Q1. Prove that $0.4\dot{7}\dot{3}$ can be written as the fraction $\frac{469}{990}$

(Total 2 marks)

Q2. Change the recurring decimal $0.\dot{2}\dot{3}$ to a fraction.

....

(Total 2 marks)

Q3. Prove that the recurring decimal $0.\dot{1}\dot{7} = \frac{17}{99}$.

(Total 2 marks)

Q4. The value of a car depreciates by 35% each year.

At the end of 2007 the value of the car was £5460

Work out the value of the car at the end of 2006

£ ....

(Total 3 marks)

Q5. Express the recurring decimal $0.2\dot{1}\dot{3}$ as a fraction.

....

(Total 3 marks)

Q6. Work out $\dfrac{4.6+3.85}{3.2^2-6.51}$

Write down all the numbers on your calculator display.

....

(Total 2 marks)

Q7. Julie buys 19 identical calculators.
The total cost is £143.64

Work out the total cost of 31 of these calculators.

£ ....

(Total 3 marks)

M1.

Working	Answer	Mark	Additional Guidance
$100x = 47.3737\ldots$ $x = 0.4737\ldots$ $99x = 46.9$ $x = 46.9/99$	proof	2	**M1** for valid method eg $100x = 47.37373$, $1x = 0.4737\ldots$ and subtract **OR** $1000x = 473.7373$, $10x = 4.737\ldots$ and subtract **A1** for valid argument leading to $\frac{469}{990}$
			Total for Question: 2 marks

M2.

Working	Answer	Mark	Additional Guidance
$100 \times 0.\dot{2}\dot{3} = 23.\dot{2}\dot{3}$ $99 \times 0.\dot{2}\dot{3} = 23$	23 99	2	**M1** for100 × $0.\dot{2}\dot{3}$ or 10000 × $0.\dot{2}\dot{3}$ ... **A1** for $\frac{23}{99}$ oe
			Total for Question: 2 marks

M3.

Working	Answer	Mark	Additional Guidance
$x = 0.1717...$ $100x = 17.1717...$ $99x = 17$ $x = \frac{17}{99}$ or $1000x = 171.7171…$ $10x = 1.7171…$ $990x = 170$ $x = 17/99$	Proof	2	**M1** for valid method eg $100x = 17.17…$, $1x = 0.1717…$ and subtract **OR** $1000x = 171.7171..$, $10x = 1.7171…$ and subtract **A1** for valid argument leading to $x = \frac{17}{99}$ **Alternative method** for long division **M1** for identifying 71 and 17 as remainders **A1** for correct statement
			Total for Question: 2 marks

M4.

Working	Answer	Mark	Additional Guidance
65% of orig value = £5460 1% of orig value = $\frac{£5460}{65}$ Orig value = $\frac{£5460}{65} \times 100$	£8400	3	**M1** 65% (of orig value) = £5460 **or** (100% – 35%) × orig price = 5460 **or** 0.65 **or** 65% seen **M1** $\frac{£5460}{65} \times 100$ **or** $\frac{5460}{0.65}$ **A1** £8400
			Total for Question: 3 marks

M5.

Working	Answer	Mark	Additional Guidance
x = 0.213131313… 10x = 2.13131313… 1000x = 213.131313… 990x = 211	$\frac{211}{990}$	3	**M1** for 0.2131313…. or 0.2 + 0.0131313…. (dots MUST be included) **M1** for two correct recurring decimals that, when subtracted, leave a terminating decimal **A1** for $\frac{211}{990}$
			Total for Question: 3 marks

M6.

Working	Answer	Mark	Additional Guidance
4.6 + 3.85 = 8.45 $3.2^2 - 6.51 = 3.73$ 8.45 3.73 =	2.26541555	2	**M1** for $\frac{169}{20}$ or $\frac{256}{25}$ or $\frac{373}{100}$ or 3.73 or 10.24 **or** 8.45 seen **A1** for 2.265(41555); accept $\frac{845}{373}$
			Total for Question: 2 marks

M7.

Working	Answer	Mark	Additional Guidance

143.64 ÷ 19 = 7.56 7.56 × 31 =	234.36	3	**M1** for 143.64 ÷ 19 (or 7.56 seen) or 143.64 × 31 (or 4452.84 seen) **M1**(dep) for '7.56' × 31 or '4452.84' ÷ 19 or 143.64 + 12 × '7.56' **A1** for 234.36 cao accept 234.36p **Alternative method:** **M1** for (or 1.63(1…) seen) **M1** (dep) '1.63…' × 143.64 **A1** for 234.36 cao accept 234.36p
			Total for Question: 3 marks

E1. The majority of candidates divided 469 by 990 on their calculator and cited this as sufficient justification in this question. However, there were some excellent clear and concise proofs from more able candidates. Many candidates had remembered some aspects of the technique required in this proof but failed to put an accurate, complete and convincing argument together.

E2. Candidates who answered this question fell into two categories they could either write down the answer with or without working, showing a well practised response, or the most common wrong answer of 23/100 was written without any working at all. About a quarter of all solutions were correct and about half of the solutions fell into the 23 out of a hundred category.

E3. Just over a quarter of candidates were able to give a full, clear and correct proof to gain both marks. This needed to include multiplying by an appropriate power or appropriate powers of 10 and subtracting, and then linking this with 17/99. Many candidates gave answers suggesting they had remembered some elements of the necessary proof but not enough to convince examiners to give them any credit.

Many candidates tried to “fudge” their proof or simply stated that when 17 is divided by 99 using a calculator the required recurring decimal is given. Long division was carried out by a small number of candidates. Where this method was employed it was often possible to award one mark where enough remainders were clearly shown, but candidates rarely tried to explain why the decimal would recur.

E4. This was generally poorly done with the correct answer given by only 13% of candidates. Most methods involved adding or subtracting 35% of £5460. Some candidates showed 65% or 0.65 but then went on to use it incorrectly.

E5. Many candidates did not fully understand the recurring decimal notation. 0.213213…was often seen, clearly leading to an incorrect answer irrespective of method. It must be noted that sight of 0.21313 without any indication that this decimal continued to recur (dots) also gained no credit unless the understanding was confirmed by the sight of two decimals whose difference was a terminating decimal.
1000 × 0.21313…. – 10 × 0.21313…. followed by incorrect arithmetic giving an answer of 211/999 was a typical error by more able candidates.

E6. **Specification A**

The majority of candidates gained full marks here. A common error was to type the whole problem into their calculator without the use of brackets, reaching an answer of –1.534023. The most successful solutions were when the candidates worked in stages calculating the numerator and denominator separately, not only does this approach avoid the former error but it also gives the opportunity to gain method marks. Another area of concern was the rounding/truncating of values, either in the answer or at various stages.

Specification B

The majority of the candidates were successful on this question, either by using a sophisticated calculator which allows direct entry of expressions of this sort, or by initially working out the numerator and denominator separately first. A few candidates had a calculator display in fraction form which they gave as their answer. This was allowable as the question did not specify which form, fraction or decimal, the answer had to be in.

E7. Specification A

This was generally answered correctly, with most candidates using two steps, first dividing by 19 and then multiplying by 31. Sometimes candidates resorted to an unnecessarily complicated method no doubt taught for situations when calculators are prohibited, e.g. find the cost of one, then 20, then thirty, and then add 1 more. Finding the cost of 1, then 12, then adding on was also quite popular.

Unfortunately the more steps that were involved the more mistakes and rounding errors that appeared. However by far the greatest source of mark loss in this question, was in misreads and transcription errors, 13 used instead of 31 being the most common.

Specification B

A well answered question with the vast majority of candidates who were very comfortable using the unitary method. A few unorthodox approaches were also seen involving the idea of 19 + 12 or 38 – 7. A few candidates when for halving, presumably under the misapprehension that 19 + 8 + 4 gives 31 – which it does, but 8 is not half of 19. They got no marks.