

Chapter 1

Exercise 1A

- 1 a 20.1
b 0.0498
c 3.30
d 0.0000249
- 2 a (i) 114 (ii) 193
b 7
- 3 a 20.88g
b 17.44g
c 10.16g
- 4 a £1648.72
b year 13 = £1915.54;
year 14 = £2013.75; so twice £1000
between these years.
c £1173.51
- 5 a $B8 = 1532$
b 10 hours
- 6 a (i) 863 (ii) 244
- 7 a 25mg
b 19.7mg

Exercise 1B

- 1 a $3 = \log_5 y$
b $t = \log_4 p$
c $h = \log_g f$
d $7 = \log_2 128$
e $x = \log_e y$
- 2 a $2^3 = 8$
b $3^5 = 243$
c $5^y = 4$
d $m^x = t$
e $4^3 = y$
- 3 a 16
b 729
c 100 000
d 2

Exercise 1c

- 1 a $3\log_7 3$
b 2
c 1
d 2
e 2
f 0
g 2
h 0
- 2 a 1
b -2
c 3
d 0
e 1
- 3 a 5
b 3
c -1
d 3
e 1
f 2
g -5
h -1
i 3
j $\frac{3}{2}$
k $11\frac{1}{2}$
- 5 160
- Exercise 1D
- 1 a $e^y = 3$
b $x = e^4$
c $q = e^p$
d $5 = 10^y$
e $x = 10^3$
- 2 a $5 = \log_e y$
b $x = \log_e 2$
c $g = \log_e f$
d $x = \log_{10} y$
e $y = \log_{10} x$

● ANSWERS

- 3 a 2.08
b 1.40
c 2.23
d 0.631

- 4 a 2
b -1
c 2
d $\frac{5}{3}$

- 5 a 2
b 3
c $\frac{3}{2}$

Exercise 1E

- 1 a 243
b 10000
c 125
d e^2
e e^4
f 4096

- 2 a 4
b $\frac{16}{3}$
c 972
d $3e^4$
e 648
f $\frac{1}{3}e^{\frac{3}{5}}$
g 65
h 11

- 3 a 0.4771
b 2.07944
c 9
d 4

- 4 a 1.38629
b 4
c 4
d 0.75
e 3

- f 12
g 10
h 0.462098

- 5 a 5
b 2
c 9
d 2
e 8

Exercise 1F

- 1 a 28
b 3
c $\frac{7}{3}$
d 3
e $\frac{2}{3}$
f 8
g 2

- 2 a 1
b 6
c 4
d 23
e 9
f 4
g 2
h $\{1, -1\}$

- 3 $\log_2 a = \frac{2}{3} \log_2 b$
 $a = 4$

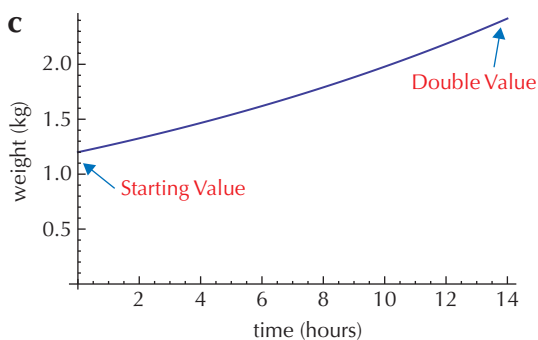
Exercise 1G

- 1 a 2
b 288
c 3
d 2
e $5\sqrt{5}$
f $\frac{31}{2}$
2 a 4
b $\frac{4}{3}$

- c $\frac{3}{2}$
 d 2.884
 e 1

Exercise 1H

- 1 a 142
 b 11 days [10.93 days]
 2 a £22518
 b 10 years [9.4 rounded up]
 3 a 200
 b 1 hour and 23 mins [rounded up]
 4 a 0.132
 b 9.12 years
 c 20.5%
 5 a 0.00502
 b 138.1 days
 6 a $P_0 = 80, k = 0.1$
 b $P(t) = 80e^{0.1(t-20)},$
 $P(t) = 80e^{0.1(t-40)}$
 7 a 1.2 kg
 b 13.86 hours

**Exercise 1I**

- 1 a 2.523
 b $-\log_{10} H = -\frac{1}{2}\log_{10} Ka + \frac{1}{2}\log_{10} c$
 $\log_{10} Ka - 2\log_{10} H = \log_{10} c$
 $\log_{10} Ka - \log_{10} H^2 = \log_{10} c$
 $\log_{10} c = \log\left(\frac{Ka}{H^2}\right)$
 2 50
 3 a Square in power of V becomes
 multiple of 2 since $\log(x^2) = 2\log x$
 $10\log_{10}\left(\frac{V_1^2}{V_0^2}\right) = 20\log_{10}\left(\frac{V_1}{V_0}\right)$
 b 19.95 V
 4 0
 5 1.5229

Exercise 1J

- 1 a $k = 10^{0.7} n = 6$
 b $k = e^{0.69} n = 6$
 c $k = 10 n = 3$
 2 a $a = 7.943 b = 2$
 b $a = 9.025 b = 3$
 c $a = 6.05 b = 4.953$
 3 (a) $y = e.e^{-2x}$
 (b) $y = 1000x^{-2}$
 4 Log log plot gives ~ straight line = $y = kx^n$
 $k = 5$
 $n = -3$