M1. Explanation that implies that 28 must be added to 3836, eg:

- ‘Just add another 28 on’
- ‘Do another 28 on’
- ‘It’s an extra 28’
- ‘3836 + 28’

__Do not__ accept vague or arbitrary reasons, eg:
‘Do the same sum but add 1 to the number’;
‘Do a times sum’;
‘Just another unit on’.
__No mark__ is awarded for giving the answer 3864 without an adequate explanation.

[1]

M2. Award TWO marks for the correct answer of 9913.

If the answer is incorrect award **ONE** mark for evidence of appropriate working which contains no more than **ONE** arithmetical error, eg

- Long multiplication, such as

$$\begin{array}{r} 431 \\ \times\ 23 \\ \hline 1293 \\ 8620 \\ \hline \end{array}$$

wrong answer

In all cases accept follow through of an error in working.

- Short multiplication, such as

$$\begin{array}{r} 431 \\ \times\ 23 \\ \hline \end{array}$$

wrong answer

__Do not__ award any marks if:

- *the error is in the place value, for example the omission of the zero when multiplying by the 2 tens;*
- *the final (answer) line of digits is missing.*

Variations on algorithms are acceptable, provided they represent viable and complete methods.

AND evidence of multiplication taking place, eg the presence of appropriate carrying figures.

- Repeated addition, such as attempts to add 431 twenty-three times.
- Decomposition methods, such as

$$\begin{array}{r} 400 \\ \times 23 \\ \hline 9200 \end{array} \quad \textbf{AND} \quad \begin{array}{r} 31 \\ \times 23 \\ \hline 713 \end{array}$$

AND

$$\begin{array}{r} 9200 \\ \underline{+713} \end{array}$$

wrong answer

- Any combination of methods which are viable and complete, such as 431 + 431, = 862

$$\begin{array}{r} 431 \\ \times 3 \\ \hline 1293 \end{array} \qquad \begin{array}{r} 8620 \\ +\underline{1293} \\ \text{wrong answer} \end{array}$$

***Do not** award any marks if 431 is added the wrong number of times.*

up to 2

[2]

M3. 348

[1]

M4. Award **TWO** marks for a correct answer of 29160

If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, eg

18 × 36 × 45

Calculation need not be performed for the award of the mark.

Up to 2

[2]

M5. Award **TWO** marks for a correct answer of 14204.

If the answer is incorrect, award **ONE** mark for evidence of appropriate working, which contains no more than **ONE** arithmetic error, eg

- Long multiplication, such as

$$\begin{array}{r} 268 \\ \times 53 \\ \hline 804 \\ 13400 \\ \hline \end{array}$$

wrong answer

- Short multiplication, such as

$$\begin{array}{r} 268 \\ \times 53 \\ \hline \text{wrong answer} \end{array}$$

AND evidence of multiplication taking place, eg the presence of appropriate carrying figures.

- Repeated addition such as attempts to add 268 fifty-three times.
- Decomposition methods such as

$$\begin{array}{r} 200 \\ \times\ 53 \\ \hline 10600 \end{array} \quad \textbf{AND} \quad \begin{array}{r} 68 \\ \times\ 53 \\ \hline 3604 \end{array}$$

AND $\begin{array}{r} 10600 \\ +\ 3604 \\ \hline \text{wrong answer} \end{array}$

- Any combination of methods which are viable and complete such as

268 × 3 = 804

268 × 100 = 26800

26800 ÷ = 13400

$$\begin{array}{r} 13400 \\ +\ 804 \\ \hline \text{wrong answer} \end{array}$$

In all cases accept follow through of an error in working.

***Do not** award any marks if:*

- the final answer line of digits is missing;
- any place value error is made.

Variations on standard algorithms are acceptable, provided they represent viable and complete methods.

***Do not** award any marks if 268 is added the wrong number of times.*

up to 2

[2]

M6. 3 **AND** 7 **AND** 11

Accept numbers in any order.

[1]

M7. Award **TWO** marks for the correct answer of 12216

If the answer is incorrect, award **ONE** mark for evidence of appropriate working which contains no more than **ONE** arithmetical error, eg

- conventional algorithms such as:

$$\begin{array}{r} 509 \\ \times\ 24 \\ \hline 2036 \\ 10180 \\ \hline \text{wrong} \\ \text{answer} \end{array}$$

*In all cases accept follow through of **ONE** error in working.*

***Do not** award any marks if:*

- *the error is in the place value, for example the omission of the zero when multiplying by the 2 tens;*
- *the final (answer) line of digits is missing.*

Variations on algorithms are acceptable, provided they represent viable and complete methods.

OR

- decomposition methods, eg
  24 × 500 = 12000
  24 × 9 = 216
  12000 + 216 = wrong answer

*Calculation must be performed for the award of **ONE** mark.*

Up to 2

[2]

M8. 520.608

[1]

M9. 5 and 6 written in the boxes in either order as shown:

$\boxed{\mathbf{5}}\boxed{0} \times \boxed{\mathbf{6}}\boxed{0} = \boxed{3}\boxed{0}\boxed{0}\boxed{0}$

OR

$\boxed{\mathbf{6}}\boxed{0} \times \boxed{\mathbf{5}}\boxed{0} = \boxed{3}\boxed{0}\boxed{0}\boxed{0}$

[1]

M10. $\boxed{7.4}$ and $\boxed{9.4}$

Accept numbers in either order.

Both numbers must be correct for the award of the mark.

U1

[1]

M11. Award **TWO** marks for the correct answer of 5291

If the answer is incorrect, award **ONE** mark for evidence of appropriate working which contains no more than **ONE** arithmetical error, eg

- long multiplication algorithm such as

$$\begin{array}{r} 143 \\ \times\ 37 \\ \hline 1001 \\ 4290 \\ \hline \end{array}$$

wrong answer

• grid method

	100	40	3
30	3000	1200	90
7	700	280	21

= wrong answer

• decomposition methods, eg

143 × 40 = 5720

143 × 3 = 429

5720 – 429 = wrong answer

*In all cases accept follow through of **ONE** error in working.*
***Do not** award any marks if:*
- *the error is in the place value, eg the omission of the zero when multiplying by three tens,*

1001
+ 429

- *the final (answer) line of digits is missing.*

Variations on algorithms are acceptable, provided they represent viable and complete methods.
*Calculation must be performed for the award of **ONE** mark.*

Up to 2

[2]

M12. Award **TWO** marks for the correct answer of 15 680

If the answer is incorrect, award **ONE** mark for evidence of appropriate working which contains no more than **ONE** arithmetical error, eg:

• long multiplication algorithm, eg

560 ×
2811200 4480wr
ong answer

• grid method, eg

	500	60
20	10000	1200
8	4000	480

= wrong answer

• partitioning method, eg

560 × 10 = 5600560 × 10 = 5600560 × 8 = 4480 wrong answer

- factorisation method, eg

560 × 7 = 39203920 × 4 = wrong answer

*In all cases accept follow through of **ONE** error in working.*

***Do not** award any marks if:*

- *the error is in the place value, eg the omission of the zero when multiplying by two tens, eg*

560 × 281120 4480wrong answer

- *the final (answer) line of digits is missing.*

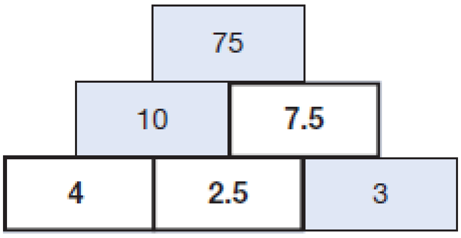
Variations on algorithms are acceptable, provided they represent viable and complete methods.

*Working must be carried through to reach an answer for the award of **ONE** mark.*

Up to 2m

[2]

M13. Gives the three correct numbers in their correct positions, ie:

- 

Accept unambiguous indication

Accept equivalent fractions, eg:

- $7\frac{5}{10}$ *for 7.5*

2

or

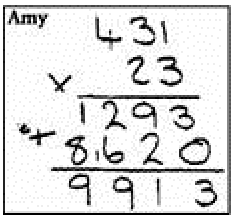
Gives two correct numbers in their correct positions

1

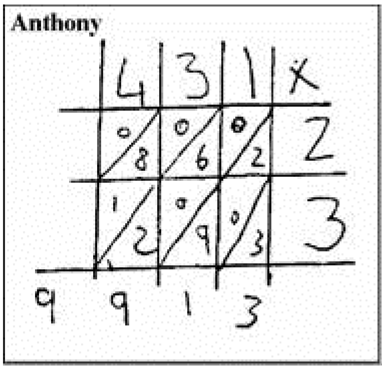
[2]

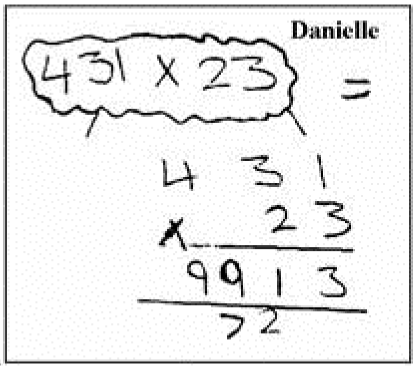
E1. No comment available.

E2. This multiplication question was a straightforward calculation multiplying a 3-digit number by a 2-digit number: Calculate 431 × 23. There can be no direct comparison with previous similar questions, since in the past such questions have been set in context, and usually on test B, where a calculator had been available. This test A question was not well done, except by those children working at or towards level 5. Unsurprisingly, more than a quarter of children attaining level 3 overall did not even attempt this question (although an eighth did in fact get it right). The majority of children set out the numbers in a vertical format, and most of those working at level 4 and above used a standard *long multiplication* algorithm as shown by Amy with varying degrees of success.



Other methods included versions of 'Napier's Bones' as shown by Anthony, and 'short multiplication', as shown by Danielle:





These proved to be successful in many cases.

E3. In the *Standards Report to Schools, key stage 2* for 1997, a weakness was noted in children's ability to handle multiplication using a pencil and paper method, particularly at the lower levels. This question tested multiplication by 6, and revealed different approaches by children, and different success rates, particularly by children who achieved the lower levels overall.

Performance on the question, where essentially children had to multiply £2.20 by 6, was markedly better than on this question (58 × 6) by children who attained level 3 overall, and slightly better for the rest. This difference may be partially accounted for by the size of the digits being multiplied by 6 (2s as compared to 5s and 8s), although question 7 has what may appear to be the added complication of sorting through a context, and taking units into consideration.

Many children achieving level 3 did not even attempt to answer the question, which suggests that they were not confident with multiplication, or did not see that they could use an additive strategy. This may be why children can get relatively simple contextualised multiplication calculations correct, whilst apparently not knowing a multiplication algorithm. These children may not recognise that they have been carrying out a multiplication at all. However, those children who do not know a multiplication algorithm become disadvantaged as the numbers get more complicated.

E4. 37% (5% at level 3, 37% at level 4 and 73% at level 5) answered this question correctly, gaining both of the two marks available. 7% were awarded a single method mark.

This two-mark question assessed problem solving involving multiplication, with one mark being awarded for use of an appropriate method. Those children who answered correctly are assumed to have used an appropriate method. For those who attempted the question but did not answer correctly, very few gained a method mark. The difficulty in this question, therefore, lay in knowing what to do rather than in successfully carrying out the necessary multiplication, using a calculator. The most common incorrect responses resulted from multiplying 2 of the 3 numbers, although some children at all levels gave the answer '2430', which resulted from adding 36 and 18 and multiplying the answer by 45. About one in six children achieving level 3 showed addition in working, revealing their misunderstanding of the question's requirements.

E5. 36% (7% at level 3, 33% at level 4 and 72% at level 5) answered this question correctly gaining both of the two marks available. 12% were awarded a single method mark.

This was a straightforward assessment of long multiplication of a three-digit number by a two-digit number. It very clearly separated children achieving level 5 from others. Almost a third of children achieving level 3 did not attempt it, though this may reflect its lateness in the paper. The most common method was to use the long multiplication algorithm. Some children achieving level 4 and more at level 3 attempted short multiplication.

E6. This question combines children's understanding of *prime numbers* and their ability to use a problem solving strategy to answer the question. This question assesses children's ability to solve number problems using a calculator.

Sixty-five per cent of children at level 5 answered correctly, as did 20% of those at level 4 and nearly 5% of children at level 3. The question had the highest omission rates on the test. Nearly 10% of children at level 5, one-third at level 4, and more than half at level 3 did not offer an answer.

Incorrect responses were varied, with no common trends.

It is impossible to say how many children used a calculator on this question, but at all levels some children showed working notes that indicated they did not use a calculator.

E7. For this question, children are required to multiply a three-digit integer by a two-digit integer. Children are asked to record their working.

Eighty per cent of children at level 5 gave a correct answer for two marks; about half of those at level 4 were also correct. The question was difficult for children at level 3, though all made an attempt only 5% gave a correct answer.

Children could gain one mark if they recorded a correct method and made no more than one error, this error being computational and not a place value error. In fact, many errors were of a place value nature, hence an award of one mark was not particularly common. A typical error was the failure to recognise that when multiplying by the two in 24 the multiplication is by 20 and not by two.

Over 40% of children at level 3 attempted to use the traditional vertical multiplication method. The method was also used by 55% of children at level 4, and nearly 70% of children at level 5. Grid methods were used by about 10% of children overall, and were most popular with those at level 5. Informal methods based on partitioning were used by more than 10%, mostly among children at level 4. Other informal methods were seen most often from children at level 3, where they were used by 15%.

The normal answer box was missing from this question, but this appeared to cause children few problems. The intended answers from children at level 3 were ambiguous in only 7% of cases; there were no ambiguous final answers at level 5.

Two marks awarded for fully correct answer

E8. This question, targeted at level 5, is designed to assess children's knowledge of the order of operations. They have to select the correct key sequence on a calculator for a calculation with more than one operation.

Ninety per cent of children at level 5 were successful, as were 70% of children at level 4 and one-third of those at level 3. Nearly 10% of children at level 3 failed to give an answer. Few children rounded their answer, which would have been accepted for the award of the mark.

The most common error was 110.058; this was made by over 15% of children at level 4 and over 40% of those at level 3. This suggests that these children did not adjust the order of the operations to take account of the brackets in their calculation.

E9. This question assesses children's ability to solve a problem involving multiplying multiples of ten to achieve the product 3000. Children are required to find the missing digits to complete the multiplication.

Over 80% of children at level 5 answered correctly, as did about 40% of children at level 4 and about 10% of those at level 3. Over 10% of children at both levels 3 and 4 omitted this question.

A common error at both level 3 and level 4 was to use the digits 1 and 3 in either order, suggesting that children failed to appreciate place value in their product. Another error made by about 20% of children at level 3 and nearly 10% at level 4 was to use the digit 3 in each empty box.

E10. Target Level: 5

This question assesses pupils' ability to use and apply their mathematics to reason about solving a number problem. Pupils are required to identify the two numbers from a given selection, including decimals, which have the product closest to 70.

Performance

- Nearly 70% of pupils working at level 5 identified both numbers for the award of the mark. Almost 35% of pupils working at level 4 and over 10% of those working at level 3 were also correct.

Common errors and misconceptions

- More than one-quarter of pupils working at level 5 chose 7.4 and 10 as their answers. Almost 40% of pupils working at level 4 and over 45% of those working at level 3 also made this error. These pupils were familiar with multiplying by 10 and probably assumed that 74 was close enough to 70.

Methods

- Nearly 30% of pupils working at level 5 and almost 20% of those working at level 4 recorded evidence of carrying out at least two trials.

- Of those pupils working at level 5 who recorded evidence of a trialling method, about 80% were successful.

E11. Target Level: 5

Curriculum Coverage (POS ref: Ma2/3j)

This question assesses pupils' ability to multiply a three-digit number by a two-digit number. Pupils are asked to show their working.

Performance

- More than 70% of pupils working at level 5 gave the correct answer and were awarded two marks. Almost 35% of pupils working at level 4 and over 5% of those working at level 3 were also correct for the award of two marks.

- Over 15% of pupils working at level 5 gained one mark for recording a correct method. Twenty per cent of pupils working at level 4 and more than 5% of those working at level 3 were also awarded one mark for their method.

Common errors and misconceptions

- Incorrect responses were varied with no common trends.

- Almost 10% of pupils working at level 5 gave an answer which was a 4-digit number with just one of the digits incorrect. This suggests that these pupils used a correct method but made an error in their final addition.

Methods

- The most common methods seen were the grid method and other partitioning methods. These were used by two-thirds of pupils working at level 5 and more than half of pupils working at level 4.

- Around one-quarter of pupils working at the higher levels used a long multiplication method, as did one-fifth of pupils working at level 3.

- Pupils working at level 5 who used either the grid method or a long multiplication method were equally successful, with about 70% of those who used either method reaching the correct answer. Pupils working at level 4 used the grid method more successfully than long multiplication.