Question	Scheme		Marks	AOs
7(a)	$\log_{10} a = 3.3$ or $\log_{10} b = \frac{2.1-3.3}{6}\ (=-0.2)$	e.g. $\log_{10} P = 3.3-0.2x$ or $\log_{10} P = 3.3+\frac{2.1-3.3}{6}x$	M1	1.1b
	$a = 10^{3.3}$ or $b = 10^{-0.2}$		A1	1.1b
	$a = 10^{3.3}$ and $b = 10^{"-0.2"}$	$P = 10^{3.3-0.2x} = 10^{3.3}\times 10^{-0.2x}$	dM1	3.1a
	$P = 1995\times 0.6310^{x}$		A1	3.3
			(4)	
(b)	The **concentration** (in parts per million) **1 km** from the chimney		B1	3.2a
			(1)	
				(5 marks)

Notes

(a)

M1: Attempts an equation in *a* or *b*. Score for $\log_{10} a = 3.3$ or $\log_{10} b = \frac{2.1-3.3}{6}\ (=-0.2)$

Condone an incorrectly evaluated gradient provided $\frac{2.1-3.3}{6}$ o.e. was attempted (may be seen as two simultaneous equations). Alternatively, forms a correct linear equation in $\log_{10} P$ and *x*. Do not penalise if base 10 is missing.

May be implied by a correct unsimplified value for *a* or *b*. (which could be truncated rather than rounded for *b*)

A1: A correct unsimplified value for *a* or *b*. This may be within the linear equation in the alternative method e.g. $P = 10^{3.3}\times 10^{-0.2x}$

dM1: A correct method to find unsimplified values for *a* and *b*. Allow use of their -0.2 found from a correct attempt at the gradient of the line. Alternatively, correctly uses laws of indices to achieve $P = 10^{3.3}\times 10^{"-0.2"x}$. It is dependent on the previous method mark. May be implied by their final correct equation.

A1: Complete equation with *a* = awrt 1995 and *b* = awrt 0.6310 (condone 0.631)

(b)

B1: Must refer to **concentration** (or **e.g. parts per million**) and **1km** o.e.
Condone use of emitted for measured e.g. "concentration of smoke particles emitted 1km from the chimney"
Do not accept "**amount** of smoke particles" or referring to when $x = 1$ (not in context)