Question 9 (Total 9 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	If $d = kV^n$, then $\log_{10} d = \log_{10} k + n \log_{10} V$	M1	This mark is given for finding an appropriate log relationship between d, k, V and n
	Plotting $\log_{10} d$ against $\log_{10} V$ will result in a straight line with gradient n and intercept $\log_{10} k$	A1	This mark is given for an explanation of why the second graph shows that $d = kV^n$
(b)	$\log_{10} d = -2$, $\log_{10} V = 0$ $-2 = \log_{10} k$ $k = 0.01$	B1	This mark is given for using Figure 6 to obtain a value for k
	When $V = 24$, $d = 16$ $\log_{10} 24 = -2 + n \log_{10} 16$	M1	This mark is given for substituting in the formula as a method to find the value of n
	$n = \dfrac{\log_{10} 24 + 2}{\log_{10} 16}$	M1	This mark is given for a correct expression for n
	$n = 2.32$ to 3 significant figures $d = 0.01 \times V^{2.32}$	A1	This mark is given for finding a correct value of n to 3 significant figures and writing a complete equation for the model
(c)	$\dfrac{44}{3600} \times 0.8 \times 1000 = 9.77\ldots$ m	M1	This mark is given for a method to find the distance, in metres, covered in the reaction time of 0.8 seconds
	$d = 0.01 \times 44^{2.32} = 64.984564\ldots\ldots$ m	M1	This mark is given for a method to use the formula to find the stopping distance
	9.77 m + 64.98 m = 74.75 m Sean will **not** be able to stop before reaching the puddle	A1	This mark is given for finding a correct value of the total stopping distance and giving a valid conclusion