

A/A* - Recurring decimals



www.bit.do/AgradeRecurringDecimals

Question	Maximum Mark	Mark Awarded
1	3	
2	4	
3	6	
4	5	
5	7	
Total Mark		



1.

Complete the following table.
The fraction must be expressed in its simplest form.

[3]

Fraction	Decimal	Is this a recurring or terminating decimal?
$\frac{2}{3}$	0. $\dot{6}$	recurring
.....	0.15
$\frac{7}{11}$

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2.

Complete the following table.

Fraction	Decimal	Recurring decimal? Yes or No	Terminating decimal? Yes or No
$\frac{2}{5}$			
$\frac{5}{8}$			
$\frac{7}{9}$			
$\frac{2}{11}$			

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[4]

3.

(a) Express $0.\dot{7}4$ as a fraction. [2]

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(b) Simplify $(\sqrt{18} + \sqrt{2})^2$. [2]

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(c) Evaluate $25^{-\frac{3}{2}}$. [2]

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4.

(a) Express $0.\overline{346}$ as a fraction.

[2]

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(b) Simplify $(7 - 5\sqrt{2})^2$ and state whether your answer is rational or irrational.

[3]

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5.

(a) Evaluate $\frac{1}{3} + 0.0\dot{4}$, expressing your answer as a fraction.

[3]

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(b) Evaluate $16^{-\frac{1}{2}}$.

[2]

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(c) Simplify $(3 - \sqrt{5})^2$.

[2]

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Marking Scheme

1.

15(a) All 4 correct entries				
Fraction	Decimal	Recurring or terminating?		
3/20		Terminating		
	0.6363(63...)	Recurring		
			B1	3/20. Do not accept 15/100
			B1	0.6363... Do not accept 0.63 unless 0.6363 seen in working
			B1	Terminating and recurring in the correct cells. CAO
			3	

2.

5.				B4	All correct
Fraction	Decimal	Recurring	Terminating		B3 any 3 rows correct or all 4 decimals correct
2/5	0.4	No	Yes		B2 any 2 rows correct or 3 decimals correct
5/8	0.625	No	Yes		B1 any 1 row correct or 2 decimals correct
7/9	0.77(777...) or 0.78	Yes	No		
2/11	0.18(18...)	Yes	No		
				4	Accept unambiguous intention for Yes/No columns Accept if candidate indicates yes without giving the corresponding no, unless there is a contradiction, and vice versa

3.

Unit 2 GCSE Maths June 2015 Higher Tier	T I C K	M A R K	Comment
12. (a) $x = 0.74444\dots$ $10x = 7.4444\dots$ with an attempt to subtract $67/90$ or equivalent e.g. $737/990$		M1 A1	Or $10x$ and $100x$, or equivalent. Or an alternative method. An answer of $6.7/9$ gains M1 only. Mark final answer. Do not ignore incorrect cancelling.
(b) $18 + \sqrt{36} + \sqrt{36} + 2$ or $\sqrt{324} + \sqrt{36} + \sqrt{36} + \sqrt{4}$ or equivalent = 32		M1 A1	3 of the 4 terms correct. $\sqrt{18}\sqrt{2}$ is insufficient for $\sqrt{36}$. Do not ignore subsequent working <i>Alternative method:</i> $(3\sqrt{2} + \sqrt{2})^2$ M1 = 32 A1
(c) $1/125$ or 0.008 or equivalent		B2	B1 for 125^{-1} or $1/5^3$ or $(1/5)^3$ or $1/\sqrt{15625}$ or $1/15625^{1/2}$ or $(1/15625)^{1/2}$

4.

2015 Summer Linear Paper 1 Higher Tier		Comments
17(a) Attempt to subtract $10x = 3.4646\dots$ from $1000x = 346.46\dots$ or alternative method $343/990$	M1 A1	Or equivalent for $100x = 34.646\dots$ and $x = 0.34646\dots$ Final answer of $34.3/99$ M1 only
17(b) $49 - 35\sqrt{2} - 35\sqrt{2} + 50$ $= 99 - 70\sqrt{2}$ Irrational	B1 B1 E1	FT correctly simplified (equivalent level of difficulty) provided at least 3 of the terms are correct OR $49 \pm a\sqrt{2} + 50$ with $a \neq 0$ Depends on 'their answer' including a surd and at least B1 previously awarded

5.

<p>(a) $x = 0.04444\dots$ $10x = 0.4444\dots$ <u>with</u> an attempt to subtract $(\frac{1}{3} +) \frac{4}{90}$ OR $(\frac{1}{3} +) \frac{2}{45}$ $34/90 (= 17/45)$</p>	<p>M1 A1 A1</p>	<p>Or $10x$ and $100x$, or equivalent. Or an alternative method. An answer of $0.4/9$ gains M1 only. FT 'their $4/90$' provided equivalent difficulty. Mark final answer. Do not ignore incorrect cancelling. <i>Alternative solution</i> $x = 0.37777\dots$ B1 $10x = 3.7777\dots$ <u>with</u> an attempt to subtract M1 $x = 34 / 90 (= 17/45)$ A1</p> <p>If no marks awarded, SC1 for a final answer of $34/99$ (resulting from using $0.343434\dots$) OR SC1 for a final answer of $37/99$ (resulting from using $0.373737\dots$)</p>
<p>(b) $1/4$ or 0.25</p>	<p>B2</p>	<p>B1 for 4^{-1} or $1/\sqrt{16}$ or $1/16^{1/2}$ or $(1/16)^{1/2}$ Allow $\pm 1/4$ or ± 0.25 for B2 OR $-1/4$ or -0.25 for B1</p>
<p>(c) $9 - 3\sqrt{5} - 3\sqrt{5} + 5$ $14 - 6\sqrt{5}$</p>	<p>M1 A1 7</p>	<p>3 or 4 terms correct. Mark final answer.</p>

Examiner's Comments

1. 3/5 instead of 3/20

15/100 seen a few times

0.77 instead of 0.6363

Very disappointing.

Quite a few awarded B1 for correctly putting terminating and recurring in the correct cells

This comment originally referred to question 15 on paper 4363/01 (01/10/2014)

2. Q5 A number of candidates incorrectly believe that $\frac{2}{5}$ is equivalent to 0.2 rather than 0.4.

A number of candidates have weak skills in division of numbers, on occasions candidates incorrectly decided to divide the denominator by the numerator

This comment originally referred to question 5 on paper 4363/02 (06/11/2013)

3. (a) This was usually well done, though there were some place value errors made in multiplying the decimal by a power of ten. A few candidates chose to split the given decimal into 0.7 and 0.0444..., aiming to add the two resulting fractions, though few were able to complete this process correctly.
(b) Many candidates attempted to expand the brackets, usually producing four terms appropriately. However, manipulating the surds was troublesome in many cases, with candidates often failing to simplify $\sqrt{18}\sqrt{2}$ correctly.
(c) Only a few gained full credit here. Many were unable to deal with the negative fractional index, and 25 was a common wrong answer.

This comment originally referred to question 12 on paper 4352/02 (04/06/2015)

4. Part (a) was well answered by candidates with knowledge of techniques. Other candidates seemed to lack knowledge of recurring decimals.

Part (b) was not well answered; many candidates had little knowledge of surds.

This comment originally referred to question 17 on paper 4370/05 (21/05/2015)

5. (a) The usual approach here was to start by expressing $0.044444\dots$ as a fraction, and this was generally well done, though there were some place value errors in multiplying the recurring decimal by a power of 10. Many candidates, however, did not then deal successfully with the need to add $\frac{1}{3}$.

Alternatively, some used the approach of starting by adding the two quantities. The ablest of these candidates correctly produced $0.377777\dots$ and went on to convert this into a fraction as required. Unfortunately, others initially added the quantities to give $0.343434\dots$ or $0.373737\dots$

- (b) Most candidates attempted to expand the brackets here, though manipulating the surds was not always correctly undertaken, e.g. $(\sqrt{5}) \times 3$ was sometimes given as $\sqrt{15}$. Dealing with minus signs caused some difficulty. Some only gave two terms as their 'expansion', namely 9 and 5.
- (c) Many candidates recognised that the negative index meant taking a reciprocal, though it was disappointingly common to see that the index of $\frac{1}{2}$ was often used to multiply by 16 rather than taking the square root, with 8, - 8, $\frac{1}{8}$ or $-\frac{1}{8}$ being very common wrong answers.

This comment originally referred to question 14 on paper 4352/02 (09/06/2016)