OCR
RECOGNISING ACHIEVEMENT

GCE

Mathematics (MEI)

Advanced GCE **4754B**

Applications of Advanced Mathematics (C4) Paper B: Comprehension Greener Travel

Mark Scheme for June 2010

Oxford Cambridge and RSA Examinations

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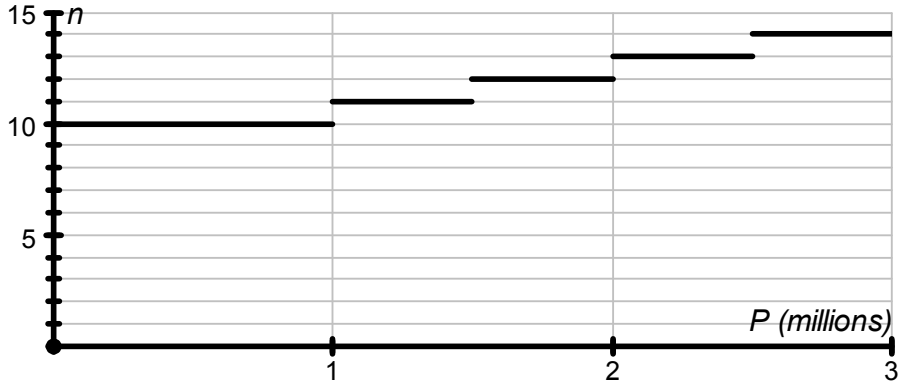
1.		Rail: $307\times0.0602=18.4814=18.5$ kg (3 sf) Road: $300\times0.2095\div1.58=39.77...=39.8$ kg (3 sf) Reduction = 21.3 kg	**B1** for either **B1**
2.		$y=\frac{1}{10^4}(x^3-100x^2-10000x+2100100)..$ $\Rightarrow \frac{dy}{dx}=\frac{1}{10^4}(3x^2-200x-10\ 000)$ $\frac{dy}{dx}=0 \Rightarrow 3x^2-200x-10\ 000=0$ $(3x+100)(x-100)=0$ $x=100$ (or $x=-\frac{100}{3}$) The graph shows the minimum emission occurs at speed of 100 km hour^{-1} Substituting $x=100$ gives $y=110.01$ Minimum rate of emission is 110 grams per km.	**M1** **A1** **M1** solving quadratic **A1** **A1** or $\frac{d^2y}{dx^2}$ justify min **A1**
3.	**(i)**	Substituting $p=250, d=279, s=4$ in $E=(10+0.0015p)d+200s$ $\Rightarrow E=3694.625$ (in kg) So emissions are 3.7 tonnes to 2 s.f. *	**M1** subst **E1**
	(ii)	Emission rate = 1.5 g km^{-1} Distance = 279 km Emissions = $1.5\times279=418.5$ g = 0.42 kg (2 s.f.), and so is less than ½ kg. *or* p=251 in formula gives E=3695.0435, difference=0.4185kg<0.5kg	**E1**
4.	**(i)**	 **Approximate Step graph** **Correct with scales shown**	**M1** **A1**
	(ii)	There is a basic service of 10 trains a day for up to 1 million passengers per year. For every half million extra passengers above 1 million, an extra daily train is provided.	**B1** **B1**

5.		100 miles = 1.609344 × 100 km = 160 km 934 m 40 cm So it appears to give the answer to the nearest 10 cm (option B).	**M1** **A1** **A1** **[18]**

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