Solutions

Marking: **M1** a correct method, **A1** the correct answer, **B1** an independent mark.

Each answer shows the steps, then the **result**.

2.1

$(\mathbf{x}+\mathbf{3})^{\mathbf{2}}$; $g(4) = \mathbf{7}$

2.2

translation $\begin{pmatrix}1\\0\end{pmatrix}$; vertical stretch, scale factor 2; translation $\begin{pmatrix}0\\3\end{pmatrix}$

2.3

20; **500**; **228**

2.4

$\log y = \log a + n \log x$; $n = \mathbf{1.5}$; $a = 10^{0.3} = \mathbf{2.00}$

3.1

(a) $\ln y = \ln a + x \ln b$, which has the form $Y = c + mx$ (R1)

(b) $\ln y$: $1.792, 2.890, 3.989, 5.088, 6.186$; $\ln y = \mathbf{1.10x} + \mathbf{0.693}$

(c) $a = e^{0.693} = \mathbf{2}$; $b = e^{1.0986} = \mathbf{3}$

(d) $2 \times 3^6 = \mathbf{1458}$

3.2

(a) **10**

(b) **1000**

(c) $1 + 99e^{-0.5t} = 2$; $e^{-0.5t} = \frac{1}{99}$; $t = 2\ln 99 = \mathbf{9.19}$ days

(d) $\dfrac{1000}{1 + 99e^{-2.5}} = \mathbf{110}$

(e) the number cannot grow for ever: it levels off at the size of the town (R1)

(f) translation $\begin{pmatrix}3\\0\end{pmatrix}$; the same spread happens 3 days later (R1)

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