote catch-up programmes to parents and elicit their involvement and support;
- monitor progress and evaluate the success of the catch-up provision;
- provide regular updates for staff and governors.

It is best if a specialist mathematics teacher who is a member of the Key Stage 3 management group coordinates the Springboard 7 programme. The coordinator's role could involve liaising with partner primary schools to identify pupils most likely to benefit from the programme. Other links you could make with primary schools might include, for example, visits by Year 7 teachers, summer term pupil visits to meet their Year 7 teachers, sharing arrangements for summer schools, providing summer holiday study packs, and joint planning for a reception programme for the start of the secondary school year.

The coordinator will need to work closely with the Year 7 teachers who are planning and teaching the Springboard 7 programme. This will give the coordinator an opportunity to report to the Management Group on the progress pupils are making and to evaluate its impact.

The SENCO is another teacher who will need to be kept well informed about the programme and with whom the coordinator should work closely. Together, the coordinator and SENCO can plan appropriate ways in which Springboard 7 can be used to support pupils with special educational needs and to inform and meet the targets in the pupils' Individual Education Plans (IEPs).

Catch-up programmes in literacy and numeracy are more effective if all subject departments understand the intentions of the programme and are familiar with its key objectives. The Springboard coordinator and the Management Group can help to ensure that other subject colleagues are involved. For example, if teachers of another subject know what pupils following the Springboard 7 programme have achieved then they can offer pupils opportunities to apply their newly-acquired mathematical skills in ways that will benefit both their mathematics and the subject. Being able to apply mathematical skills, in ways that are real and relevant to them, helps pupils to feel successful. For example, pupils who have learned how to read, write and order large numbers might in a geography lesson determine the relative sizes of towns by ranking them by population. Teachers of other subjects should be able to identify opportunities like these and make the Springboard coordinator aware of them.

TARGET SETTING

Springboard 7 needs close cooperation between primary and secondary schools so that you have good baseline data from which to plan the teaching programme for the pupils transferring to your school. You will find much of the information that you need in the statutory school transfer document, which should include:

- Key Stage 2 test and teacher assessment levels for the end of Key Stage 2;
- raw scores for Key Stage 2 test;
- any standardised test scores;
- comments by Year 6 teachers on a pupil's attainment and attitude.

To evaluate the programme, it helps to set targets for pupils and later measure how successfully they have been met. For example, you could set targets for all Year 7 pupils, specifying the proportions you expect to achieve Level 4, Level 5 and Level 6 in mathematics by the end of the year. One measure of success could be teachers' end-of-year assessments of each pupil's 'best fit' against the level descriptions. Another measure could be results of QCA's optional tests for mathematics, to be introduced for Year 7 and Year 8 in the summer of 2001. A progress test for pupils who did not attain at least Level 4 when they entered Key Stage 3 is available from May 2001.

You might also wish to set targets which give you and the pupils more immediate information on the progress they are making over shorter periods of time. Short-term targets could, for example, be linked to improving scores in pre- and post-unit tests, responding more quickly to set tasks, remembering items needed for lessons or completing homework more regularly.

Such targets can help you to monitor pupils' overall progress in mathematics and to judge the effectiveness of the programme of support. Numerical targets, however, do not necessarily tell you which aspects of mathematics pupils have grasped and which are still causing difficulty. For example, two pupils who achieved Level 3 in the Key Stage 2 test may have accrued the same total marks but on different questions. 'Level 3' tells you that the pupil has reached an overall particular standard but does not give you the detail you need to adjust your planning and teaching to move the pupils on.

To give you a more specific guide to what mathematics to plan and teach, you could translate targets expressed as levels or test scores into specific curricular targets, specifying which mathematical skills need to be improved. To do this, you may need more information than is provided in the transfer document. To get this you could, for example:

- liaise with primary schools to identify the target pupils' strengths and weaknesses in relation to the *Framework's* key objectives;

- ask primary schools to send to your school samples of these pupils' workbooks so that you can see what work they have done after the Key Stage 2 tests;
- study QCA's annual Standards Report for Key Stage 2, which discusses the questions from the Key Stage 2 test that children in a national sample had difficulty with (extracts included in Part 4: Revision Guidance);
- talk to staff running summer numeracy schools and share any assessment data;
- build good diagnostic teaching into the first few lessons of the new school year, using a selection of open and closed tasks that will cover a range of mathematical topics.

Some of the curricular targets you identify may be common to many pupils; others may apply to smaller groups or individual pupils. By identifying the targets you should be able to determine which parts of the Springboard 7 programme are best suited to your pupils' needs.

INVOLVING PUPILS AND PARENTS

A key feature of effective teaching is to involve pupils in improving their performance by discussing with them what they can do and what they need to improve. Pupils are better motivated when they understand what they are to achieve, how to achieve it and recognise the progress they are making. A brief discussion with a pupil can lead to a new target and a suitable deadline for achieving it, recorded in the pupil's workbook for later review. During the discussion, stress how the pupil's work will be different when the target has been achieved and what the pupil can do to help, in class and independently at school and at home. Marking homework linked to a unit of work and giving guidance on how to improve, with the opportunity for pupils to comment, can maintain their involvement. Sharing learning objectives, and inviting pupils to assess themselves and to set their own challenges, are other strategies you can use. Each unit of Springboard 7 contains a 'Checklist for pupils'. This lists what pupils are expected to learn in the unit.

All teachers know the value of recognising and rewarding achievement through small rewards: a congratulatory chat with a teacher, a short letter to parents, putting work on display, asking pupils to explain work orally, giving stickers or small prizes or merit awards.

The support and interest of parents and carers can also help to motivate pupils to succeed. Aim to keep them informed about the catch-up programme from the beginning and, at appropriate times, discuss with them their child's targets and progress. Send home tasks that pupils can share with others at home, such as brief but frequent tables work, simple games that do not take too long to set up, puzzles or short problems. You could also give details about how to download suitable freeware from the Internet. There are also suggested homework activities in the Springboard 7 units.

MATHEMATICS TEACHING

Pupils transferring into Year 7 will have experienced the National Numeracy Strategy in Key Stage 2. It will help pupils' transition to secondary school if secondary teachers are aware of:

- the *Framework for teaching mathematics from Reception to Year 6*;
- the key objectives for Years 5, 6 and 7, which can be found in the *Framework for teaching mathematics: Years 7, 8 and 9*;
- the three-part mathematics lesson;
- the role of mental and oral work in mathematics teaching and the Strategy's approach to written calculations.

It may be helpful to visit a leading mathematics teacher to see the daily mathematics lesson in action. Alternatively, look at the video of primary mathematics teaching given to secondary schools in the Key Stage 3 transition training in April 2000.

Lessons based on the National Numeracy Strategy model aim to strike a balance between whole-class, group and individual work. They involve a substantial proportion of direct teaching. Pupils transferring to your school are likely to be used to this model of teaching. It has introduced them to participating in lessons by chanting in unison, explaining and demonstrating their solutions to the whole class, discussing with a partner before answering, and so on. They have experienced a variety of teaching strategies.

DIRECT TEACHING STRATEGIES

- directing and instructing;
- explaining;
- demonstrating and modelling;
- questioning and discussing;
- practising and consolidating;
- evaluating pupil responses and summarising.

Details of these teaching strategies were discussed in the Key Stage 3 training and are described in the introduction to the *Framework for teaching mathematics: Years 7, 8 and 9*.

Schools involved in the Key Stage 3 pilot programmes funded through the Standards Fund found considerable benefits in using features of the three-part

lesson. Other secondary schools have also tried out some of the National Numeracy Strategy principles, including strengthening the oral and mental work in their lessons. In general, Key Stage 3 teachers found that:

- pupils quickly become accustomed to the routines and expectations, chanting in unison with others, coming to the board to demonstrate and explain some mathematics to the class, and so on;
- pupils respond well to the structure of the lesson – they benefit from being told what they are to learn at the beginning of the lesson and a review at the end;
- class teaching helps to promote interaction and to maximise the time pupils are taught;
- pupils benefit considerably from the opportunity to discuss the mathematics with their teacher and their peers.

THE THREE-PART MATHEMATICS LESSON

You will need to adopt the model of teaching which, in your view, best suits the needs of the target pupils. However, if you decide to adopt the three-part lesson for teaching the Springboard programme, you could structure a 40–60 minute lesson like this:

ORAL AND MENTAL STARTER

5–10 minutes

- development and rehearsal of mental and oral skills, use of correct mathematical vocabulary and mental imagery

MAIN TEACHING ACTIVITY AND PUPIL ACTIVITIES

30–45 minutes

- clear teaching objectives shared with pupils
- interactive direct teaching input to the whole class
- tasks and activities for all pupils on the same mathematical topic

lower set

graduated tasks for individuals, pairs or small groups, with focused teaching of one or two groups or individuals for much of the time, all based on Springboard 7 or all based on other equivalent materials

mixed-ability class

either: whole-class work as above but based on a mix of closed and open-ended tasks suitable for the whole range of attainment in the class

or: large group work, differentiated at no more than three levels, with one group's work based on Springboard 7, with focused teaching of one or two groups for much of the time, plus some extra support for pupils with high degrees of special educational needs

PLENARY

5–15 minutes

- feedback from pupils to identify progress and sort misconceptions
- summary of key ideas and what to remember
- links to other work, next steps
- work set to do at home

EXIT STRATEGIES

The aim of the Springboard 7 programme is to ensure that pupils make sufficient progress to be able to return to the main teaching programme and achieve Level 4 in the progress tests in May of Year 7. Some may be able to return to the main programme earlier in the school year. However, you may need to arrange to carry catch-up provision forward into Year 8 for a few of the pupils and continuing support will also be necessary for pupils with identified special educational needs.

As pupils leave the programme, you might need to:

- prepare a report identifying any further action needed to support the pupils with their mathematics;
- set clear, individualised mathematics targets with each pupil, with timescales for review;
- monitor the pupils' progress and achievement of their targets over the next school year;
- have contingency support available to respond to particular needs that arise;
- plan further brief injections of support at times when pupils meet new work that they find particularly difficult as they may lack some of the essential confidence and understanding needed to cope.

**ESSENTIAL TEACHING OBJECTIVES
IN A YEAR 7 CATCH-UP PROGRAMME**ESSENTIAL TEACHING OBJECTIVES •
IN A YEAR 7 CATCH-UP PROGRAMME**NUMBERS AND THE NUMBER SYSTEM****PLACE VALUE, ORDERING AND ROUNDING**

- Read and write numbers in figures and in words.
- Multiply and divide mentally whole numbers and decimals by 10 or 100 and explain the effect.
- Order a given set of positive and negative integers, or decimals with up to two places.
- Round a decimal to the nearest whole number.

PROPERTIES OF NUMBERS

- Find all the pairs of factors of any number up to 100.
- Recognise square numbers.

CALCULATIONS**RAPID RECALL OF ADDITION AND SUBTRACTION FACTS**

- Recall addition and subtraction facts up to 20.
- Recall decimals that total 1 (for example, $0.2 + 0.8$) or 10 (for example, $6.2 + 3.8$).
- Recall two-digit pairs that total 100 (for example, $43 + 57$).

MENTAL STRATEGIES

- Put the larger number first.
- Count on and back in 1s, 10s, 100s.
- Add and subtract mentally a 'near multiple of 10'.
- Add several small numbers.
- Add and subtract mentally any pair of two-digit numbers.
- Use known number facts and place value to consolidate mental addition and subtraction (for example, $470 + 380$, $7.4 + 9.8$, $9.2 - 8.6$).
- Calculate mentally a difference such as $8006 - 2993$.
- Know that an addition fact can be interpreted as a subtraction fact and vice versa.

PENCIL AND PAPER PROCEDURES FOR ADDITION AND SUBTRACTION

- Carry out column addition and subtraction of positive integers less than 10 000.
- Carry out column addition and subtraction of numbers involving decimals.

ESSENTIAL TEACHING OBJECTIVES •

UNDERSTANDING OPERATIONS

- Understand the four operations and use, read and write the associated vocabulary.
- Understand and use subtraction as the inverse of addition and division as the inverse of multiplication.
- Find remainders after division.
- Begin to express a quotient as a fraction or a decimal.
- Round up or down after division, depending on the context.

RAPID RECALL OF MULTIPLICATION AND DIVISION FACTS

- Know by heart all multiplication facts up to 10×10 and derive quickly corresponding division facts.
- Derive quickly doubles of whole numbers 1 to 100, doubles of multiples of 10, for example, 670×2 , doubles of two-digit numbers, for example, 3.8×2 , 0.76×2 .
- Recall square numbers, including squares of multiples of 10, for example, 60×60 .

MENTAL STRATEGIES

- Use known facts, place value and a range of mental calculation strategies to multiply and divide mentally.

PENCIL AND PAPER PROCEDURES FOR MULTIPLICATION AND DIVISION

- Carry out multiplication of $HTU \times U$ and then numbers involving decimals.
- Carry out multiplication of $TU \times TU$.
- Carry out division of TU by U .

USING A CALCULATOR

- Develop calculator skills and use a calculator effectively.

FRACTIONS, DECIMALS, PERCENTAGES, RATIO AND PROPORTION

- Recognise the equivalence between the decimal and fraction forms of one half, one quarter, three quarters... and tenths and hundredths.
- Find simple fractions of numbers or quantities.
- Use decimal notation for tenths and hundredths.
- Relate fractions to division and to their decimal representations.
- Understand percentage as the number of parts in every hundred and find simple percentages of small whole number quantities.
- Solve simple problems involving ratio and proportion.

ESSENTIAL TEACHING OBJECTIVES •
EMME
IN A YEAR 7 CATCH-UP PROGRAMME

SOLVING PROBLEMS

PROBLEMS INVOLVING 'REAL LIFE', MONEY AND MEASURES

- Use all four operations to solve word problems involving numbers and quantities based on 'real life', money and measures (including time), explaining methods and reasoning.
- Choose and use appropriate number operations to solve problems, and appropriate ways of calculating: mental, mental with jottings, written methods, calculator.

HANDLING DATA

- Solve a problem by extracting and interpreting information presented in tables, graphs and charts.

MEASURES, SHAPE AND SPACE

MEASURES

- Use, read and write standard metric units including their abbreviations and relationships between them, for example, km, m, cm, mm, kg, g, l, ml.
- Measure and draw lines to the nearest millimetre.
- Use a protractor to measure and draw acute and obtuse angles to the nearest degree.
- Understand area measured in square centimetres (cm²); understand and use the formula in words 'length x breadth' for area of a rectangle.
- Calculate the perimeter and area of simple compound shapes.

SHAPE AND SPACE

- Recognise line symmetry in 2D shapes.
- Recognise where a shape will be after a reflection or a translation.
- Read and plot coordinates.

