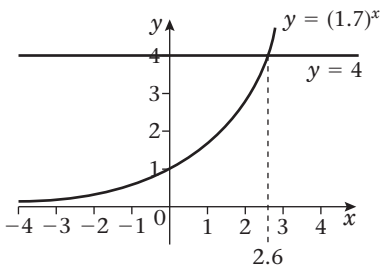


Chapter 3 Answers

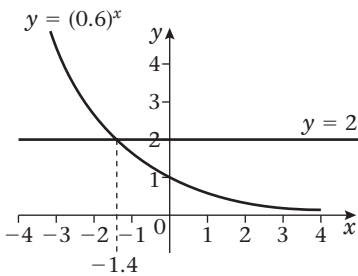
Exercise 3A

1 a



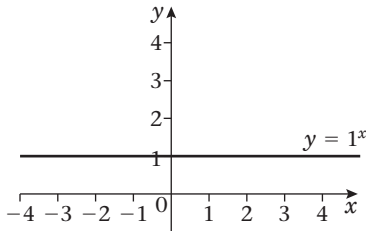
b $x \approx 2.6$

2 a



b $x \approx -1.4$

3



- 3 a $3 \log_a x + 4 \log_a y + \log_a z$
 b $5 \log_a x - 2 \log_a y$
 c $2 + 2 \log_a x$
 d $\log_a x + \frac{1}{2} \log_a y - \log_a z$
 e $\frac{1}{2} + \frac{1}{2} \log_a x$

Exercise 3E

- 1 a 6.23 b 2.10 c 0.431 d 1.66
 e -3.22 f 1.31 g -3.24 h -0.0617
 i 1.42 j -0.542
 2 a 0, 2.32 b 1.26, 2.18 c 1.21
 d 0.631 e 0.565, 0.712 f $x = 0$
 g $x = 2$ h $x = -1$

Exercise 3F

- 1 a 2.460 b 3.465 c 4.248
 d 0.458 e 0.774
 2 a 1.27 b 2.09 c 0.721
 3 a $\frac{1}{2}, 512$ b $\frac{1}{16}, \frac{1}{4}$ c 2.52

Mixed exercise 3G

- 1 $x = -1, x = 0$
 2 a $2 \log_a p + \log_a q$ b $\log_a p = 4, \log_a q = 1$
 3 a $\frac{1}{4}p$ b $\frac{3}{4}p + 1$
 4 a 9 b 12 c $\frac{1}{9}, 9$
 5 b 2.32
 6 $x = \frac{3}{22}, y = \frac{24}{11}$
 7 $\frac{1}{3}, 9$
 8 $-\frac{1}{3}, -2$
 9 (4, 16) or (16, 4)
 11 b $x = \frac{\sqrt{3}}{4}, y = \frac{\sqrt{3}}{2}$
 12 b $\alpha = \frac{1}{4}, \beta = \frac{3}{2}$ d 0.585

Exercise 3B

- 1 a $\log_4 256 = 4$ b $\log_3 (\frac{1}{9}) = -2$
 c $\log_{10} 1\,000\,000 = 6$ d $\log_{11} 11 = 1$
 e $\log_{0.2} 0.008 = 3$
 2 a $2^4 = 16$ b $5^2 = 25$
 c $9^{\frac{1}{2}} = 3$ d $5^{-1} = 0.2$
 e $10^5 = 100\,000$
 3 a 3 b 2 c 7 d 1 e 6
 f $\frac{1}{2}$ g -1 h -2 i 10 j -2
 4 a 625 b 9 c 7 d 2

Exercise 3C

- 1 1.30 2 0.602
 3 3.85 4 -0.105
 5 1.04 6 1.55
 7 -0.523 8 3.00

Exercise 3D

- 1 a $\log_2 21$ b $\log_2 9$ c $\log_5 80$
 d $\log_6 (\frac{64}{81})$ e $\log_{10} 120$
 2 a $\log_2 8 = 3$ b $\log_6 36 = 2$ c $\log_{12} 144 = 2$
 d $\log_8 2 = \frac{1}{3}$ e $\log_{10} 10 = 1$