

**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  $0.2\dot{3}$  to a fraction.

.....

(Total 2 marks)

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

(Total 2 marks)

Q4. A company sends every item of mail by second class post.  
Each item of mail is either a letter or a packet.

The tables show information about the cost of sending a letter by second class post and the cost of sending a packet by second class post.

**Letter**

Weight range	Second Class
0–100g	32p

**Packet**

Weight range	Second Class
0–100g	£1.17
101–250g	£1.51
251–500g	£1.95
501–750g	£2.36
751–1000g	£2.84

The company sent 420 items by second class post.  
The ratio of the number of letters sent to the number of packets sent was 5 : 2.

$\frac{2}{3}$  of the packets sent were in the weight range 0 – 100 g.

The other packets sent were in the weight range 101 – 250 g.

Work out the total cost of sending the 420 items by second class post.

£ .....

(Total 5 marks)

- Q5.** The table shows the costs, per person, of a holiday at two different hotels. It shows the cost for 5 nights and the cost for each extra night. It also shows the discount for each child.

Date holiday starts	Park Palace		Dubai Grand	
	5 nights	extra night	5 nights	extra night
01 Jan – 31 Mar	£1169	£150	£849	£86
01 Apr – 09 Apr	£1229	£150	£1219	£95
10 Apr – 15 Jul	£810	£80	£853	£53
16 Jul – 20 Aug	£810	£80	£854	£53
21 Aug – 10 Dec	£810	£80	£869	£94
Discount for each child	$\frac{1}{5}$ off		15% off	

There are two adults and two children in the Smith family.  
The family want a holiday for 7 nights, starting on 1st August.

One hotel will be cheaper for them than the other hotel.

Work out the cost of the cheaper holiday.  
You must show all your working.

£ .....

(Total 6 marks)

Q6. 
$$\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$$

$$u = 2\frac{1}{2}, v = 3\frac{1}{3}$$

(a) Find the value of  $f$ .

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(3)

(b) Rearrange  $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$

to make  $u$  the subject of the formula.

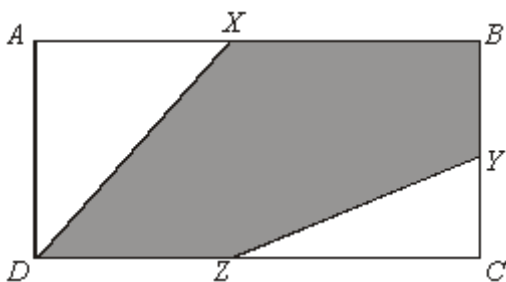
Give your answer in its simplest form.

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(2)  
(Total 5 marks)

Q7.

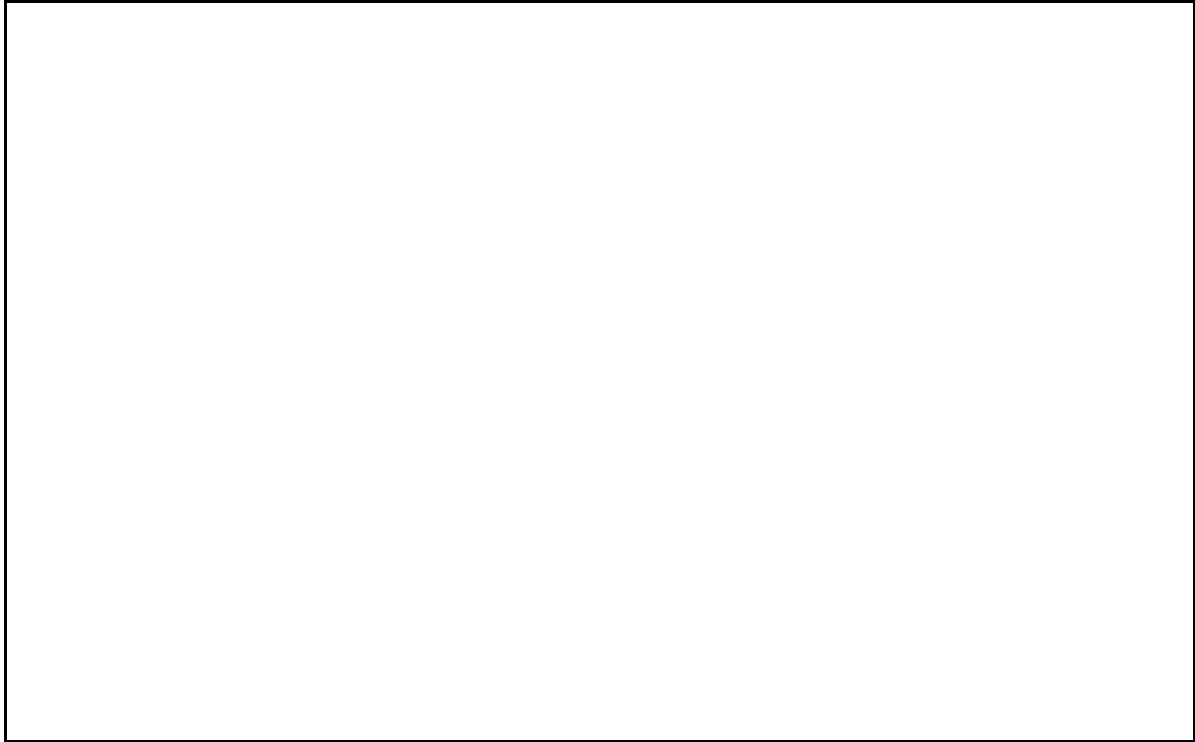
Diagram **NOT**  
accurately drawn



$ABCD$  is a rectangle.  
 $X$  is the midpoint of  $AB$ .  
 $Y$  is the midpoint of  $BC$ .  
 $Z$  is the midpoint of  $CD$ .

What fraction of the total area of  $ABCD$  is shaded?

Show clearly how you get your answer.



.....

**(Total 4 marks)**



M1.

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

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	<b>M1</b> for $100 \times 0.\dot{2}\dot{3}$ or $10000 \times 0.\dot{2}\dot{3} \dots$ $\begin{array}{r} 23 \\ \hline 99 \end{array}$ <b>A1</b> for $\frac{23}{99}$ oe
<b>Total for Question: 2 marks</b>			

M3.

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

**M4.**

Working	Answer	Mark	Additional Guidance
$420 \div 7 = 60$ $5 \times 60 = 300$ $2 \times 60 = 120$  $120 \div 3 \times 2 = 80$  $0.32 \times 300 + 1.17 \times 80 + 1.51 \times 40$ $96 \times 93.60 + 60.40$	250	5	<b>M1</b> for $420 \div (5 + 2)$ or 60 seen <b>M1</b> (dep) for $5 \times '60'$ or $2 \times '60'$ or 300 or 120 seen <b>M1</b> for $'120' \div 3 \times 2$ oe <b>M1</b> for $32p \times '300' + \text{£}1.17 \times '80' + \text{£}1.51 \times '40'$ <b>A1</b> for 250.00 or 250  SC B1 for £539
			<b>Total for Question: 5 marks</b>

M5.

Working	Answer	Mark	Additional Guidance
<p><b>Park Palace:</b></p> $810 + 80 + 80 = \text{£}970$ per adult $1/5$ of 970 = 194 $970 - 194 = \text{£}776$ per child $970 + 970 + 776 + 776 = \text{£}3492$ <p><b>Dubai Grand:</b></p> $854 + 53 + 53 = \text{£}960$ per adult $10\% + 5\%$ of 960 = 96 + 48 = 144 $960 - 144 = \text{£}816$ per child $960 + 960 + 816 + 816 = \text{£}3552$	Park Palace £3492	6	<p><b>M1</b> for identifying correct week for holiday (eg use of 854 for DG, eg circle correct row)</p> <p><b>M1</b> for using 7 nights for at least one hotel</p> <p><b>M2</b> for complete correct method for <b>reduction</b> of <math>1/5</math> <b>and</b> 15% for at least 5 nights (<b>M1</b> for correct method to get <math>1/5</math> or 15% or <math>4/5</math> or 85% of a total for at least 5 nights)</p> <p><b>A1</b> for one correct total (3492 or 3552)</p> <p><b>A1</b> for 34 92 and 3552, with Park Palace (or 3492) indicated as the best choice.</p>
			<b>Total for Question: 6 marks</b>

M6.

	Working	Answer	Mark	Additional Guidance
(a)	$\frac{1}{2\frac{1}{2}} + \frac{1}{3\frac{1}{3}} = \frac{1}{f}$ $\frac{2}{5} + \frac{3}{10} = \frac{1}{f}$ $\frac{7}{10} = \frac{1}{f}$	$\frac{10}{7}$	3	$\frac{1}{2\frac{1}{2}} + \frac{1}{3\frac{1}{3}} = \frac{1}{f}$ <p><b>M1</b></p> <p><b>M1</b> correct addition of the fractions to get <math>\frac{7}{10}</math> oe</p> <p><b>A1</b> for <math>\frac{10}{7}</math> oe</p>

(b)	$\frac{1}{u} = \frac{1}{f} - \frac{1}{v}$ $\frac{1}{u} = \frac{v-f}{fv}$	$u = \frac{fv}{v-f}$	2	<p><b>M1</b> <math>\frac{1}{u} = \frac{v-f}{fv}</math> oe or <math>vf + uf = uv</math> oe or <math>\frac{1}{u} = \frac{f-v}{fv}</math></p> <p>or <math>u = \frac{1}{\frac{v-f}{fv}}</math> or <math>u = \frac{1}{\frac{1}{f} - \frac{1}{v}}</math></p> <p><b>A1</b> <math>u = \frac{fv}{v-f}</math> or <math>u = \frac{-fv}{f-v}</math></p>
<b>Total for Question: 5 marks</b>				

M7.

Working	Answer	Mark	Additional Guidance
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Let  $AB = x$ ,  $AD = y$

Area of rectangle =  $xy$

4 **M1** a full method to find the unshaded area and subtracting from 1

**B1** area of  $AXD = \text{area of } ABCD \div 4$

**B1** area of  $CYZ = \text{area of } ABCD \div 8$

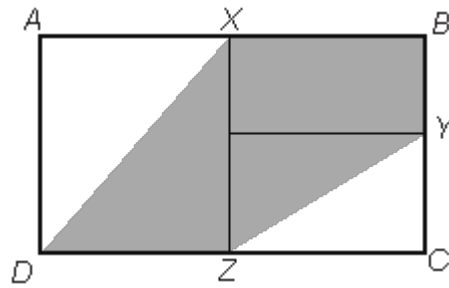
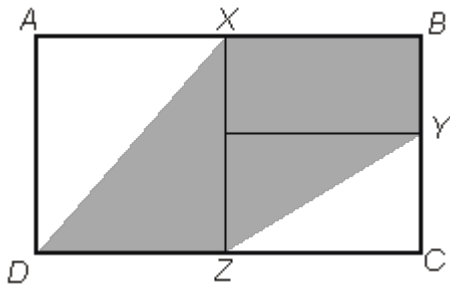
**A1** cao

**OR**

**Diagram**

**M1** for dividing left into 2 congruent triangles  
for dividing right into 4 congruent triangles

Total for Question: 4 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.

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Thirty per cent of candidates were awarded full marks for their response to this question. Unfortunately, a surprising number of candidates did not take into account the ratio of the number of letters to the number of packets thereby simplifying the question. These candidates

could be given little credit for their attempts as they restricted their working to finding a simple fraction of a quantity followed by the calculation of a simple bill. Candidates who did realise the significance of the ratio often failed to show their working in a coherent way. This may have inhibited their ability to think through the processes involved and execute them accurately in the correct logical sequence.

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Nearly all candidates were able to access this question by scoring at least one mark. However, the element of functionality proved very difficult for many candidates with very few fully correct answers seen with just under 10% scoring all 6 marks and just over 7% scoring 5 marks. Although many had a basic idea of what to do, there were too many variables that caused them problems. Centres need to be aware that they need to be developing these skills. The vast majority of candidates scored 2 or 3 marks, generally for selecting the correct week, demonstrating they had calculated for 7 nights and either finding 20% discount for Park Palace or 15% discount for Dubai Grand.

Unfortunately there were many poorly presented solutions with scribbles all over the two pages including in the margins. This sometimes made it difficult for examiners to award marks.

Some confusion was caused by the wording "discount for each child". It was quite common to see  $2/5$  or 30% calculated – doubling the discount as there were 2 children. Many struggled with the arithmetic with many candidates unable to divide by 5 or add or subtract correctly. Others thought one fifth was 25% or 5%. Where candidates did find the discount, many then failed to subtract this discount from their adult total. Errors also occurred when trying to work out the cost of 2 adults with  $810 \times 2 + 80 \times 2$  (instead of 4) frequently seen.

- E6.** Many candidates gained one mark in part (a) for a correct substitution but very few were able to progress any further. Most went on to add  $2\frac{1}{2}$  to  $3\frac{1}{3}$  and then gave either  $5\frac{5}{6}$  or the reciprocal of it as the final answer. Some candidates attempted to use a common denominator of  $2\frac{1}{2} \times 3\frac{1}{3}$  but frequently made errors in their calculations. A small number of candidates converted the fractions to  $\frac{4}{10}$  and  $\frac{3}{10}$  respectively and obtained  $\frac{7}{10}$  easily but some then forgot to invert.

Many candidates showed considerable working which was often poorly set out and difficult to follow. Only the very best candidates were successful in part (b). Most were unable to manipulate the terms correctly. Some simply inverted everything and  $u + v = f$  became  $u = f - v$ . Others attempted to clear the fractions but forgot to multiply all the terms by  $f$  (or  $v$  or  $u$ ). Those who managed to get to  $1/u = 1/f - 1/v$  sometimes went on to gain one mark for  $u = 1/(1/f - 1/v)$ .



