AQA

General Certificate of Education
Advanced Subsidiary Examination
June 2013

Use of Mathematics   **UOM4/1**

Applying Mathematics Paper 1

Friday 24 May 2013   9.00 am to 10.00 am

For this paper you must have:
* a clean copy of the Data Sheet (enclosed)
* a graphics calculator
* a ruler.

Time allowed
* 1 hour

Instructions
* Use black ink or black ball-point pen. Pencil should only be used for drawing.
* Fill in the boxes at the top of this page.
* Answer **all** questions.
* Write the question part reference (eg (a), (b)(i) etc) in the left-hand margin.
* You must answer each question in the space provided for that question. If you require extra space, use an AQA supplementary answer book; do **not** use the space provided for a different question.
* Do not write outside the box around each page.
* Show all necessary working; otherwise marks for method may be lost.
* Do all rough work in this book. Cross through any work that you do not want to be marked.
* The **final** answer to questions requiring the use of tables or calculators should normally be given to three significant figures.
* You may **not** refer to the copy of the Data Sheet that was available prior to this examination. A clean copy is enclosed for your use.

Information
* The marks for questions are shown in brackets.
* The maximum mark for this paper is 30.

Advice
* You do not necessarily need to use all the space provided.

Answer **all** questions.

Answer each question in the space provided for that question.

Use **Where does the money go?** *on the Data Sheet.*

1 (a) (i) How much income tax does someone pay in 2011–2012 if they earn a salary of £42 475 and have a standard personal allowance? *(1 mark)*

(ii) What proportion of their salary does this person pay in income tax? *(2 marks)*

(b) What is meant by a 'progressive income tax system'? *(1 mark)*

QUESTION PART REFERENCE	**Answer space for question 1**
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QUESTION PART REFERENCE	Answer space for question 1

Answer space for question 1

Turn over ▶

2 (a) For someone with the standard personal allowance and earning a salary, $£S$, between £7475 and £42 475, their take-home pay, $£I$, in 2011–2012 was given by $I = 7475 + 0.8(S - 7475)$. Explain the significance of the factor 0.8. *(2 marks)*

(b) Calculate the take-home pay of someone with the standard personal allowance of £7475 and a salary of £80 000 in 2011–2012. Show all your working. *(2 marks)*

(c) Find the salary of someone in 2011–2012 with a take-home pay of £40 000. Give your answer to the nearest pound. *(2 marks)*

QUESTION PART REFERENCE

Answer space for question 2

QUESTION PART REFERENCE	Answer space for question 2

Turn over ▶

3   In 2011–2012, people who earned over £100 000 had their personal tax allowance reduced by £1 for every £2 they earned over this amount. For someone initially entitled to the standard personal allowance, their allowance, £T, varies with their salary, £S, according to
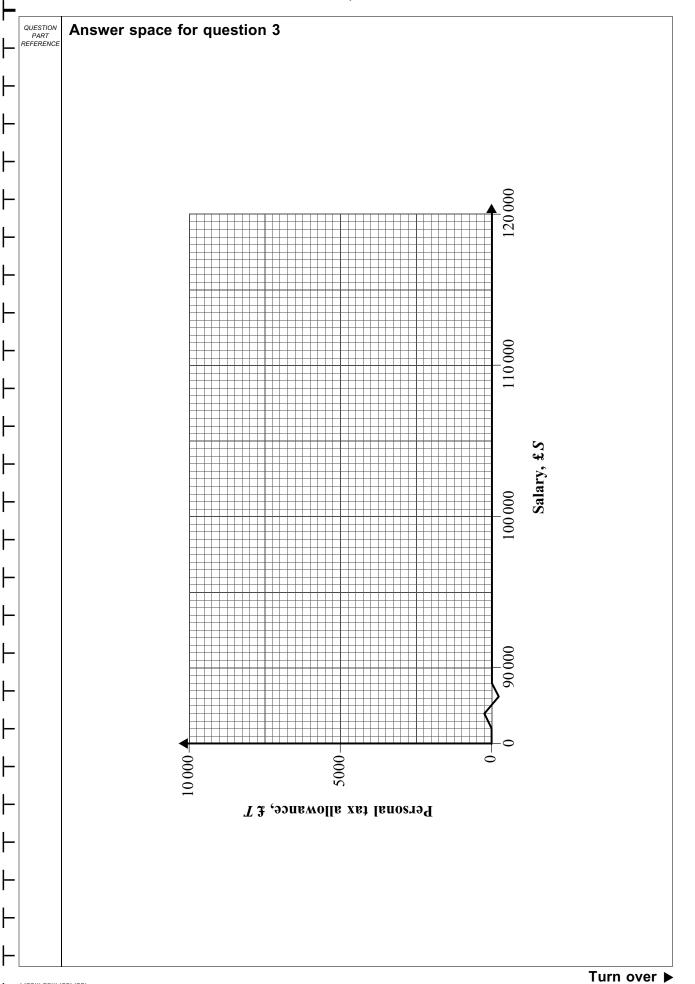
$$T = 7475 \qquad\qquad (S \leqslant 100\,000)$$

$$T = 57\,475 - \frac{S}{2} \qquad (100\,000 \leqslant S \leqslant 114\,950)$$

$$T = 0 \qquad\qquad (S \geqslant 114\,950)$$

On the grid opposite, sketch a graph of T against S for $90\,000 \leqslant S \leqslant 120\,000$. Show all significant features.

(3 marks)

QUESTION PART REFERENCE	**Answer space for question 3**

Answer space for question 3

Salary, £ *S*

Personal tax allowance, £ *T*

10 000

5000

0

0

90 000

100 000

110 000

120 000

Turn over ▶

4   For someone earning more than £150 000 in 2011–2012, find an equation for their take-home pay, £I, in the form $I = a + bS$, where £S is their salary and a and b are constants that you should find.

(4 marks)

QUESTION PART REFERENCE	Answer space for question 4

QUESTION PART REFERENCE	Answer space for question 4

Answer space for question 4

Turn over ▶

5　Consider a year in which the standard personal tax allowance is £10 000, the basic rate of tax is 25% on salaries up to £50 000 above this personal allowance and the higher rate of tax is 45% on salaries above this, up to £100 000. Use the appropriate formula from **Table 3** on the Data Sheet to find the take-home pay of someone with a salary of £80 000.

(5 marks)

QUESTION PART REFERENCE	Answer space for question 5

QUESTION PART REFERENCE	**Answer space for question 5**

Turn over ▶

6 (a) Write down the formula that gives the take-home pay, $£I$, in terms of salary, $£S$, for the non-progressive income tax model considered on the Data Sheet where everyone pays income tax at 25%. *(1 mark)*

(b) In 2011–2012, Tom had a salary below £100 000 but paid the higher rate tax on some of his salary. He had the standard personal allowance.

Calculate Tom's salary, $£S$, if his take-home pay would be exactly the same whether he paid tax using the 'progressive income tax system' or with the non-progressive income tax model considered on the Data Sheet. *(4 marks)*

QUESTION PART REFERENCE	**Answer space for question 6**

QUESTION PART REFERENCE	Answer space for question 6

Answer space for question 6

Turn over ▶

7   The graph of $I = 350\sqrt{(S + 20\,000)} - 50\,000$ can be obtained by a series of geometric transformations from the graph of $I = \sqrt{S}$. State the geometric transformation required to transform:

(a)   the graph of $I = \sqrt{S}$ to the graph of $I = \sqrt{(S + 20\,000)}$;

(b)   the graph of $I = \sqrt{(S + 20\,000)}$ to the graph of $I = 350\sqrt{(S + 20\,000)}$;

(c)   the graph of $I = 350\sqrt{(S + 20\,000)}$ to the graph of $I = 350\sqrt{(S + 20\,000)} - 50\,000$.

(3 marks)

QUESTION PART REFERENCE	**Answer space for question 7**

QUESTION PART REFERENCE	Answer space for question 7

END OF QUESTIONS

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