5. a.

x	1.08^x
0	1
1	1.08
2	1.17
3	1.26
4	1.36
5	1.47
6	1.59
7	1.71
8	1.85
9	2.00
10	2.16

c. 1.125 (answer will vary) **d.** 1.122 **e.** 4.46 (answers will vary) **6. a.** 2 weeks **b.** 5 weeks **c.** 8 weeks **d.** 9 weeks **7. a.** 9.0 s **b.** 14.3 s **c.** 18.0 s

Exercise 2-3, pages 57-58

1. a. 1 **b.** 3 **c.** 4 **d.** -2 **e.** -2 **f.** -4 **g.** -3 **h.** $\frac{3}{2}$ **i.** $\frac{3}{2}$ **j.** 9 **k.** -2 **l.** 2

2. a. $x = 3, -7$ **b.** $y = 5$ **c.** $x = 4$ **d.** $y = -1, -3$ **3. a.** $x^2 = 8^3$ **b.** $y^{-3} = 8^2$ **c.** $z^3 = 27^4$ **d.** $x^{-3} = 8^4$ **e.** $y^5 = 32^3$ **f.** $z^{-3} = 216^2$ **4. a.** $\frac{3}{2}$ **b.** $-\frac{1}{2}$ **c.** $\frac{17}{2}$ **d.** $-\frac{11}{2}$ **e.** $-\frac{1}{2}$ **f.** $\frac{2}{3}$ **g.** $-\frac{6}{5}$ **h.** 6 **i.** -2 **j.** $\frac{7}{4}$ **k.** $\frac{11}{4}$ **l.** 4 **5. a.** $6, \frac{4}{5}$ **b.** 2 **c.** $-2, -\frac{2}{9}$ **d.** $-\frac{1}{2}$ **e.** 5 **f.** $9, -\frac{9}{5}$ **6. a.** 30 g **b.** 22.6 g **c.** 35.4 g **d.** 454.1 g; 45.1 g **7.** 4 d **8. a.** 4 **b.** $\frac{5}{2}$ **c.** 6 **d.** 5 **9. a.** 3, -2 **b.** 3, -1 **c.** -2 **10. a.** 1 **b.** 3 **c.** 0, 2 **d.** 0, 1 **e.** 6 **f.** 0

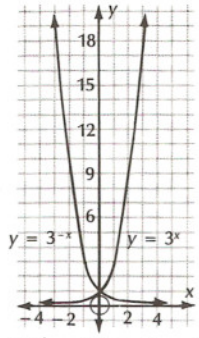
Application, page 59

1. 12.5% **2.** 0.4% **3.** t ≐ 866 a, at the time of William the Conqueror **4.** about 18 900 years ago

Exercise 2-4, pages 63-64

1. a, b, c, f, satisfy the form $y = a(b^x)$, $a, b \in \boldsymbol{R}$, $b > 0, b \neq 1$. **2. a.** $x = 1$ **b.** y increases **c.** y decreases **d.** $-\infty$ **e.** None **f.** All **3. a.** $f(x) = \frac{16}{3}\left(\frac{3}{4}\right)^x$ **b.** $f(x) = \frac{1}{3}(6)^x$ **c.** $f(x) = \frac{27}{15}\left(\frac{15}{3}\right)^x$ **d.** $f(x) = 8(16)^x$ **e.** $f(x) = 10^x$ **f.** $f(x) = \frac{1}{2}(5)^x$ **4.** $f(x)f(y) = a^x a^y = a^{x+y} = f(x + y)$ **5. a.** 3 **b.** 81

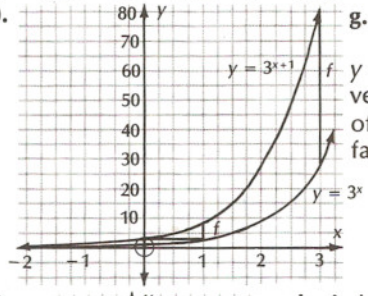
6. a.



b. The graphs are reflections of each other in the *y*-axis.

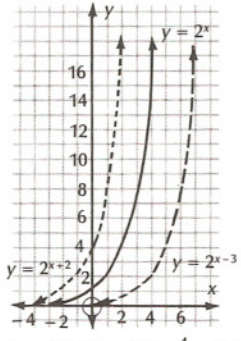
7. a. $3^{x+1} - 3^x = (3 - 1)3^x = 2(3^x)$ **b.** $a(b^x)(b^a - 1)$ **8. a.** 5.196 **b.** 0.192 **9. b. i.** about 1.21 **ii.** about 1.47 **iii.** about 1.77 **iv.** about 2.15 **d. i.** 0.22 **ii.** -0.70 **iii.** -1.92 **iv.** -2.15

10.



g. $y = 3^{x+1} = 3(3^x)$; $y = 3^{x+1}$ is a vertical stretch of $y = 3^x$ by factor of 3.

11.



b. i. horizontal translation of -2 units or vertical stretch by factor of 4. **ii.** horizontal translation of $+3$ units or vertical stretch by factor of $\frac{1}{8}$

12. $f(x) = (2^{1.5})^x$ **13.** $\frac{4}{9}$ **14.** -3

15. $f(x + 1) - 5f(x) = 4(5^2)(5^{2x})$, which is divisible by 100.

Application, page 65

1.

A3	A#	B	C	C#	D	D#
220	233	247	262	277	294	311

E	F	F#	G	G#	A4
330	349	370	392	425	440

3. Yes. There exists only one $f(x)$ for every x.
4. Yes. **5.** $f(x) = 220(\sqrt[12]{2})^x$