Version 1.0



General Certificate of Education (A-level) June 2013

## **Use of Mathematics**

**UOM4/1** 

(Specification 5350)

**Applying Mathematics** 

# Final



Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all examiners participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for standardisation each examiner analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, examiners encounter unusual answers which have not been raised they are required to refer these to the Principal Examiner.

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#### Key to mark scheme abbreviations

Μ	mark is for method
m or dM	mark is dependent on one or more M marks and is for method
А	mark is dependent on M or m marks and is for accuracy
В	mark is independent of M or m marks and is for method and accuracy
E	mark is for explanation
$\surd or$ ft or F	follow through from previous incorrect result
CAO	correct answer only
CSO	correct solution only
AWFW	anything which falls within
AWRT	anything which rounds to
ACF	any correct form
AG	answer given
SC	special case
OE	or equivalent
A2,1	2 or 1 (or 0) accuracy marks
–x EE	deduct <i>x</i> marks for each error
NMS	no method shown
PI	possibly implied
SCA	substantially correct approach
с	candidate
sf	significant figure(s)
dp	decimal place(s)

### No Method Shown

Where the question specifically requires a particular method to be used, we must usually see evidence of use of this method for any marks to be awarded.

Where the answer can be reasonably obtained without showing working and it is very unlikely that the correct answer can be obtained by using an incorrect method, we must award **full marks**. However, the obvious penalty to candidates showing no working is that incorrect answers, however close, earn **no marks**.

Where a question asks the candidate to state or write down a result, no method need be shown for full marks.

Where the permitted calculator has functions which reasonably allow the solution of the question directly, the correct answer without working earns **full marks**, unless it is given to less than the degree of accuracy accepted in the mark scheme, when it gains **no marks**.

### Otherwise we require evidence of a correct method for any marks to be awarded.

Question	Solution	Marks	Total	Comments
1(a)(i)	(42 475 - 35 475 =) 7000	B1	1	
-(w)(1)		21	-	
( <b>ii</b> )	7000	<b>M</b> 1		
(11)	$\frac{7000}{42475} = 0.165 = 16.5\%$	M1	2	ft only if their (a)(i) 7 000 $\pm 100$
	42475	A1ft	2	$1000 \pm 100$
<b>(b</b> )	when you get paid more money you pay a	B1	1	
	greater <b>proportion</b> in income tax	DI	1	
	Total		4	
<b>2(a)</b>	the tax rate is $20\% = 0.2$	B1		
	so 0.8 gives the proportion that is untaxed	B1	2	
	8 I I I			
<b>(b)</b>	I = 9990 + 0.6S	M1		(alternatively working from first
(6)				principles)
	$= 9990 + 0.6 \times 80000 = 57990$	A1	2	principiesy
	$= 5770 \pm 0.0 \times 00000 = 57330$	ЛІ	4	
	4000 = 9990 + 0.6S	M1		(any correct equation with 40,000
(c)	$4000 = 9990 \pm 0.03$	IVII		(any correct equation with 40 000
	10.000 0000			substituted)
	$S = \frac{40000 - 9990}{0.6} = 50017$	A1	2	
	0.6		-	
	Total		6	
3	horizontal straight line $T = 7475$			
	for <i>S</i> from 90 000 to 100 000	B1		(within half square)
	straight line starting joining			
	(100 000, their 7475) to (114 950, 0)	B1		tolerance within one square
	horizontal straight line along axis for	B1	3	can be implied by previous section of
	<i>S</i> ≥114950		-	graph clearly ending on axis before
	0 = 11 1 900			120 000
	Total		3	
4	$I = 0.8 \times 35000, +0.6 \times 11500, +0.5 (S)$	M1M1	5	SC 2 for sight of $a = 0.5$
	- 150000)	M1		$5 \le 2$ for signt of $u = 0.5$
	= 28000 + 69000 + 0.5S - 75000	1011		
		A 1		
	= 22000 + 0.5S	A1		
	1 0 5 5			
	I = a + 0.5S			
			4	
	(alternative method)			
	when $S = 150\ 000, I = 97\ 000$	M1A1		
	$97\ 000 = a + 75\ 000$	M1		
	$a = 22\ 000$			
	$I = 22\ 000 + 0.5S$	A1	4	

Question   Solution   Marks   Fotal   Comments     5 $I = A + (1 - r)B + (1 - t)(S - (A + B))$ M1   substituting A, B   substituting (1 - r)     =   10000 + 0.75 × 50000 + 0.55 × 20000   M1   substituting (1 - r)   substituting (1 - r)     =   58 500   A1   5   substituting (1 - r)     =   58 500   M1   oe not simplified     (b) $I = 0.75S$ B1   1   oe not simplified     (b) $I = 9990 + 0.6S$ M1   equating $0.15S = 9990$ M1   rearranging $S = \frac{9990}{0.15} = 66600$ A1   4     Total   5   5     7(a)   horizontal translation 20 000 units to the left   B1   accept vector answer	Commente	Tatal	Manla	Sol-4	Owertien
Image: Section of the term of term	 Comments	Total	Marks	Solution	Question
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			M1	I = A + (1 - r)B + (1 - t)(S - (A + B))	5
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$					
M1 A1M1 A1Substituting $(1 - t)$ TotalSubstituting $(1 - t)$ $6(a)$ $I = 0.75S$ B11 $6(a)$ $I = 0.75S$ B11 $(b)$ $I = 9990 + 0.6S$ M1 $0.75S = 9990 + 0.6S$ oe 	substituting A, B		M1		
= 58 500 A1 5   Total 5   6(a) $I = 0.75S$ B1 1 oe not simplified   (b) $I = 9990 + 0.6S$ M1 oe equating $0.75S = 9990 + 0.6S$ M1 rearranging $S = \frac{9990}{0.15} = 66600$ A1 4   Total 5   7(a) horizontal translation 20 000 units to the B1 accept vector answer	substituting $(1 - r)$		M1	$= 10000 + 0.75 \times 50000 + 0.55 \times 20000$	
= 58 500 A1 5   Total 5   6(a) $I = 0.75S$ B1 1 oe not simplified   (b) $I = 9990 + 0.6S$ M1 oe equating $0.75S = 9990 + 0.6S$ M1 rearranging $S = \frac{9990}{0.15} = 66600$ A1 4   Total 5   7(a) horizontal translation 20 000 units to the B1 accept vector answer	substituting $(1 - t)$		M1		
6(a) $I = 0.75S$ B1 1 oe not simplified   (b) $I = 9990 + 0.6S$ M1 oe equating $0.75S = 9990 + 0.6S$ M1 rearranging $0.15S = 9990$ M1 rearranging $S = \frac{9990}{0.15} = 66600$ A1 4   Total 5   7(a) horizontal translation 20 000 units to the B1 accept vector answer		5	A1	= 58500	
6(a) $I = 0.75S$ B1 1 oe not simplified   (b) $I = 9990 + 0.6S$ M1 oe equating $0.75S = 9990 + 0.6S$ M1 rearranging $0.15S = 9990$ M1 rearranging $S = \frac{9990}{0.15} = 66600$ A1 4   Total 5   7(a) horizontal translation 20 000 units to the B1 accept vector answer					
(b) $I = 9990 + 0.6S$ M1 oe $0.75S = 9990 + 0.6S$ M1 equating $0.15S = 9990$ M1 rearranging $S = \frac{9990}{0.15} = 66600$ A1 4   Total 5   7(a) horizontal translation 20 000 units to the		5		Total	
(b) $I = 9990 + 0.6S$ M1 oe $0.75S = 9990 + 0.6S$ M1 equating $0.15S = 9990$ M1 rearranging $S = \frac{9990}{0.15} = 66600$ A1 4   Total 5   7(a) horizontal translation 20 000 units to the	 oe not simplified	1	B1	I = 0.75S	6(a)
$0.75S = 9990 + 0.6S$ M1equating rearranging $0.15S = 9990$ M1rearranging $S = \frac{9990}{0.15} = 66600$ A14Total57(a)horizontal translation 20 000 units to theB1accept vector answer					
$0.75S = 9990 + 0.6S$ M1equating rearranging $0.15S = 9990$ M1rearranging $S = \frac{9990}{0.15} = 66600$ A14Total57(a)horizontal translation 20 000 units to theB1accept vector answer	oe		M1	I = 9990 + 0.6S	<b>(b)</b>
$0.15S = 9990$ M1rearranging $S = \frac{9990}{0.15} = 66600$ A14Total57(a)horizontal translation 20 000 units to theB1accept vector answer	equating		M1	0.75S = 9990 + 0.6S	
$S = \frac{9990}{0.15} = 66600$ A14Total5T(a)horizontal translation 20 000 units to theB1accept vector answer			M1	0.15S = 9990	
Total57(a)horizontal translation 20 000 units to theB1accept vector answer	0.0			g 9990	
Total57(a)horizontal translation 20 000 units to theB1accept vector answer		4	Al	$S = \frac{1}{0.15} = 66600$	
7(a)horizontal translation 20 000 units to theB1accept vector answer		5			
	 accept vector answer	<u> </u>	B1		7(a)
			21		/( <b>u</b> )
(b) stretch scale factor 350 in the vertical B1			B1	stretch scale factor 350 in the vertical	(h)
direction			21		
(c) translation vertically 50 000 units		_		translation vertically 50 000 units	(n)
downwards B1 3		3	B1		(0)
Total 3		3			
TOTAL 30					