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 $y = \log_{10} x$

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

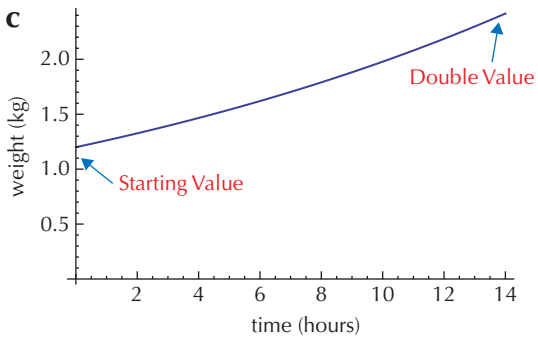
6 a $P_0 = 80, k = 0.1$

b $P(t) = 80e^{0.1(t-20)}$,
$P(t) = 80e^{0.1(t-40)}$

7 a 1.2 kg

b 13.86 hours

c



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 $\log\left(x^2\right) = 2\log x$

$10\log_{10}\left(\frac{V_1^2}{V_0^2}\right) = 20\log_{10}\left(\frac{V_1}{V_0}\right)$

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 plot gives ~ straight line = $y = kx^n$

$k = 5$

$n = -3$