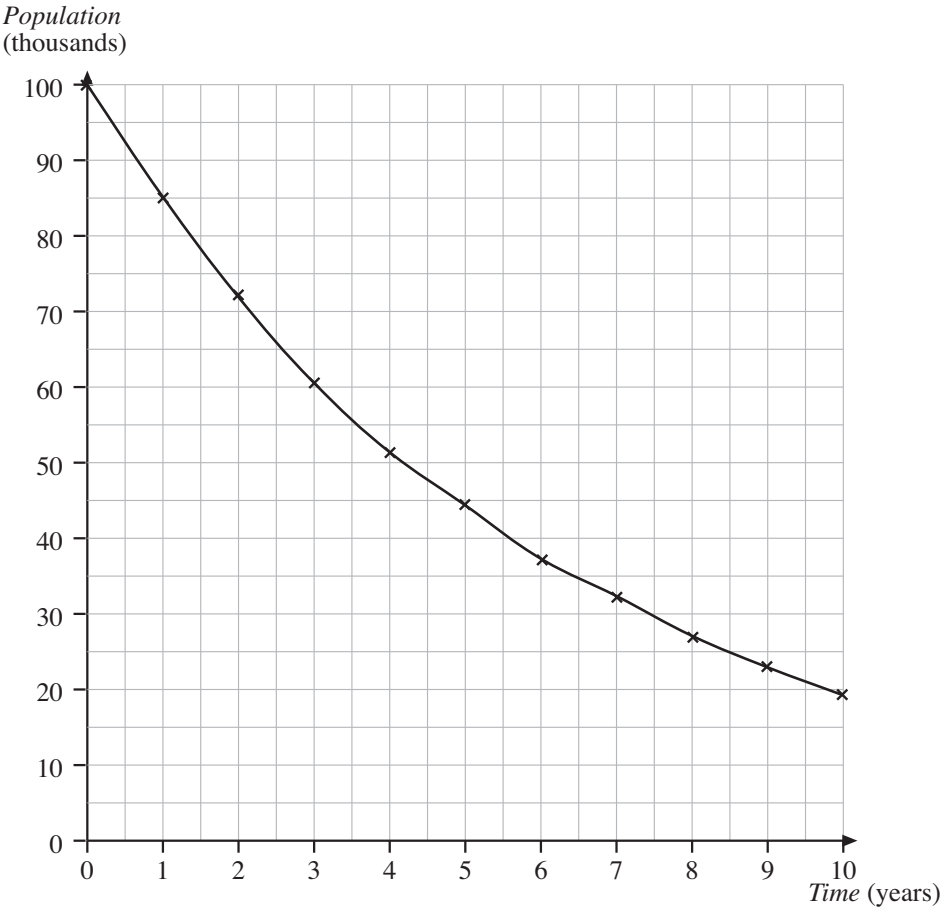
Growth and Decay Text Answers

1 Modelling Population

1. (a) $P(x) = 100\,000 \times (0.85)^x$

Years elapsed	*Population*
0	100 000
1	85 000
2	72 250
3	61 413
4	52 201
5	44 371
6	37 715
7	32 058
8	27 249
9	23 162
10	19 687

2. (a)



(b) Year 9 is when the population has become dangerously low.

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2 Models of Growth and Decay

1. (a) 17 years (b) 4 years (c) 2 years

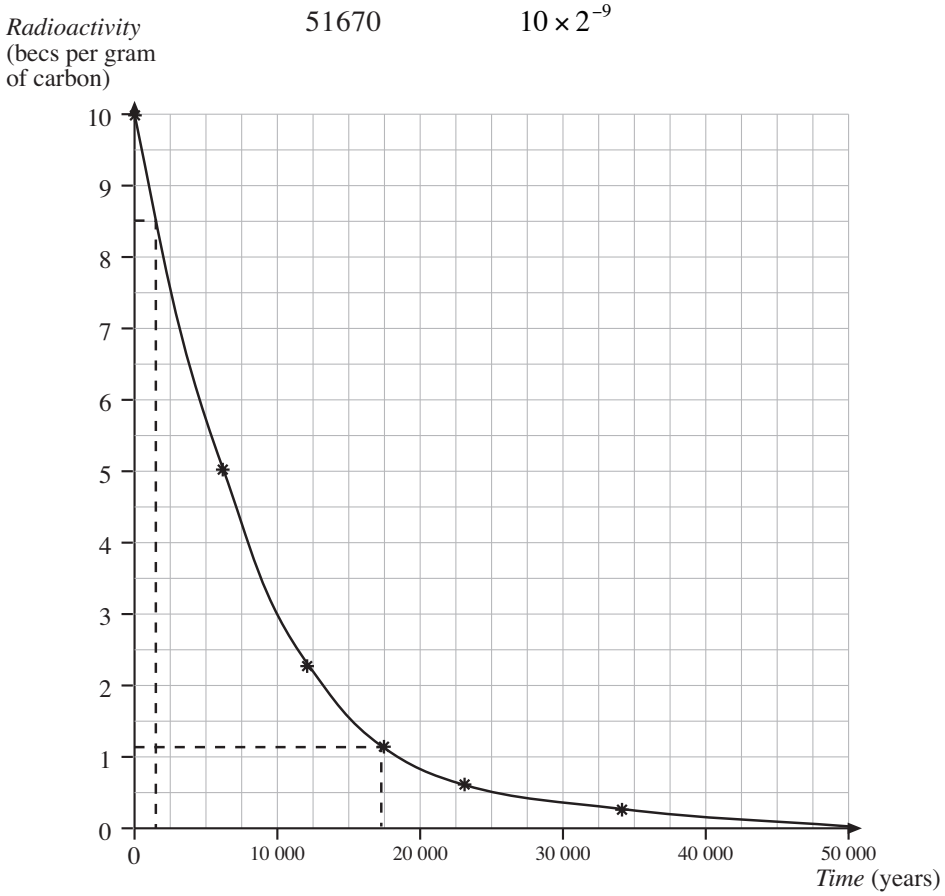
2. Immigration and migration are not specifically included; government policy could have a dramatic effect; birth and death rates could be unpredictable for various reasons (e.g. extremes of weather, epidemics, etc.).

3 Carbon Dating

1.

Age (in years)	*Radiation* (becs)
0	10
5730	$10 \times \frac{1}{2} = 10 \times 2^{-1}$
11460	$10 \times (\frac{1}{2})^2 = 10 \times 2^{-2}$
17190	$10 \times (\frac{1}{2})^2 = 10 \times 2^{-3}$
23020	10×2^{-4}
28750	10×2^{-5}
34480	10×2^{-6}
40210	10×2^{-7}
45940	10×2^{-8}
51670	10×2^{-9}

2.



3. (a) About 1500 years (b) About 17500 years

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4 Rate of Growth

1. 1.61
2. -0.69
3. -0.288
4. 0
5. 0.575
6. 0.41
7. 1.1
8. 4.25
9. 0.55
10. 1.39

5 Solving Exponential Equations

1. 2.32
2. 0
3. -0.415
4. 1.46
5. -2.58
6. 0.63
7. 1.68
8. 0.50
9. -4.1
10. -0.38

6 Properties of Logarithms

1. 19.43 hours
2. $a = 30$, $k = 0.0995$, 10.05 hours