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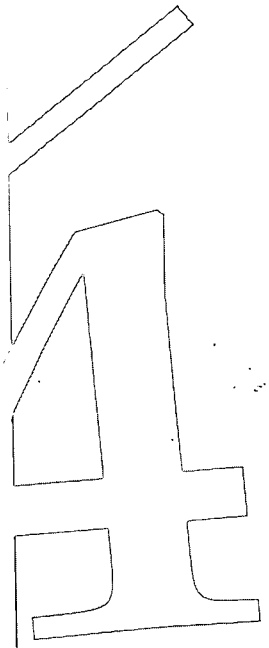
ABSTRACT

This information packet contains the 1997 results of the Assessment of Achievement Programme (AAP), established by the Scottish Office Education and Industry Department to monitor the performance of pupils in Scottish schools in particular areas of the curriculum. The packet contains two booklets on the results of the 1997 mathematics survey and overhead transparency masters which give key findings of the survey. "Fifth Survey of Mathematics, 1997: Findings and Issues" summarizes the surveys key points. Samples were selected to be representative of pupils in all mainstream schools. Over 10,000 pupils completed assessments. Approximately one third of all the students took part in the survey of performances on practical mathematics. This survey provided information on current performance of written and practical mathematics at Primary 4, Primary 7, and Secondary 2, with detailed analyses within the categories of information handling; number, money and measurement; and shape, position, and movement. Comparisons were taken between stages on written and practical tasks, of the performances of boys and girls at each stage, of performance in 1997 with findings from previous years' surveys; and of performance in relation to levels of Scottish National Guidelines: Mathematics 5-14. Each school participating in the survey completed a questionnaire that contained questions on curriculum and classroom organization, aspects of teaching and learning, resources, student support, assessment, and primary-secondary liaison. Students were also asked to complete a short questionnaire about their experience in schools in general and mathematics in particular. "Fifth Survey of Mathematics, 1997: Examples" gives examples of the types of questions used in the 1997 survey. Some of these show examples of good pupil responses; others illustrate common errors made by pupils. The early sections present examples used in the written part of the survey. These are organized by the reporting categories used for the survey and are followed by examples taken from the practical part of the survey along with examples of problem solving. For each question, the stage and 5-14 level are given, followed by the percentage of pupils who answered the question correctly, the commonest wrong answer, and the percentage of pupils who did not attempt to answer the question at all. If the question was used in a previous survey, the percentage of pupils answering correctly in that survey is shown for comparison. (ASK)

AAP

INFORMATION PACK



Fifth Survey of MATHEMATICS 1997

Findings, Issues and Examples

Assessment of Achievement Programme

AAP

Findings and Issues

Fifth Survey of

MATHEMATICS 1997

Assessment of Achievement Programme

What is the Assessment of Achievement Programme?

The Assessment of Achievement Programme (AAP) was established by the Scottish Office Education and Industry Department (SOEID) in 1981 to monitor the performance of pupils in Scottish schools in particular areas of the curriculum. Since 1983, there have been regular surveys in three core curricular areas:

- **English language**
- **mathematics**
- **science.**

The main objectives of the AAP are to:

- **assess what pupils in P4, P7 and S2 know and can do**
- **provide information on performance in relation to levels defined in the 5-14 National Guidelines**
- **provide evidence about changes in performance over time.**

The surveys are intended to inform the SOEID, education authorities, teachers and other interested parties about the achievement of pupils, and to indicate ways of improving teaching and learning.

THE INFORMATION PACK

This booklet is part of an Information Pack on the results of the 1997 Mathematics Survey. The pack also includes examples of items used in the survey along with comments on the performance of pupils. Overhead transparency masters give some key findings of the survey.

Copies of the pack have been distributed to all primary and secondary schools in Scotland. Additional copies are available from the **Dissemination Officer, Educational Research Unit, Area 2B, Victoria Quay, Edinburgh EH6 6QQ (0131-244-0167); web site http://www.hmis.scotoff.gov.uk/riu.**

The 1997 Mathematics Survey

The fifth AAP survey of pupils' attainment in mathematics was carried out in 1997 by two mathematics specialists working with the AAP National Co-ordinator. Samples of pupils at P4, P7 and S2 stages were selected to be representative of pupils in all mainstream schools. Over 10,000 pupils completed the assessments. Assessment was based on the curriculum defined in the National Guidelines: Mathematics 5-14. The reporting categories used in the survey were based on the following aspects of mathematics:

- **Information Handling**
- **Number, Money and Measurement**
- **Shape, Position and Movement.**

The assessment tasks were matched to Levels A – E and beyond Level E as detailed in the National Guidelines 5-14.

The survey involved written assessments undertaken by all the pupils in the survey. Each pupil completed two test booklets. The booklets contained questions covering a range of strands and levels in the 5-14 National Guidelines. At each stage there were a large number of booklets; for example there were 16 test booklets at P7. On average each booklet was completed by over 400 pupils. In any school pupils took different combinations of booklets. This approach ensured that there was a very wide coverage of the mathematics syllabus – much wider than would be achieved in a single test taken by all pupils.

The survey also involved practical assessments taken by about a third of all the pupils in the survey, pupil questionnaires and school questionnaires.

Separate sections give the results of each of these parts of the survey.

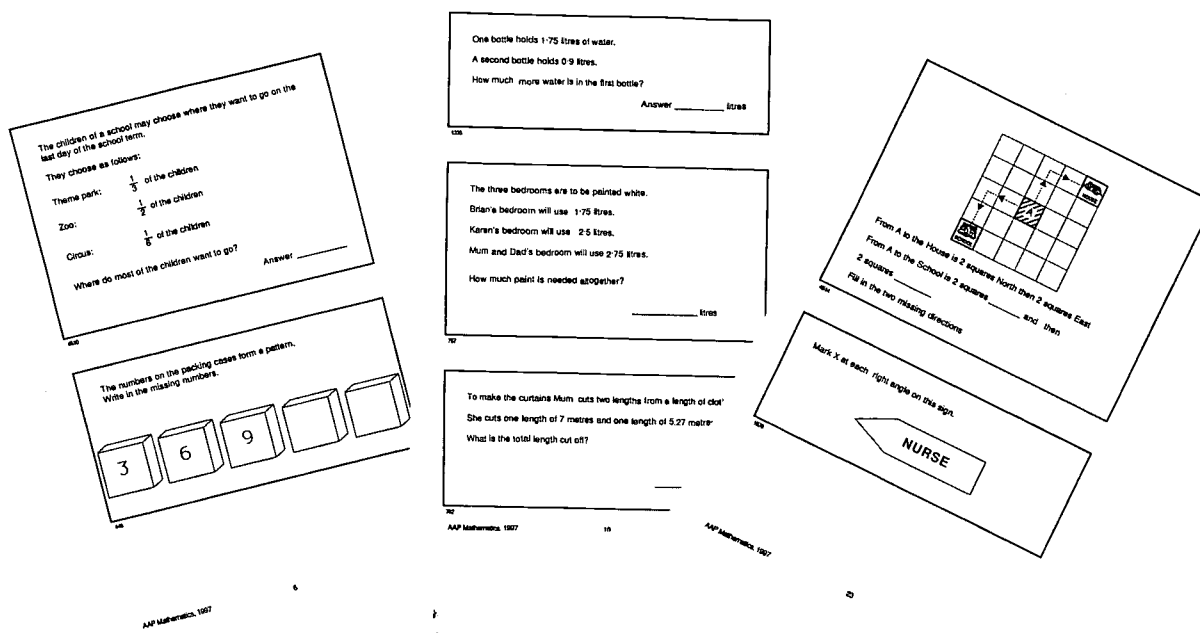
1 The Written Assessments

The mean percentage correct for all the questions at a given level in a given category is used to report the findings of the survey. Thus we report, for example, that P4 had a mean percentage correct of 66.7% for *Add and Subtract* at Level B.

In this survey the success of performance at a given level is defined as follows:

- **mean percentage correct of 83% or more in a category – very good: major strengths**
- **mean percentage correct of 67% to 82% in a category – good: strengths outweighed weaknesses**
- **mean percentage correct between 50% and 66% – fair: some important weaknesses**
- **mean percentage correct of less than 50% – unsatisfactory: major weaknesses.**

In this survey there were no significant differences between the performances of girls and boys.



Performance in Relation to 5-14 National Guidelines

PRIMARY 4 performance in Level B items was good in the majority of categories. In no category was performance considered unsatisfactory.

PRIMARY 7 performance in Level D items was fair in most categories. It was good in only one category *(Add and Subtract)* and was unsatisfactory in one category *(Fractions, Percentages and Ratio)*.

SECONDARY 2 performance in Level E items was good in only one category *(Display and Interpret)* and unsatisfactory in three categories *(Number Concepts inc. Algebra, Multiply and Divide,* and *Fractions, Percentages and Ratio)*.

Table 1: The mean percentage correct in each category at the target level for each stage.

Aspect of Mathematics	Category	P4 Level B	P7 Level D	S2 Level E
Information Handling	*Display and Interpret*	83.9%	55.7%	68.9%
Number, Money and Measurement	*Number Concepts (inc. Algebra)*	68.3%	61.6%	48.7%
	Add and Subtract	66.7%	66.5%	60.6%
	Multiply & Divide	64.8%	56.0%	48.7%
	Fractions, %ages and Ratio	59.5%	46.8%	39.7%
	Measure	71.1%	55.7%	52.0%
Shape, Position and Movement	*Shape, Position and Movement*	59.2%	62.3%	56.7%

Performance over Time

In order to find out what is happening to performance over time the results of the 1997 survey were compared with the results of previous surveys in 1994 and 1991. To make the comparison as valid as possible it was based only on tasks used in the 1997 survey which were also included in the 1994 and 1991 surveys. *This comparison is not confined to the target level;* it draws on all the common items available irrespective of level. When this comparison is made the survey reveals that:

PRIMARY 4 performance has improved significantly[1] since 1994 in most categories. Since 1991 there has been improvement in only two categories; in one category performance is worse in 1997 than in 1991.

PRIMARY 7 performance has not changed significantly since 1994. Performance is still below the 1991 level in four categories.

SECONDARY 2 performance has only improved significantly since 1994 in *Shape, Position and Movement.* There has been a significant drop in performance since 1991 in two categories but performance has improved significantly in *Shape, Position and Movement.*

Table 2: Statistically significant changes in performance over time.

Aspect of Mathematics	Category	P4 1994-7	P4 1991-7	P7 1994-7	P7 1991-7	S2 1994-7	S2 1991-7
Information Handling	*Display and Interpret*	–	–	–	–	–	–
Number, Money and Measurement	*Number Concepts (inc. Algebra)*	Better	Better	No change	No change	No change	No change
	Add and Subtract	No change	Worse	No change	Worse	No change	Worse
	Multiply and Divide	Better	No change	No change	Worse	No change	Worse
	Fractions, %ages & Ratio	–	–	No change	Worse	No change	No change
	Measure	Better	No change	No change	No change	No change	No change
Shape, Position and Movement	*Shape, Position and Movement*	Better	Better	No change	Worse	Better	Better

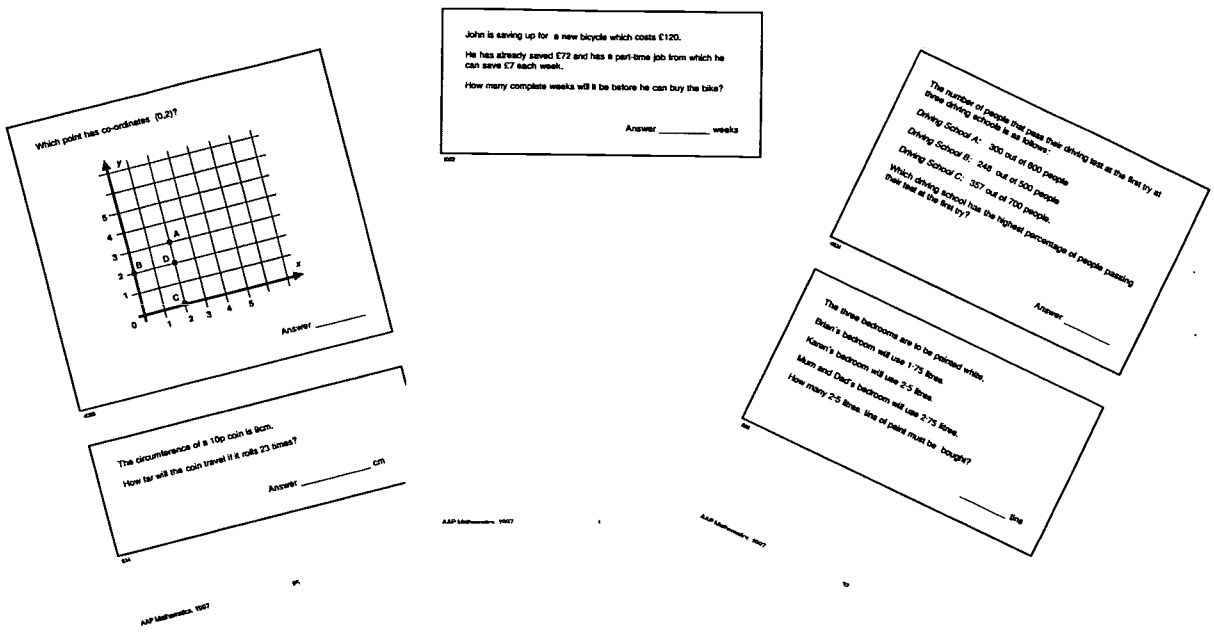
[A dash (-) indicates insufficient data.]

1 In the descriptions of performance 'significantly' means that there has been a statistically significant change

Performance over Stages

In the survey some tasks were given to pupils in both P4 and P7 and some to pupils in both P7 and S2. As a result it is possible to compare the performance of the older pupils with the performance of the younger pupils on the same tasks. For the P4/P7 comparison this was done on Level C tasks; for the P7/S2 comparison this was done on the Level D and Level E tasks. These comparisons are not measures of progression as different pupils were involved, but they do give an indication of progression. When this comparison is made the survey shows that:

- **there are quite large differences between the scores of P4 and P7 pupils i.e. pupils in P7 performed better than pupils in P4 on all the items used at both stages**
- **the differences between scores of P7 and S2 are more variable with gains being quite small in some categories. Pupils in S2 did not always perform better than pupils in P7 on all the items used at both stages.**



2 The Practical Assessments

Mental Calculations

To respond to current concerns about skills in mental calculation a Mental Calculation section was included in the 1997 practical survey. Questions mainly involved the four basic operations – add, subtract, multiply and divide.

The following are examples of typical tasks:

Primary 4	**Write down the number seven hundred and two.** Level B: 93.2% correct
Primary 7	**I buy a bar of chocolate for 35p and hand over a £1 coin. How much change do I get?** Level C: 78.0% correct
Secondary 2	**Subtract 17 from 43** Level D 52.2% correct

Each task was read out to the pupils, then repeated. Pupils had a short time to write down the answer before the next task was read out.

The results, based on the mean score for tasks at the target level, indicate that:

PRIMARY 4 performance in Level B items was good

PRIMARY 7 performance in Level D items was good

SECONDARY 2 performance in Level E items was fair showing some important weaknesses, particularly on items with *Fractions, Percentages and Ratio.*

Table 3: Mental Calculations: mean percentage correct on the items at the target level for each stage.

P4 Level B	**P7** Level D	**S2** Level E
68.7%	73.9%	59%

The tests were designed with common tasks between P4 and P7 and between P7 and S2. This allowed comparisons across stages to be made, using all the common questions irrespective of level. The results show a substantial gain in performance between P4 and P7, but some deterioration between P7 and S2. Table 4 gives the results.

Table 4: Mental Calculations: comparison of mean percentage correct on common items.

P4	P7
53.3%	91.3%

P7	S2
72.0%	70.8%

Calculator Skills

In this part of the practical assessment pupils showed their skills in using calculators. The majority of tasks involved the four arithmetic operations, but in S2 a significant number of tasks on fractions, percentages and ratio were also included. The results show that:

PRIMARY 4 pupils achieved a very good level of attainment on Level B tasks

PRIMARY 7 pupils achieved a good level of attainment on Level D tasks

SECONDARY 2 pupils achieved a good level of attainment on Level E tasks which would have been very good (83.5%) if *Fractions, Percentages and Ratio* tasks were excluded.

Pupils at **all stages:**

- performed very well on straightforward non-context tasks
- found some difficulty in tackling context tasks which involved rounding
- showed a high degree of accuracy in keying-in multi-digit numbers.

Table 5: Calculator Skills: mean percentage correct on the tasks at the target level for each stage

P4 Level B	**P7** Level D	**S2** Level E
88.2%	77.7%	69.1%.

Common questions were used to allow comparisons across stages to be made. Performances were high at all three stages and hence the gains between P4 and P7 and between P7 and S2 were limited and quite similar.

Problem Solving

Problem solving is an important aspect of mathematics. Short response problem-solving tasks were included in the written part of the survey at all three stages. The following is an example of a Level B task given at P4:

> **Tom bought 5 ice creams for the family.**
>
> **He could only carry 2 ice creams at once.**
>
> **How many trips does he make?**

74.6% of P4 pupils answered it correctly. '2 R1' was a common wrong answer.

In addition, P7 and S2 were asked to attempt one of four 'extended' problem-solving tasks.

The main findings are:

- **P4 performance in the short response problems was good, but P7 and S2 performance was unsatisfactory and poorer than expected**
- **there was no significant change in performance from 1994 in the short response problems at all three stages**
- **performance in extended problem solving was unsatisfactory**
- **in extended problems, there was very little evidence of progression from P7 to S2.**

Pupils' skills at interpreting problem-solving tasks need development. The standards of neatness and layout are in need of improvement.

Estimation

A pupil's ability to estimate can give an indication of his/her 'feel' for number, so estimation is an important skill. It is also a sophisticated one so is included in the survey only for P7 and S2 pupils. The use of a calculator was not permitted.

The survey showed that:

- **the scores at both P7 and S2 were unsatisfactory and a cause for concern (See Table 6)**
- **estimation is an area of the mathematics curriculum requiring attention.**

The following is an example of the type of task asked:

Ring A B C D or E

9% of £107.50

A £10 B £90 C £100 D £10000 E £9000

P7 score: 35% S2 score; 56%

Table 6: Mean percentage correct for Estimation

P7	S2
37.2%	40.3%

Practical Circuit

Pupils' practical skills were tested by tasks at a series of stations under the supervision of a Field Officer. At each station pupils had to respond to a set of written instructions. In some cases results may have reflected difficulties in reading and interpretation as much as problems with mathematics. However much of what was tested could reasonably be classified as life skills and as such represents an important part of the mathematics curriculum. The following topics were assessed: measure; time; money; shape; position and movement; patterns and sequences. Scores were disappointingly low with some basic tasks being poorly done, e.g.:

- at P4, less than half the pupils could measure the length of a box using a metre stick.
- at P7, less than half the pupils could work out the difference in time between 1:20pm and 3:01pm.

3 The School Questionnaires

Schools participating in the survey were asked to complete a questionnaire covering a wide range of topics on the provision of mathematics.

Summary of responses: **Primary (P4 and P7)**

Curriculum and classroom organisation

- Time allocation is generally within the 5-14 guidelines. A significant minority (almost 20%) spent less than the recommended minimum time of 225 minutes per week on mathematics. Schools spent around half their mathematics time on Number, Money and Measurement.
- Teachers spend just over half their time teaching groups; pupils spend about 40% of their time working individually.

Aspects of teaching and learning

- Calculators are used by most schools at P4 and P7, but their use is limited and controlled by their teachers.
- Mental arithmetic is allocated on average 10 minutes per day. The majority of schools taught mental arithmetic explicitly each week.
- Homework patterns vary widely. The average time for a homework assignment on any one day is 16 minutes at P4 and 21 minutes at P7.

Resources

- Textbooks – most schools are using the Heinemann mathematics scheme.
- Computers – BBC computers were the most common, particularly at P4. Few schools had PC machines. Around half had one or two Apple computers available at each stage. Computers were most often used for practice and drill.

Support for Pupils

- Most schools had little or no time allocated to learning support in mathematics.

Assessment

- A wide variety of approaches is used, but scrutiny of classwork, with results recorded, is the approach which most schools say they use most often.

Primary-Secondary Liaison

- Transfer of attainment information is the most common form of liaison between primary and secondary schools. Discussion between schools is most likely to cover resources, but teaching, learning and assessment are not commonly discussed.

Summary of responses: **Secondary (S2)**

Curriculum and classroom organisation

- Most schools spent more than the recommended minimum of 165 minutes on mathematics but 6% spent less than 165 minutes. Although most time was spent on Number, Money and Measurement less than half the time was spent on this outcome.
- About two-thirds of schools used either setting or broad banding. About 30% used mixed ability.
- Teaching time is skewed towards helping individuals. Most pupils spent less than half their time being taught directly as part of a class or group.

Aspects of teaching and learning

- The majority (60%) of schools sampled said they used calculators 'often' or 'almost always' in S2 mathematics work. In most schools, teachers made the decision about when they could be used.
- Mental arithmetic is part of the pupils' programme but is not given a significant allocation of time and approaches to mental arithmetic are rarely taught explicitly.
- Homework patterns vary widely. The average time for a homework assignment on any one day is 23 minutes. A significant minority expected S2 pupils to spend less than one hour per week on mathematics homework.

Resources

- Text books – just over half the schools use *Maths in Action*. SMP booklets were used as a main resource in around a quarter of the schools.
- Computers are available but in relatively small numbers. They are not, in general, used very often.

Support for pupils

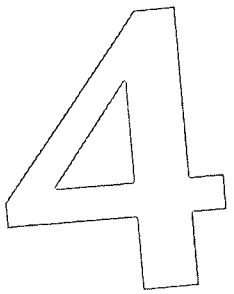
- The average time for in-class support by Learning Support specialists in secondary mathematics departments is 2 hours 55 minutes per week. There is very little out-of-class support.

Assessment

- A wide variety of approaches are used, but most schools use teacher produced tests. Half the schools sampled use national tests in mathematics in S1/S2 rarely or never.

Primary-Secondary liaison

- Transfer of attainment information is the most common form of liaison between primary and secondary schools. Discussion between schools is most likely to cover resources, but teaching, learning and assessment are not commonly discussed.



Pupil Questionnaire

The pupils who took part in the survey were asked to complete a short questionnaire about their experience of schools in general and mathematics in particular.

The main findings were:

- **most pupils enjoy school and feel they are making good progress**
- **a high proportion of pupils claim that it is not easy to find a quiet place to do homework**
- **pupils of P4 and P7 tend to prefer working on their own in mathematics, but S2 pupils prefer to work in pairs**
- **pupils of P4, P7 and S2 claim they are helped in learning mathematics most by listening to the teacher**
- **pupils in primary schools say that calculator use is always at the discretion of the teacher**
- **a high proportion of pupils claim that they never use a computer in mathematics and this increases from P4 to P7 to S2**
- **nearly three-quarters of primary pupils and more than half of S2 pupils claim they are given homework less than once a week.**

ISSUES HIGHLIGHTED BY THE SURVEY

1 Performance at P4

No major issues were highlighted. In most categories performance had improved since the last survey. However there was improvement in only two categories since 1991.

2 Performance at P7

There is no change in performance since 1994, but performance in 1997 has weaknesses and is still significantly below the 1991 level in some categories.

Weaknesses include:

- language and interpretation skills in handling information
- using scales with multiple units
- poor performance in *Add and Subtract, Multiply and Divide, Fractions, Percentages and Ratio* and *Shape, Position and Movement* compared with 1991.

3 Performance at S2

Performance at S2 indicates many weaknesses including poor performance in *Number concepts (including Algebra), Multiply and Divide,* and *Fractions, Percentages and Ratio.*

Add and Subtract and *Multiply and Divide* show a significant drop in performance from 1991.

4 Mental calculation

There is a fall-off in performance in mental calculation from P7 to S2.

5 Fractions, Percentages and Ratio

Fractions, Percentages and Ratio shows weaknesses at all stages.

6 Problem solving

Performance in Problem solving at P7 and S2 was unsatisfactory. Pupils' skills at interpreting problem-solving tasks need development.

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AAP

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Examples

Fifth Survey of

MATHEMATICS 1997

Assessment of Achievement Programme

What is the Assessment of Achievement Programme?

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Introduction

This booklet is part of an Information Pack for schools summarising the results of the fifth survey in mathematics in the Assessment of Achievement Programme carried out in 1997. It gives examples of the types of questions used in the 1997 survey. Some of these show examples of good pupil responses; others illustrate common errors made by pupils.

The early sections present examples used in the written part of the survey. These are organised by the reporting categories used for the survey. These are followed by examples taken from the practical part of the survey along with examples of Problem Solving.

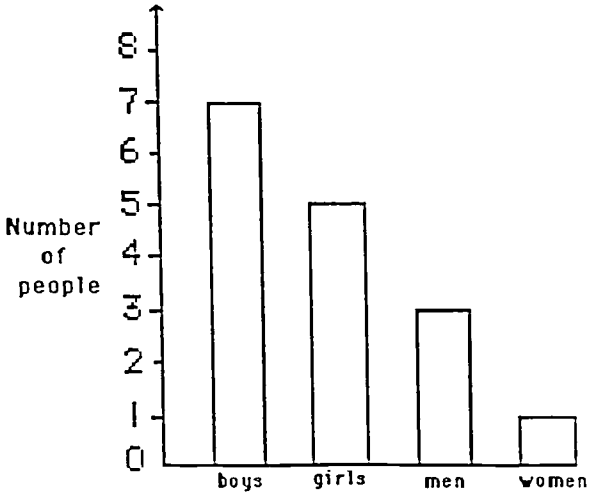
For each question the stage and 5-14 Level are given. This is followed by the percentage of pupils who answered the question correctly. There is usually a comment on the pupils' performance, often including an indication of the commonest wrong answers. Sometimes the percentage of pupils who did not attempt to answer the question is given, usually where this non-response rate is high. Finally, if the question was used in a previous survey, the percentage of pupils answering correctly in that survey is shown for comparison. (For this booklet the question have been photographically reduced from their original size.)

The examples have been produced to illustrate strengths and weakness found in pupils' performance in the 1997 survey and so to inform classroom debate and practice. The examples should be set in the context of the overall findings of the 1997 survey report which are summarised in another booklet in the Information Pack.

Contents

The Health Centre

This bar chart shows the people who visited the Health Centre yesterday.



1 How many girls visited the health centre yesterday?

_____ girls

2 How many more boys than girls visited the health centre ?

_____ more

3 How many children visited the health centre in total?

_____ children

Level B (Q1)

P4: 94.8%

Typically excellent performance at reading bar graphs.

Level B (Q2)

P4: 79.5%

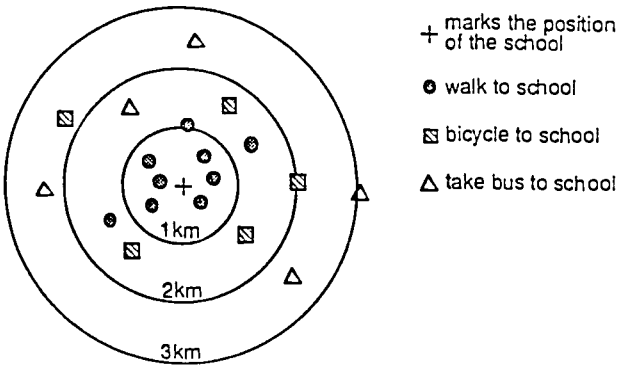
Simple calculation from a bar graph is very well done. 7 was the commonest error - perhaps showing many don't read or comprehend the whole sentence.

Level B (Q3)

P4: 71.4%

Simple calculation from a bar graph is very well done. 16 was the commonest error - giving the total number of visitors to the health centre.

When all the children had marked the chart, it looked like this.



How many children travel by bicycle to the school?

18 _____ children

Level C
P7: 96.4%

How many children live less than 1 km from the school?

19 _____ children

Level D
P7: 82.2%

How do most of the children travel to school?
Ring your answer.

walk bicycle bus

20

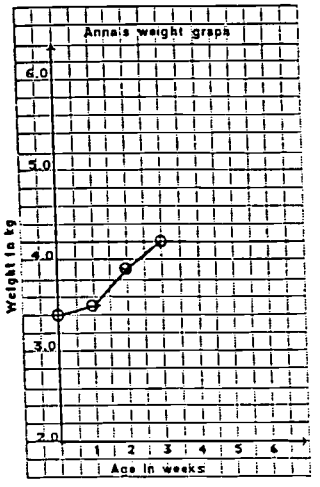
Level C
P7: 96.6%

This type of diagram was probably unfamiliar to many pupils. However they clearly took in the concept and handled the language and interpretation successfully.

Anna was weighed **at birth** and then **once each week** at the same time.

The line graph shows how her **weight** is changing.

Complete the line graph to show a weight of **4.4 kg** at **4 weeks**.



Level D

P7: 33.8% **S2:** 63.2%

Commonest error was to extend the line to 4.6 or 4.8. Clearly the vertical scale had not been interpreted correctly. This problem in the use and interpretation of scales with multiple units was common to both P7 and S2.

1994 S2: 52.9%

At birth Anna weighed 3·4kg.

How much weight did Anna gain in her first two weeks of life?

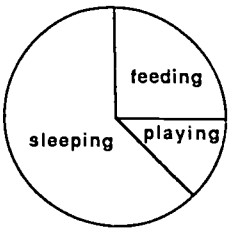
Answer _____ kg

Level E

P7: 31.4% **S2:** 45.6%

0.1 and 4 were common errors.

Here is a pie chart showing how the **24 hours** of Anna's day are usually spent.



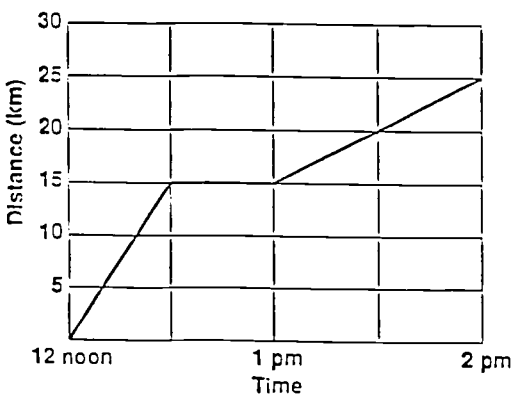
How many hours does Anna spend feeding?

Answer _____ hours

Level D

P7: 42.2 % **S2:** 65.8%

"3 hours" was a very common mistake - perhaps thinking there are 12 hours in a day or possibly a confusion with 3 o'clock.



This graph shows how far a cyclist went and the time he took to get there.

How many kilometres did he cycle altogether?

Answer _____ km

Level D

P4: 43.5%

Many pupils have interpreted this Level D item correctly. 6 was the commonest error perhaps arrived at by following the line - 3 boxes up, 1 box along and 2 boxes up.
Non response - 17.6%.

P7: 59.2% **S2:** 81.9%

A disappointing result for a Level D item. 40 was the commonest error - 15+25?

1994 P7: 77.8%
S2: 90.6%

In the number 582 the 5 represents 5 hundreds (500).

What does the 8 represent?

Answer _____

Level B

P4: 47.1 %

Poor result. 800 was the commonest wrong answer.

The children of a school may choose where they want to go on the last day of the school term.

They choose as follows:

Theme park: $\frac{1}{3}$ of the children

Zoo: $\frac{1}{2}$ of the children

Circus: $\frac{1}{6}$ of the children

Where do most of the children want to go?

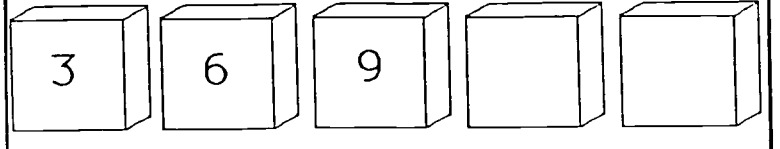
Answer _____

Level C

P4: 19.5% P7: 71.3%

Poor result. Most pupils at P4 gave the "Circus" as the answer, showing that they have not grasped the concept of a fraction. A common error at P7 was also "Circus".

The numbers on the packing cases form a pattern.
Write in the missing numbers.



Level B

P4: 89.9%

Number patterns usually well tackled.
Commonest error was to repeat the pattern rather than continue it, i.e. the commonest error was 3,6.

Last week the sweet shop's takings were £816·47.

Round £816·47 to the nearest pound.

£ _____

Level D

P7: 58.4%

Poor result. A wide variety of wrong answers was given. Decimals may have been a problem.

Month	Number of Passengers
May	3629
June	3192
July	4436
August	5972
September	2984

Round the July total to the nearest 1000.

_____

Level E

P7: 75.1 %

Good result - rounding was generally well handled. Why did pupils find the item above harder?

1994 P7: 71.6%

Write $\frac{3}{25}$ as a decimal.

Answer _____

Level E

P7: 7.5% **S2:** 14.8%

Poor result. Awareness that 3/25 = 12/100 is not evident.

Non response

P7 - 13.3%

S2 - 16.3%

A survey shows that 8 out of 10 Scots people are prepared to pay higher prices for a cleaner environment.

What percentage of Scots people is that?

Answer _____ %

Level D

P7: 49.5%

Poor result. Most common errors were 8% and 2%.

Non response - 10%

If y pounds are shared equally among four girls, how many pounds does each girl receive?

Answer £_____

Level E

S2: 28.4%

Abstract questions like this are difficult.

Non response - 21.8%

From the table shown, find a rule that could connect M and N.

M	0	1	2	3
N	3	4	5	6

Answer N = _____

Level E

P7: 13.8% S2: 35.2%

This is also difficult - quite a few pupils gave the answer +3 instead of M + 3.

Non response

P7 - 23.1%

S2 - 11.9%

If $y + 2x = 17$, calculate x when $y = 5$

Answer _____

Level E+

S2: 53.8%

This is an encouraging result - equation work was well done at P7 and S2.

Non response - 19.5%

A girl gives a shopkeeper £1 to pay for a bag of potatoes costing 86p.

What change does she receive?

Remember to write £ or p in your answer.

Answer _____

Level B

P4: 52.1%

A disappointing result. 24p was a very common answer.

Add

674
+296

____

Level D

P4: 63.6% **P7:** 91.6%

A good result. 960 and 870 were common mistakes. More unexpectedly, 1060 was also common. All indicate problems with carrying forward.

One bottle holds 1·75 litres of water.

A second bottle holds 0·9 litres.

How much more water is in the first bottle?

Answer _____ litres

Level D

P7: 31.1% **S2:** 44.6 %

A poor result for both P7 and S2. 1.66 litres was a very common error - a failure to line up the decimal point.

The three bedrooms are to be painted white.

Brian's bedroom will use 1·75 litres.

Karen's bedroom will use 2·5 litres.

Mum and Dad's bedroom will use 2·75 litres.

How much paint is needed altogether?

_____ litres

Level D

P7: 45.2%

A common answer was 6.55, i.e. number bonds are secure, but the decimal point is not lined up.

To make the curtains Mum cuts two lengths from a length of cloth.

She cuts one length of 7 metres and one length of 5.27 metres.

What is the total length cut off?

_____ metres

Level D

P7: 61.8%

Perhaps the context is obscuring the straight-forward addition.

1994: 56.0%

Subtract

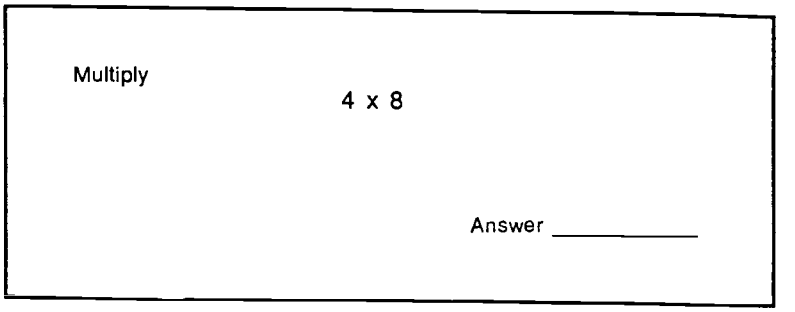
6 — 2·25

Answer _____

Level E

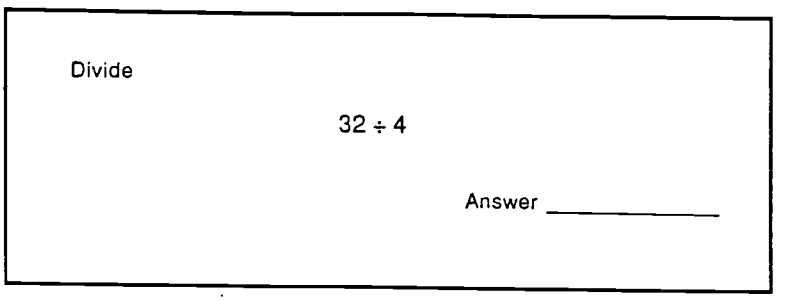
S2: 57.8%

In such questions pupils often failed to insert necessary zeros, i.e. 6.00 in this case. They often just subtracted in the way that seemed easiest. In this example a very common answer was 2.19, perhaps reached by subtracting 0.06 from 2.25.



Level B

P4: 75.8%

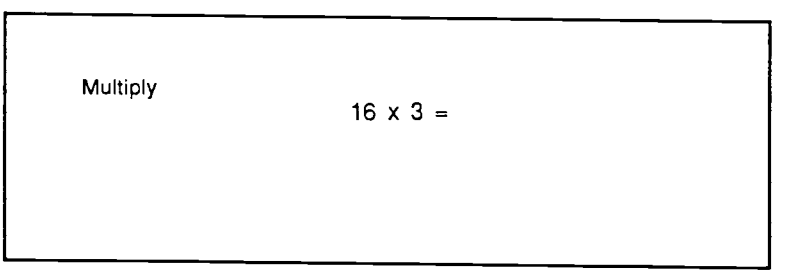


Level B

P4: 55.5%

Disappointing result - especially if you compare it with the one above.
Non response - 13.6%.

1994: 42.4%



Level B

P 4: 39.2 %

Poor result. 5R1 was a common error.

1994: 53.9%

Ann buys 15 space lollies.

How much does she have to pay?

_____ p

Level C

P4: 42.5%

21p was the most common error - the result of choosing the wrong operation.

It costs 5p a mile to travel by bus.

How much will it cost to travel 32 miles?

_____

Level C

P7: 64.9%

Poor result

1994: 72.6%

The multi-storey car park has 4 floors.

Each floor holds 148 cars.

How many cars does the car park hold?

_____ cars

Level D

P7: 73.3%

Overall between a third and a quarter of P7 pupils were insecure in basic multiplication.

1994: 85.4%

Divide

936·7 ÷ 100

Answer _____

Level D

P7: 31.0% S2: 43.2%

Poor result. Common wrong answers at P7 were 93.67 and 9.3R67.

Non response

P7 - 18.4%

S2 - 14.7%

Multiply

25 x 31

Answer _____

Level E+

P7: 48.6% S2: 49.6%

A good result at both P7 and S2 for a Level E+ item. A very common wrong answer was 65, i.e. 2 x 3 tens and 5 x 1 units!

Non response

P7 - 3.1%

Divide

8066 ÷ 37

Answer _____

Level E+

P7: 12.6% S2: 14.2%

Not an easy long division. As with the item above, not much progression from P7 to S2.

Non response

P7 - 31.4%

S2 - 43.7%

What is one quarter of 28?

Answer _____

Level B

P4: 41.7%

Poor result. 14 was a very common error - confusing a quarter and a half.

1994: 30.6%

During the interval, the sales lady sells 180 ice-creams.

Two thirds of them are raspberry.

How many raspberry ice-creams are sold?

_____ice-creams

Level D

P7: 47.1 %

Disappointing result. Common wrong answer was 60 - correctly calculating a third, but forgetting to finish the question.

Calculate 50% of 420 kilometres

Answer _____ kilometres

Level D

P7: 65.6% S2: 83.8%

920 and 370 were the most common wrong answers. Is this due to reading 50% as 500 or 50 or does it show a more fundamental weakness in handling percentages?

1994 S2: 75.8%

A delivery of potatoes weighs 300 kg.

12% are found to be rotten and have to be thrown out.

What weight is thrown out?

Answer _____ kg

Level E

P7: 13.4% S2: 34.3%

25 kg was a common wrong answer, i.e. 300 divided by 12.

The table below shows the number of visitors to the theatre that week.

Day	Number of Visitors
Monday	836
Tuesday	740
Wednesday	1045
Thursday	970
Friday	1050
Saturday	1143

50% of the audience on Thursday were children?

How many children were in the audience?

Answer _____ children

Level D

P7: 54.3% S2: 57.5%

Poor result. Is this a problem with percentages or of dividing 970 by 2?

Anna will soon need a high chair.

Peter sees one in a local shop with $\frac{1}{3}$ off the original price of £69.

What is the new cost of the high chair?

Answer £ _____

Level D

P7: 23.7% S2: 45.0%

More than half of P7 answered £23; about 20% of S2 also gave this answer - correctly calculating a third, but forgetting to finish the question.

1994 P7: 29.6%
S2: 50.8%

A new motor car costs £6000.

It loses 30% of its value over the first year.

What is the drop in value over the first year?

Answer £_____

Level E

S2: 18.3%

The technique of finding 10% and then multiplying by 3 is not known.

Non response - 16.2%

Add

$\frac{1}{8} + \frac{3}{4}$

(Give your answer in its simplest form)

Answer _____

Level E+

S2: 25.0%

About 40% gave the answer 4/12 (or 1/3), adding the top numbers and adding the bottom numbers.

1994: 29.7%

1991: 31.5%

1988: 33.6%

A painter needs to mix green and yellow paint in the ratio of 4 to 7 to obtain the colour he wants.

If he has 28 litres of green paint, how many litres of yellow paint should be added?

Answer _____ litres

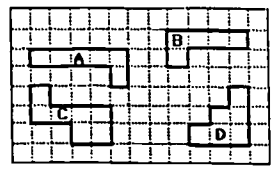
Level E+

S2: 36.9%

A good score at Level E+. Unitary ratios at Level E were well handled, but compound ratios caused difficulties.

Non response - 15.1%

Circle the letters in the two shapes that have the same area.



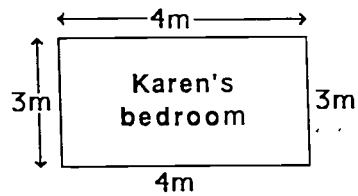
Level C

P4: 60.8% **P7:** 87.3%

This question was well done - it is typical of questions where shapes of the same area have to be found. The commonest error is to choose shapes which look alike i.e. A and B was the most common error here.

1994 P4: 46.4%

Karen wants to put the patterned border round the walls of her bedroom.



What is the perimeter of Karen's bedroom?

_____ m

Level D

P4: 64.3 %

This question on perimeter seemed to be very well handled by P4. If only the length and breadth had been given, then the score would almost certainly have been less.

The children leave the space ship at 9.30am and return at 10.00am.

How long does the space walk last?

_____ minutes

Level C

P4: 63.2%

A good result.
Non response - 12.7%.

Sam's next appointment was made for 25.07.97

What month will that be?

_____

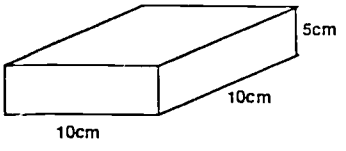
Level C

P4: 73.6%

A very good result. August was the most common error.

1994: 64.7%

What is the volume of this cuboid in cubic centimetres?



Answer _____ cm^3

Level E

P7: 27.1% **S2:** 57.0%

25 was, not surprisingly, the most common wrong answer. Pupils simply added the numbers shown in the diagram.

A postman works 6 days in the week.

He takes 2 hours 50 minutes each day to deliver his letters

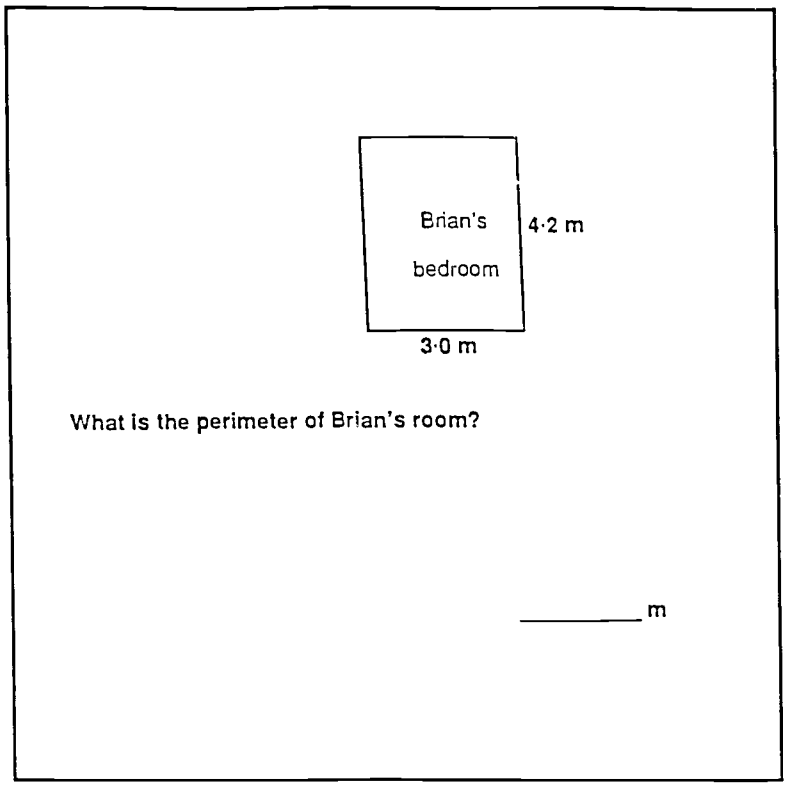
How much time does he spend delivering his letters each week?

Answer _____ hours

Level D

P7: 12.1%

15 hours was by far the most popular answer. It appears the common mistake of treating time as decimal has been made.



What is the perimeter of Brian's room?

_____ m

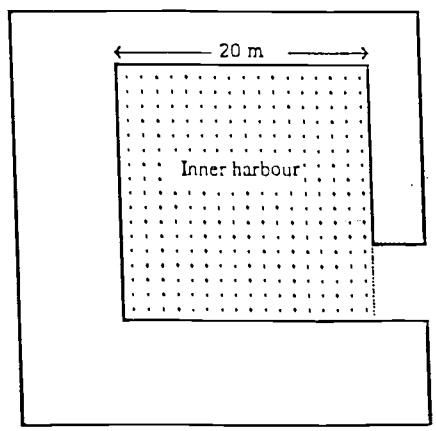
Level D

P7: 56.0%

Nearly 20% gave the answer 7.2m, i.e. they just added the numbers shown.

1994: 49.0%

The inner harbour is square.



What is the area of the inner harbour?

_____ m^2

Level E

P7: 23.5%

40% gave 80 as the answer - perimeter/area confusion.

How many metres are there in 8·62 kilometres?

Answer _____ metres

Level E
P7: 22.8% S2: 39.8%

At S2 nearly 20% gave the response 862 - they have partial understanding, but appear to think there are 100 metres in a kilometre rather than 1000.

The pupils left school at 0900 on Tuesday 30 March and arrived at their destination in France at 1700 on Wednesday 31 March.

How long did the journey take?

Answer _____ hours

Level D
P7: 33.7% S2: 43.2%

At P7 nearly 20% gave the answer 8 hours - weakness in reading skills or carelessness?

1994 P7: 26.0%
S2: 46.4%

George took 7 hours 55 minutes to drive from Glasgow to London.

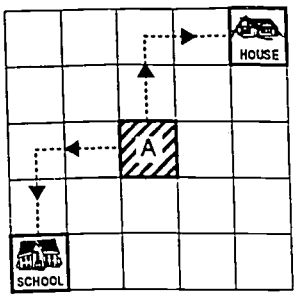
Eric took 9 hours 15 minutes to drive the same journey.

How much quicker was George?

Answer _____ hour(s) _____minutes

Level E
P7: 25.9% S2: 41.7%

Around 20% gave the answer 2h 40min, i.e. they subtracted the "easy" way.



From A to the House is 2 squares North then 2 squares East

From A to the School is 2 squares _____ and then

2 squares _____

Fill in the two missing directions

Level B

P4: 47.5%

Disappointing result. "East then South" was most common error.
Non response - 13.3%

Mark X at each right angle on this sign.

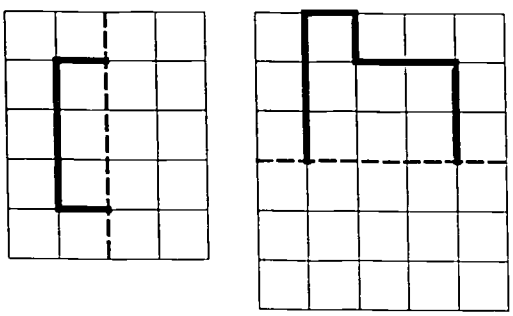
Level B

P4: 47.6%

A disappointing result. Selecting the acute angle was the most common error.
Non response - 18.3%

1994: 40.8%

Complete each of the following shapes so that the dotted line is an axis of symmetry of the completed figure:



Level C

P4: 81.3% **P7: 94.7%**

S2: 94.8%

Excellent result. This item illustrates the general finding that even at P4 pupils understand the term "symmetry".

A circle has a diameter of 14 metres.

What is the radius of the circle?

Answer _____m

Level D

P 7: 56.0% S2: 62.0%

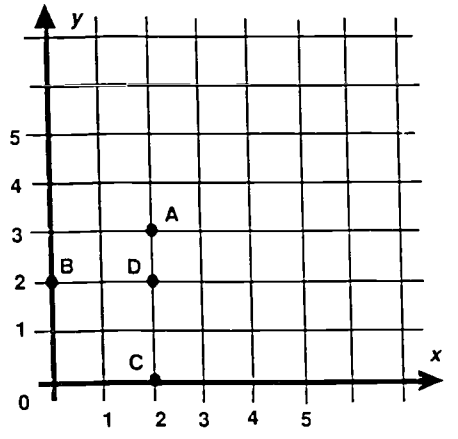
Poor result for both P7 and S2. Not unexpectedly the commonest error was 28 metres, confusing radius and diameter.

Non response

P7 - 17.9%

S2 - 16.4%

Which point has co-ordinates (0,2)?



Answer _____

Level D

P7: 51.2% S2: 75.7%

Not surprisingly C was the commonest wrong answer.

The circumference of a 10p coin is 9cm.

How far will the coin travel if it rolls 23 times?

Answer _____ cm

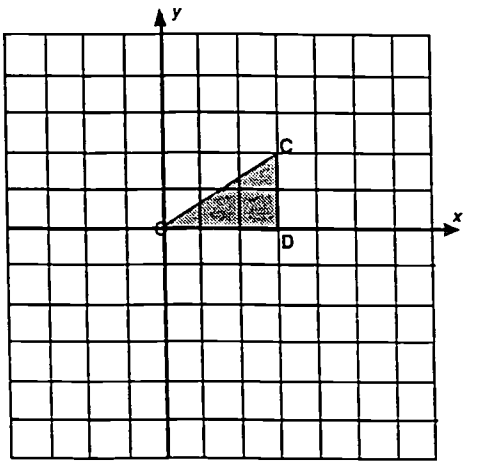
Level D

P7: 70.1%

The score in this item would be improved if the small number of responses 2.07and 2m 7cm were accepted as correct.

Triangle OCD is given a clockwise rotation of 90° about O.

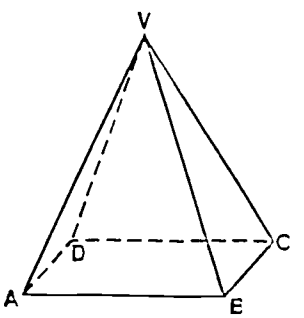
Draw the triangle in its new position?



Level E
S2: 41%

Nearly 25% gave a reflection in x or y axis. Rotation is not well known.

How many edges has the pyramid VABCD?

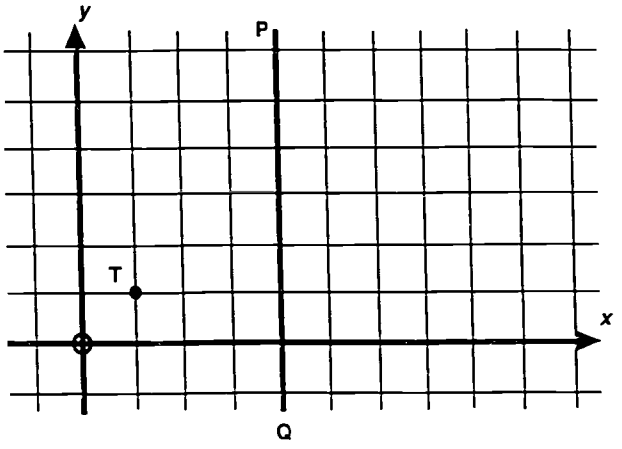


Answer _____

Level D
S2: 48%

Nearly half the pupils gave 5 as the answer. Counting the faces or corners instead of edges or ignoring the "hidden" edges?

1994: 55.0%



T is the point with coordinates (1, 1).

What are the coordinates of the image of T after reflection in the line PQ shown?

Answer (___ , ___)

Level E
S2: 22%

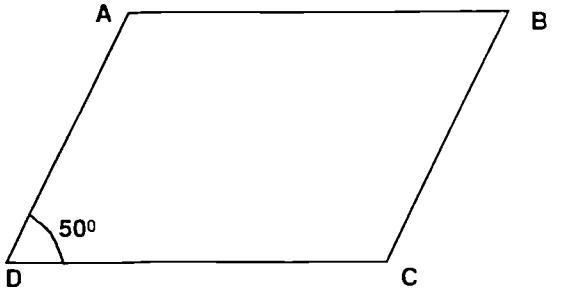
There is room for improvement in transformation geometry. *Non response* - 10%.

1994: 33.4%

ABCD is a parallelogram.

Angle ADC measures 50^0.

What is the size of the angle DAB?



Answer _____ °

Level E
S2: 37%

About 25% gave 50 as the answer.

Mental calculations - Primary 4

Item	Level	% correct
A1 Add 16 and 8. Pause. 16 plus 8 equals	B	89.0
A2 Write down the number seven hundred and two. Pause. Repeat	B	93.2
A3 Multiply 5 times 7. Pause. Or 5 sevens are	B	86.4
A4 I buy a bar of chocolate for 35p and hand over a £1 coin. How much change do I get? Pause. Repeat	C	28.0
A10 Multiply 9 times 7. Pause. Or 9 sevens are.	C	34.7
A15 I buy 4 ice lollies at 9p each. How much do I pay? Pause. Repeat.	B	25.4

Mental calculations - Primary 7

Item	Level	% correct
A1 Add 16 and 8. Pause. 16 plus 8 equals.	B	98.6
A2 Divide 42 by 6. Pause. 42 divided by 6 equals.	C	93.3
A3 Multiply 5 times 7. Pause. Or 5 sevens are.	B	99.0
A4 I buy a bar of chocolate for 35p and hand over a £1 coin. How much change do I get? Pause. Repeat	C	86.5
A7 Round the number 637 to the nearest ten. Pause. Repeat.	C	94.7
A9 A train left at nine forty and arrived at five past eleven. How long did the journey take? Pause. Repeat.	D	59.6
A12 What is three quarters of 20? Pause. Repeat	D	68.8

Mental calculations - Secondary 2

Item	Level	% correct
A1 Divide 42 by 6. Pause. 42 divided by 6 equals.	C	83.5
A2 Write down the number twenty five thousand, six hundred and twenty. Pause. Repeat.	D	88.0
A3 Add 43 and 25. Pause. 43 plus 25 equals.	D	86.1
A4 Round the number 637 to the nearest ten. Pause. Repeat.	C	86.1
A5 Multiply 9 times 30. Pause. 9 Times 30 equals.	E	65.2
A6 Subtract 17 from 43. Pause. 43 subtract 17 equals.	D	52.5
A7 What is 20% of 320? Pause. Repeat.	E	17.7
A10 Round 7.236 to one decimal place. Pause. Repeat.	E	51.9
A12 What is three quarters of 20? Pause. Repeat.	D	69.6

Primary 4

Use a calculator to answer these questions

1
37 + 45
= _____

2
823 – 97
= _____

3
98 x 5
= _____

4
79 + 24 + 45
= _____

5
63 ÷ 9
= _____

6
¼ of 72
= _____

7
Mary has a piece of string 40 cm long. She cuts off a piece measuring 15cm. What length of string is left?

Length left = _____cm

8
35 Pupils are going on a trip. Their teacher collects £7 from each of them. How much does the teacher collect in total?

Amount collected = £ _____

Question	1	2	3	4	5	6	7	8
Level	B	B	B	B	B	B	B	B
% correct	97.5	91.5	92.4	89.0	93.2	18.6	71.2	44.9

Primary 7

Use a calculator to answer these questions.

1 863 − 395

= _____

2 3721 + 4983 + 1278

= _____

3 131·54 − 58·16

= _____

4 256 x 37

= _____

5 87·17 ÷ 23

= _____

6 906·2 x 3·87

= _____

7 $^1/_9$ of £407·43

= _____

8 23% of £489

= _____

9 231 pupils are going on a trip. One bus holds 55 passengers. How many buses are needed?

_____ buses

10 A large bottle contains 1000ml of medicine.Small bottles each hold 112ml. Calculate how many small bottles can be filled from the large one.

Number of bottles filled = _____ bottles

How many millilitres will be left over? _____ml

Question	1	2	3	4	5	6	7	8	9	10
Level	C	D	D	C	D	E	E	E	D	E
% correct	93.7	95.0	93.7	97.5	91.8	86.2	65.4	11.3	61.6	14.5

Secondary 2

Use a calculator to answer these questions.

1 $3721 + 4983 + 1278$

$= \_\_\_\_\_$

2 $131{\cdot}54 - 58{\cdot}16$

$= \_\_\_\_\_$

3 $87{\cdot}17 \div 23$

$= \_\_\_\_\_$

4 $906{\cdot}2 \times 3{\cdot}87$

$= \_\_\_\_\_$

5 $^3/_7$ of £295·33

$= £\_\_\_\_\_$

6 23% of £489

$= £\_\_\_\_\_$

7 Calculate $\frac{920{\cdot}16}{9 \times 12}$

$\_\_\_\_\_$

8 Calculate 9^3

$\_\_\_\_\_$

9 231 pupils are going on a trip. One bus holds 55 passengers. How many buses are needed?

$\_\_\_\_\_$ buses

10 A large bottle contains 1000ml of medicine.Small bottles each hold 112ml. Calculate how many small bottles can be filled from the large one.

Number of bottles filled = $\_\_\_\_\_$ bottles

How many millilitres will be left over? $_____$ml

Question	1	2	3	4	5	6	7	8	9	10
Level	D	D	D	E	E	E	E+	E+	D	E
% correct	91.7	93.6	97.5	87.3	46.5	42.7	30.6	19.7	72.0	22.3

Primary 7

Estimation (7A)

In each question ring A, B, C, D or E, whichever you think gives the best estimate.

1 3283 + 1874 + 2901

A 6000 B 6500 C 7000 D 8000 E 9000

2 7839 x 9

A 8000 B 60000 C 70000 D 80000 E 100000

3 590·5 ÷ 18

A 25 B 30 C 50 D 60 E 80

4 35·943 – 8·18

A 20 B 26 C 27 D 28 E 30

5 48% of £1800

A £9 B £100 C £500 D £900 E £1000

Question	1	2	3	4	5
% correct	54.7	35.4	23.4	38.0	40.6

Secondary 2

Estimation (2C)

In each question ring A, B, C, D or E, whichever you think gives the best estimate.

1 $8905 + 809 + 1168$

A 9000 B 10000 C 11000 D 12000 E 13000

2 $12{\cdot}3 \times 28{\cdot}2$

A 30 B 300 C 3000 D 30000 E 300000

3 9% of £107·50

A £10 B £90 C £100 D £1000 E £9000

4 15 people have an equal share of the top lottery prize of £22,560,990. Each person's share is about

A £500,000 B £750,000 C £1,000,000 D £1,500,000 E £2,000,000

5 $21^2 + 19^2$

A 80 B 160 C 800 D 1600 E 8000

Question	1	2	3	4	5
% correct	51.3	53.2	56.3	53.2	43.0

Station 3

The cork floor is to be tiled.
Match a blue tile to the shape in the middle of the brown cork.

What shape is the small blue tile?

141 The small blue tile is a _____

Look at the bigger (cream coloured) tile.
How many sides has it?

142 The bigger tile has _____ sides.

Continue to tile the cork floor until you have used all the tiles from the box.
Make sure all the tiles are on the cork. 01
Make sure there are no gaps in the pattern. 02

When you have finished, ask the teacher to check what you have done.

143 Teacher checkpoint 10 01 02 90

Please put all the tiles back in the box before you move on.

Practical materials

6 small square blue tiles; 6 octagonal cream tiles. Cork square with a small square outlined (as starting position).

At this station the Field Officer had to check the pupils' tiling pattern and record the result.

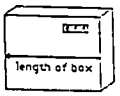
Level A (Item 1)
P4: 80.2%

Level A (Item 2)
P4: 67.1%

Level B (Item 3)
P4: 49.9%

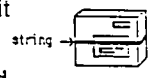
Station 1

Measure the length of the box.



Write your measurement here _____
01

String was put round the box to send it through the post.



What is the minimum length needed to go round the box with no overlap?

Use this space for any measurements or working.

Write your answer here _____
21

Tina untied the ribbon from the present inside the box.

Measure the length of the ribbon.

Write your measurement here _____
02

Practical materials

Metre stick (provided by the school to ensure familiarity)
Box (47 cm in length).
Gift ribbon (1m 24cm in length)

Level B (Item 1)
P7: 59.3%
S2: 68.5%

Level B (Item 2)

P7: 20.2%
S2: 35.4 %

Level B (Item 3)

P7: 50.1%
S2: 59.4%

These results are disappointing for P7 and S2 pupils. The items are only at Level B and are basic measurement of length. In each item an allowance was made for a margin of error.

Tom bought 5 ice creams for the family.

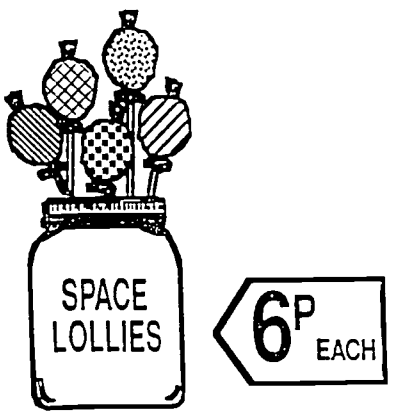
He could only carry 2 ice-creams at once.

How many trips does he have to make?

_____trips

Level B
P4: 74.6%

The answer 2 RI featured among the common wrong answers.



Asif has only 50p left.

How many lollies can he buy?

_____ lollies

Level C
P4: 32.0%

Common wrong answers were 56 - just adding the numbers - and 10 - perhaps misreading 50p as 60p.
Non response -12.8%

A ball of string 40 metres long is cut into pieces 2 metres 50 centimetres long.

How many pieces can be cut?

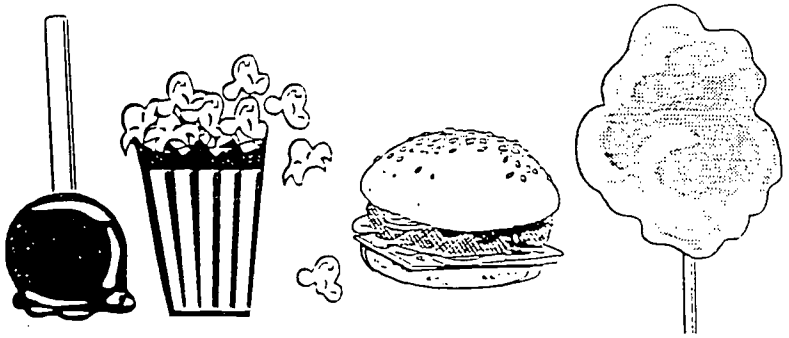
Answer _____

Level D
P7: 27.1% S2: 40.9%

"8 pieces" featured among the wrong answers, suggesting a correct initial strategy was applied, i.e. double 2m 50cm and divide into 40.
Non response
P7 - 18.9%
S2 - 15.5%

1994 S2: 43.5%
1991 S2: 50.4%
(Not asked at P7 before 1997.)

Jean has £2 left. She wants to buy two different things to eat and still have enough money left for a ride. A ride costs 50p.



Toffee apple 70p | Popcorn 85p | Hamburger 90p | Candy Floss 65p

Which two things can Jean buy?
List all possible answers.

_____

_____

Level D
P7: 52.0%

The commonest error was to buy only candy floss and popcorn, presumably thinking that exactly 50p needed to be left over.

John is saving up for a new bicycle which costs £120.

He has already saved £72 and has a part-time job from which he can save £7 each week.

How many complete weeks will it be before he can buy the bike?

Answer _____ weeks

Level D
P7: 44.0% S2: 55.4%

Quite a number gave the response 6 (i.e. they rounded down instead of up). However their choice of operations was correct.

The number of people that pass their driving test at the first try at three driving schools is as follows:

Driving School A: 300 out of 600 people

Driving School B: 248 out of 500 people

Driving School C: 357 out of 700 people.

Which driving school has the highest percentage of people passing their test at the first try?

Answer _____

Level E
P7: 65.1% S2: 68.8%

The three bedrooms are to be painted white.

Brian's bedroom will use 1·75 litres.

Karen's bedroom will use 2·5 litres.

Mum and Dad's bedroom will use 2·75 litres.

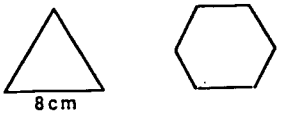
How many 2·5 litres tins of paint must be bought?

_____ tins

Level E
S2: 61.7%

About 15% gave 4 tins as their answer, taking this as three separate tasks - 1+1+2?

Peter draws a triangle and a hexagon to hang from the mobile.



The shapes are regular and have the **same perimeter.**

Each side of the triangle is 8cm.

How long is each side of the hexagon?

Answer _____ cm

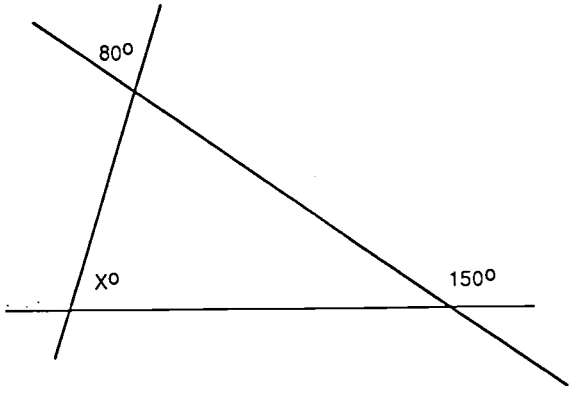
Level E

P7: 56.1% **S2:** 74.0%

1994 P7: 49.9%
S2: 70.6%

Three straight lines intersect as shown in the diagram.

What is the value of x ?



Answer _____

Level E+

S2: 36.9%

About 15% gave 130^0
($360^0 - 230^0$?)

Leisure Activities

This problem was adapted from one given the same title in the 1994 survey. It is relatively unstructured and tests the ability to measure time and to handle information given in timetables. No knowledge of mathematics beyond Level D is required.

Problem 1 LEISURE ACTIVITIES

The Grant family are having a holiday at a holiday camp.

Kathleen looked at the activities on offer for the next day.

NOTICE BOARD

SWIMMING LESSONS
10 am – 11.45 am
2 pm – 3.35 pm

HANG GLIDING
10.30 am – 12.30 pm
1 pm – 3 pm

VIDEOS
4 pm – 5 pm
6.00 pm – 7.00 pm
8.30 pm – 10 pm

VOLLEYBALL
10 am – noon
2 pm – 4 pm
4 pm – 6 pm

DISCO
7 pm – 9 pm
9.30 pm – 1 am

The whole family is going for a boat trip from 1 pm to 3.30pm.

They will have their evening meal between 5.30 pm and 6.30 pm.

Kathleen has offered to baby-sit from 9.30 pm onwards.

Kathleen wants to attend three different activities listed on the notice board.

List the different ways that she can do this during her free time.

66% of P7 pupils and 61% of S2 pupils gave at least one correct response to the problem, indicating that most pupils appeared to understand the question.

Perhaps this performance illustrates the concept that many pupils assume a task is complete when an answer is obtained and, through lack of study of the question, do not appreciate that more is required. Most pupils at P7 and S2 did indeed list their results; a small number (about 5%) wrote a paragraph to give their answer. One pupil drew a horizontal time line and used it to list her answers.

At P7, 17% of pupils gave a list of activities but omitted the times. At S2 the corresponding figure was 15%. Answers given in this way were marked wrong. It is disappointing that P7 performance was better than that of S2.

1 The Objectives of the Survey

The main objectives were to:

- assess what pupils in P4, P7 and S2 know and can do in mathematics
- provide information on performance in relation to levels defined in the 5-14 National Guidelines
- provide evidence about changes in performance over time.

2 The Sample

Stage	Number of Schools	Number of Pupils	Approximate number of pupils completing each written paper
P4	221	3341	503
P7	223	3382	417
S2	132	4034	522

3 The Scope of the Survey

The survey involved:

- written assessment for pupils
- practical assessment for pupils
- questionnaires for pupils
- questionnaires for schools.

4 The Written Assessment

At each stage – P4, P7 and S2 – pupils completed two assessment booklets as follows:

A questions presented in a traditional format, some with a context others without a context, and independent of each other (28 booklets in total)

B contextualised questions linked together in a theme such as Space Trip (16 booklets in total)

The items in each booklet covered a range of levels with the focus on the 5-14 target level for the stage and a spread of assessment categories.

5 The Practical Assessment

A subset of schools in the survey took part in the practical assessments as well as the written assessment.

The practical assessment included the range of activities shown in the table.

ACTIVITY	P4	P7	S2
Mental Calculations	✔	✔	✔
Calculator Skills	✔	✔	✔
Estimation		✔	✔
Practical Circuit	✔	✔	✔
Information Handling	✔	✔	✔
Extended Problem Solving		✔	✔

6a

STRANDS AND REPORTING CATEGORIES

Information Handling

5-14 Strand	AAP Reporting Category
Collect	Not assessed
Organise	*Organise* (Assessed in the practical assessment)
Display Interpret	*Display and Interpret*

STRANDS & REPORTING CATEGORIES

Number, Money and Measurement

5-14 Strand	AAP Reporting Category
Range and type of number Round numbers Patterns and sequences Functions and equations	*Number concepts (inc. Algebra)*
Add and subtract	*Add and Subtract*
Multiply and divide	*Multiply and Divide*
Fractions, percentages and ratio	*Fractions, Percentages and Ratio*
Measure Time	*Measure* *(inc. Time, Perimeter and Scales)*
Money	Included in *Add and Subtract* and *Multiply and Divide* as appropriate
Perimeter, formulae, scales	Reported in various categories.

STRANDS AND REPORTING CATEGORIES

Shape, Position and Movement

5-14 Strand	AAP Reporting Category
Range of Shapes Symmetry	*Range of shapes (inc. Symmetry)*
Position and movement Angle	*Position and Movement (inc. Angle)*

7

5-14 Levels

Level A should be attainable in the course of P1-P3 by almost all pupils.

Level B should be attainable by some pupils in P3 or even earlier, but certainly by most in P4.

Level C should be attainable in the course of P4-P6 by most pupils.

Level D should be attainable by some pupils in P5-P6 or even earlier, but certainly by most in P7.

Level E should be attainable by some pupils in P7-S1, but certainly by most in S2.

Level E+ for pupils attaining beyond Level E.

Performance Ratings

The **mean percentage correct** for all the questions at a given level in a given category is used to report the findings of the survey.

In this survey the success of performance at a given level in a given category is defined as follows:

83% or more	very good: major strengths
67% to 82%	good: strengths outweighed weaknesses
50% to 66%	fair: some important weaknesses
less than 50%	unsatisfactory: major weaknesses

Example: In P4 the mean percentage correct for *Multiply and Divide* was 64.8% which is described as "fair with some important weaknesses".

Performance in relation to 5-14 National Guidelines

PRIMARY 4 performance in Level B items was good in the majority of categories. In no category was performance considered unsatisfactory.

PRIMARY 7 performance in Level D items was fair in most categories. It was good in only one category *(Add and Subtract)* and was unsatisfactory in one category *(Fractions, Percentages and Ratio).*

SECONDARY 2 performance in Level E items was good in only one category *(Display and Interpret)* and unsatisfactory in three categories *(Number Concepts inc. Algebra, Multiply and Divide, and Fractions, Percentages and Ratio).*

9b

Performance in relation to 5-14 National Guidelines

The mean percentage correct in each category at the target level for each stage.

Aspect of Mathematics	Category	P4 Level B	P7 Level D	S2 Level E
Information Handling	*Display and Interpret*	83.9%	55.7%	68.9%
Number, Money and Measurement	*Number Concepts (inc. Algebra)*	68.3%	61.6%	48.7%
	Add and Subtract	66.7%	66.5%	60.6%
	Multiply & Divide	64.8%	56.0%	48.7%
	Fractions, %ages & Ratio	59.5%	46.8%	39.7%
	Measure	71.1%	55.7%	52.0%
Shape, Position and Movement	*Shape, Position and Movement*	59.2%	62.3%	56.7%

FINDINGS OF THE SURVEY: THE WRITTEN ASSESSMENT

Performance over Time

PRIMARY 4 performance has improved significantly[1] since 1994 in most categories. Since 1991 there has been improvement in only two categories; in one category performance is worse in 1997 than in 1991.

PRIMARY 7 performance has not changed significantly since 1994. Performance is still below the 1991 level in four categories.

SECONDARY 2 performance has only improved significantly since 1994 in *Shape, Position and Movement.* There has been a significant drop in performance since 1991 in two categories but performance has improved significantly in *Shape, Position and Movement.*

1 In the descriptions of performance 'significantly' means that there has been a statistically significant change.

FINDINGS OF THE SURVEY: THE WRITTEN ASSESSMENT

Performance over Time

Statistically Significant Changes in Performance over Time

Aspect of Mathematics	Category	P4 1994-7	P4 1991-7	P7 1994-7	P7 1991-7	S2 1994-7	S2 1991-7
Information Handling	*Display & Interpret*	-	-	-	-	-	-
Number, Money and Measurement	*Number Concepts (inc. Algebra)*	Better	Better	No change	No change	No change	No change
	Add and Subtract	No change	Worse	No change	Worse	No change	Worse
	Multiply & Divide	Better	No change	No change	Worse	No change	Worse
	Fractions, %ages & Ratio	-	-	No change	Worse	No change	No change
	Measure	Better	No change	No change	No change	No change	No change
Shape, Position & Movement	*Shape, Position & Movement*	Better	Better	No change	Worse	Better	Better

[A dash (-) indicates insufficient data.]

Performance over Stages

Pupils in P7 performed better than pupils in P4 on all the items used at both stages.

The differences between scores of P7 and S2 are more variable with gains being quite small in some categories.

Pupils in S2 did not always perform better than pupils in P7 on all the items used at both stages.

Mental Calculations

PRIMARY 4 performance in Level B items was good

PRIMARY 7 performance in Level D items was good

SECONDARY 2 performance in Level E items was fair showing some important weaknesses particularly on items with fractions, percentages and ratio.

Mental Calculations: mean percentage correct on the items at the target level for each stage.

P4 Level B	**P7** Level D	**S2** Level E
68.7%	73.9%	59%

Problem Solving

The main findings are:

- P4 performance in the short response problems was good, but P7 and S2 performance was unsatisfactory and poorer than expected
- there was no significant change in performance from 1994 in the short response problems at all three stages
- performance in extended problem solving was unsatisfactory
- in extended problems, there was very little evidence of progression from P7 to S2.

14a

ISSUES HIGHLIGHTED BY THE SURVEY

Performance at P4

No major issues were highlighted. In most categories performance had improved since the last survey. However there was improvement in only two categories since 1991.

14b

ISSUES HIGHLIGHTED BY THE SURVEY

Performance at P7

There is no change in performance since 1994, but performance in 1997 has weaknesses and is still significantly below the 1991 level in some categories.

Weaknesses include:

- language and interpretation skills in handling information
- using scales with multiple units
- poor performance in *Add and Subtract, Multiply and Divide, Fractions, Percentages and Ratio* and *Shape, Position and Movement* compared with 1991.

14c

ISSUES HIGHLIGHTED BY THE SURVEY

Performance at S2

Performance at S2 indicates many weaknesses including poor performance in *Number concepts (including Algebra), Multiply and Divide,* and *Fractions, Percentages and Ratio.*

Add and Subtract and *Multiply and Divide* show a significant drop in performance from 1991.

15 Other Issues Highlighted by the Survey

Mental Calculation

There is a fall-off in performance in mental calculation from P7 to S2.

Fractions, Percentages and Ratio

Fractions, Percentages and Ratio shows weaknesses at all stages.

Problem Solving

Performance in problem solving at P7 and S2 was unsatisfactory. Pupils' skills at interpreting problem-solving tasks need development.

Assessment of Achievement Programme
1997 Mathematics Survey

Information Pack

Comments

This comment sheet is part of the Information Pack on the 1997 AAP survey of mathematics. It offers you an opportunity to comment on the Information Pack. You are invited to complete it and return it to:

AAP National Co-ordinator
2B Victoria Quay
Leith
EDINBURGH
EH6 6QQ

Your general reaction

1. The Information Pack presents the findings of the survey in a variety of ways. Generally how useful did you find each of the following?

	Very useful	Useful	Of little use
The *Findings and Issues* booklet	☐	☐	☐
The *Examples* booklet	☐	☐	☐
The set of overhead transparency masters	☐	☐	☐

2. The Information Pack is presented as a folder.

	Yes	No
Generally do you find this helpful?	☐	☐

3. If "No", what type of publication would you find more helpful? _____

_____

4. The Information Pack is designed to be used flexibly. For which of the following purposes have you personally used/will you personally use the Information Pack.

	Yes	No
Private individual study/reference	☐	☐
Departmental/small group discussion	☐	☐
Whole-school staff meeting/discussion	☐	☐
In-service training course	☐	☐
Pre-service training	☐	☐
Other	☐	☐ Please specify _____

_____

***Findings and Issues* booklet**

3. Generally is the amount of information provided -

☐ too much? ☐ about right? ☐ too little?

Continued overleaf

Examples **booklet**

4. Generally is the number of examples provided -

☐ too great? ☐ about right? ☐ too few?

5. Generally is the information provided on each example -

☐ too much? ☐ about right? ☐ too little?

6. Here are some statements about the *Examples* booklet. Tick the statements with which you agree.

☐ The examples have given me new insights into the errors made by pupils.
☐ For me there was nothing new in the examples.
☐ The examples will be a good basis for discussion with colleagues.
☐ I might try some of the examples with my pupils.
☐ I was surprised at the level of performance on some of the items.
☐ The information on performance did not tell me anything new.

About yourself

7. Where do you work?

☐ Primary school ☐ Secondary school ☐ Other. Please specify _____

8. What post do you hold?

☐ Teacher
☐ Senior teacher
☐ Assistant principal teacher
☐ Principal teacher
☐ Assistant head teacher
☐ Depute head teacher
☐ Head teacher
☐ College/university lecturer

Other. Please specify _____

9. When approximately did you receive the Information Pack? _____

10. Where did you receive the Information Pack?

☐ In my own school ☐ At a course ☐ Other. Please specify _____

11. In the future greater use may be made of the World Wide Web (WWW) to disseminate the findings of AAP surveys.

	Yes	No
Generally, do you think this would be useful?	☐	☐
Does your school/college/university currently have access to the WWW?	☐	☐
Have you personally accessed the World Wide Web at school/college/university?	☐	☐
Have you personally accessed the World Wide Web elsewhere?	☐	☐

Use this space for any additional comments you wish to make.

Thank you for your help

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