OCR
Oxford Cambridge and RSA

Level 3 Certificate

Quantitative Reasoning (MEI)

Unit **H866/01** Introduction to quantitative reasoning

OCR Level 3 Certificate in Quantitative Reasoning (MEI)

Mark Schemes for June 2016

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

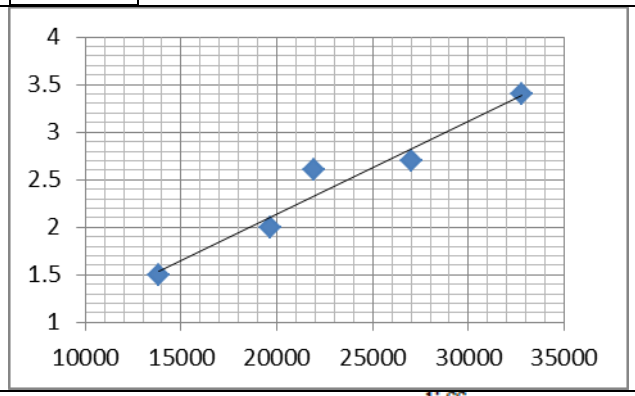
All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

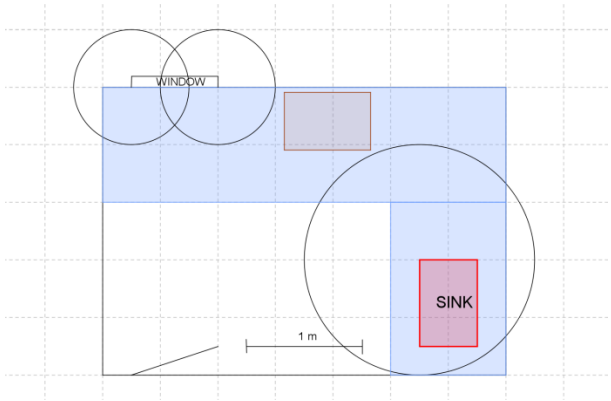
OCR will not enter into any discussion or correspondence in connection with this mark scheme.

© OCR 2016

Question			Answer	Marks	Guidance
1			For 100m $Z = \frac{10.23-10.99}{0.25} = (-)3.04$	M1	Attempting to use z-scores (possibly implicitly)
				A1	Needs full accuracy.
			For long jump $Z = 2$	A1	
			So 100m should score more points.	E1	
				[4]	

Question			Answer	Marks	Guidance
2	i		13824 19683 21952 32768 27000	B1 **[1]**	at least 4 correct numbers (to 3sf or better)
2	ii			G1 G1 G1ft **[3]**	at least two correct points (within one square) – no ft all points correct (within one square) – no ft Reasonable line of best fit
2	iii		$\text{gradient} = \frac{y\text{-difference}}{x\text{-difference}}$ $a \approx 0.0001(\text{kg/cm}^3)$	M1 A1 **[2]**	needs some evidence, e.g. a triangle on graph. Do not allow for gradient of line from (0,0) to a single point on the table ft their graph
2	iv		$0.0001 \times 36^3 \approx 4.7\text{kg}$ So the rabbit is overweight.	M1 A1 E1 **[3]**	correct model used ft their value of a Must be consistent with working above.

Question			Answer	Marks	Guidance
2	v		Any sensible reason e.g. Points lie close to a straight line.	E1 **[1]**	
3	i		416×1.04 $= 432.64$ $432.64 \times 5 = 2163.2(\text{million tonnes})$	M1 A1 A1 **[3]**	Adding on 4% by any method Accept to 3sf
	ii		Attempting to find at least one CO2 per person ratio Allow C02 values between LB and UB or their 3i answer Using valid population Allow figure for 5 year period Selecting a pair of values for which their ratio exceeds 6 and making a comparison with 6 Target is not certain to be met	M1 M1 M1 E1 **[4]**	Must be for 1 year Ft their 3i if used May be their only ratio Conclusion clearly stated www Don't allow if they state that exceeding 6 to nnes is meeting the target
			Alternative method Attempting to find at least limit for CO2 based on 6 tonnes per person Using valid population Comparing a predicted CO2 that exceeds their limit with their limit Target is not certain to be met	 M1 M1 M1 E1 **[4]**	 Allow any value between LB and UB Allow any value between UB and LB Conclusion clearly stated

Question			Answer	Marks	Guidance
4	i		0.75m It does not satisfy the regulations	B1 E1 **[2]**	
4	ii		Anywhere on the surface outside of the circles:  	B1 B1 B1 **[3]**	Entirely on blue surface More than 1m from sink (allow =1m from sink) More than 50cm from window (allow =0.5m from window)

Question			Answer	Marks	Guidance
5	i		Totals 92, 908, 48, 952 1000÷48 Which is about 1 in 21 or 1 in 20	B1 M1 A1 **[3]**	 Allow for 48÷1000
5	ii		$\frac{48}{1000} \times 300{,}000 = 14{,}400$ patients Total cost $= 2{,}600 \times 14{,}400 = £37440000$ $\approx £37$ million	M1 A1 M1 A1 **[4]**	Finding number with diabetes ft their ans 5i if used Finding total cost Rounded to the nearest million ft their number of patients
5	iii		e.g. Researcher's results are relevant to area of the hospital. Everybody who is diabetic gets treatment.	E1 **[1]**	Any relevant comment.
5	iv		$\frac{44}{48} (\approx 0.917)$	B1 B1 **[2]**	Denominator Numerator
5	v		$\frac{44}{92} (\approx 0.478)$	B1 B1 **[2]**	Denominator Numerator
5	vi		Yes or no, supported by relevant comment e.g. since the probability of someone with a positive result actually having diabetes is relatively low.	E1 **[1]**	

Question			Answer	Marks	Guidance
6	i		- A larger percentage of people used the internet (daily)in 2013 - The use is lower for older people - Proportion using internet is increasing.	B1 B1 **[2]**	Allow any two distinct evaluative comments.
6	ii		$7.4 \times 0.88 = 6.5\,\text{million}$ $9.0 \times 0.76 = 6.8\,\text{million}$ The claim is not true.	M1 A1 E1 **[3]**	attempt to work out both numbers at least one correct number Correct conclusion www.
6	iii		$7.4 \times 0.88 + 8.7 \times 0.84 + \cdots = 36.458$ Total population 52 million $\frac{36.458}{52} \times 100\% = 70.1(12)$	M1 A1 M1 M1 A1 **[5]**	attempt at a total number of people who use internet daily attempt to find total population divide by "52" art 70.1

Question			Answer	Marks	Guidance
7	i		$10^{-3} \div (5 \times 10^{-6})$ $= 200$	M1 A1 **[2]**	Allow for $(5 \times 10^{-6}) \div 10^{-3}$
7	ii		2×10^4 or 20,000 (hours)	B1 B1 **[2]**	For 2× Correct power of 10
7	iii	A	$24 \times 365 \times 2$ $= 17{,}520$ $\approx$ 20,000 (hours)	M1 A1 **[2]**	Allow 365 or better. Answer rounded to nearest 10,000.
7	iii	B	200 (tonnes)	B1 **[1]**	

Question			Answer	Marks	Guidance
8	i		Taxable income = (24000 − 10600 − 1200) (= 12200) (= 12200 × 0.20) = 2440	M1 A1 **[2]**	For attempt to subtract both allowance and pension (condone confusing annual and monthly values) All numbers correct N.b. allow going straight to monthly calculations and scaling up.
8	ii		24000 − 8065 − 1200 (= 14735) 14735 × 0.12 (= 1768.2) 1768.2 ÷ 12 = 147.35	M1 M1 A1 **[3]**	For attempt to subtract allowance and pension only (condone confusing monthly and annual values) applying a correct percentage to either annual or monthly income with some deductions art 147
8	iii		= (A2 − 10600) * 0.20	B1 B1 **[2]**	A2-10600 seen ( )*0.2 and starts with = Do not allow for any formula containing B2
8	iv		<table><tr><td></td><td>2880</td></tr><tr><td>2880</td><td>3000</td></tr><tr><td>3080</td><td>3120</td></tr><tr><td>3280</td><td>3240</td></tr><tr><td>3480</td><td>3360</td></tr><tr><td>3680</td><td></td></tr></table>	B1B1 B1 **[3]**	At least one in each column correct All correct

Question			Answer	Marks	Guidance
8	v		£26 000 and £27 000	B1 **[1]**	FT their table (only if complete)
8	vi		$24\,000 \times 1.02 (= 24\,480)$	M1	using an appropriate method to increase salary by 2%
			$(24\,480 - 10\,600 - 1200) \times 0.20$ $= 2536$	M1 A1	using their '24480' exact answer
			$(2536 - 2440) \div 2440 (\times 100)$ $= 3.93\%$	M1 A1 **[5]**	using their '2536' art 3.9
			Alternative method Additional income $24\,000 \times 0.02 (= 480)$ All payable at basic rate Extra tax $480 \times 0.20 = 96$ $(96) \div 2440 (\times 100)$ $= 3.93\%$	M1 M1 A1 M1 A1 **[5]**	Attempting 2% of salary Understanding all payable at basic rate (may be implied) using their '96' art 3.9

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity

OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553

© OCR 2016

PART OF THE CAMBRIDGE ASSESSMENT GROUP

LLOYD'S REGISTER QUALITY ASSURANCE · ISO9001 · UKAS MANAGEMENT SYSTEMS 001