BLM Answers

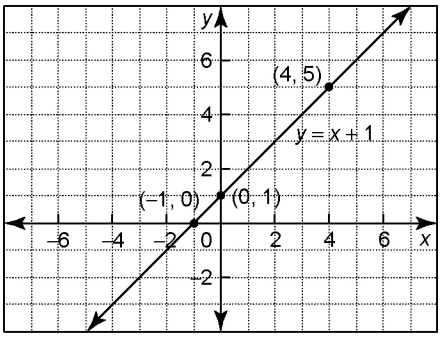
BLM 7-1 Prerequisite Skills

1. a) 3^3 **b)** $(-3)^5$ **c)** $(-1)^6$ **d)** $\left(\frac{1}{5}\right)^5$ **e)** $\left(-\frac{2}{3}\right)^6$

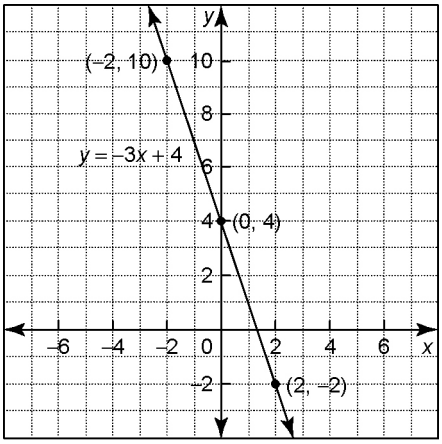
2. a) 216 **b)** 81 **c)** –16 **d)** 16
e) –27 **f)** –27 **g)** $\frac{1}{16}$ **h)** $-\frac{1}{125}$

3. a) $m = -4$; $b = 2$ **b)** $m = \frac{1}{3}$; $b = -2$
c) $m = 2$; $b = \frac{1}{2}$ **d)** $m = \frac{4}{3}$; $b = 0$

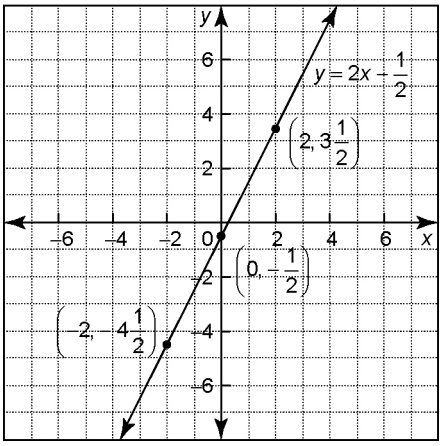
4. a)



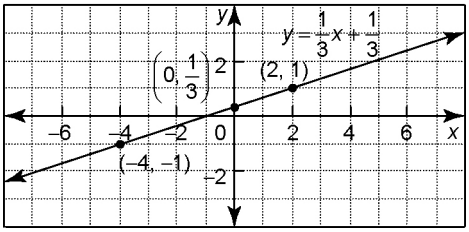
b)



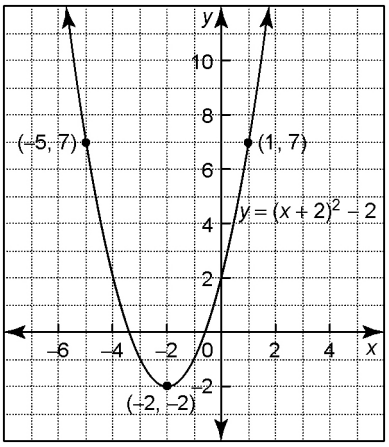
c)



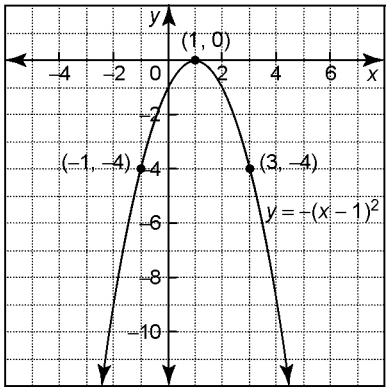
d)



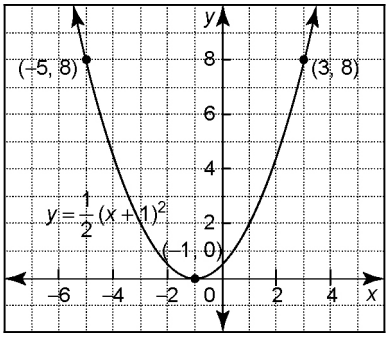
5. a) $E = 3n + 500$ **b)** \$950 **c)** 125 inserts
6. a) $A = 121$ **b)** $P \doteq$ \$3118.39
c) $D = 15$ **d)** $V \doteq 226$
7. a) translated 2 units right
b) reflected in the x-axis and translated upward 4 units
8. a)



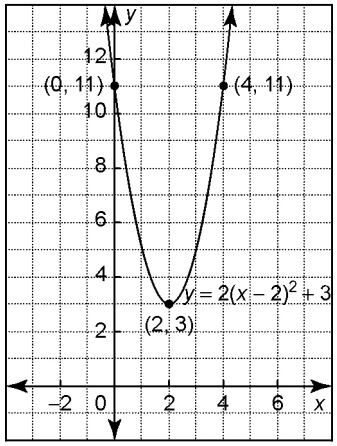
b)



c)



d)



BLM 7-3 Section 7.1 Exponent Rules

1. a) 3^4; 81 **b)** 2^7; 128 **c)** $(-5)^4$; 625
d) $(-1)^{10}$; 1 **e)** $\left(-\frac{1}{4}\right)^5$; $-\frac{1}{1024}$ **f)** $\left(\frac{2}{5}\right)^4$; $\frac{16}{625}$

2. a) 5^3; 125 **b)** 8^2; 64 **c)** 2^2; 4
d) $(-3)^3$; –27 **e)** $(-5)^4$; 625 **f)** 4^4; 256

3. a) 3^6; 729 **b)** 2^8; 256 **c)** $(-3)^4$; 81
d) $\frac{1}{729}$ **e)** $(-1)^{30}$; 1 **f)** $\frac{1}{256}$

4. a) $25 \times 125 = 3125$; $5^5 = 2125$

b) $\frac{32}{8} \times \frac{256}{16} = 4 \times 16$; $\frac{2^{13}}{2^7} = 2^6$; 64

c) $\frac{256}{64} \times 16 = 4 \times 16$; $4 \times 4^2 = 4^3$; 64

d) $\frac{243 \times 27}{9 \times 9} = \frac{6561}{81}$; $\frac{3^8}{3^4} = 3^4$; 81

5. Answers may vary. Sample answers:
a) $7^2 \times 7^4$ and $7^3 \times 7^3$
b) $5^5 \div 5^2$ and $5^{17} \div 5^{14}$
c) $\left(3^8\right)^2$ and $\left(3^4\right)^4$

6. a) $\frac{1}{27}$ in.^{3} **b)** $\frac{64}{27}$ ft^3

7. $\frac{64}{729}$ yd^3

8. a) $6^{7.3}$; 479 186.01 **b)** 3^4; 81
c) $(2)^{7.7}$; 207.94 **d)** $(4)^{3.8}$; 194.01

9. a) $\frac{1}{4}$ **b)** $\frac{1}{16}$

BLM 7-4 Section 7.2 Zero and Negative Exponents

1. a) 6^{-3} **b)** 4^{-2} **c)** 9^{-8} **d)** 8^{-2}

2. a) $\frac{1}{3^4}$ **b)** $\frac{1}{7^6}$ **c)** $\frac{1}{2}$ **d)** $\frac{1}{5^6}$

3. a) 9; $\frac{1}{9}$ **b)** 125; $\frac{1}{125}$
c) 1000; $\frac{1}{1000}$ **d)** –27; $-\frac{1}{27}$

4. a) $\frac{1}{100}$ **b)** $-\frac{1}{64}$ **c)** 256 **d)** 27

5. a) 8^2; 64 **b)** 4^{-1}; $\frac{1}{4}$ **c)** $\left(\frac{1}{3}\right)^2$; $\frac{1}{9}$
d) $\frac{1}{3^4}$; $\frac{1}{81}$ **e)** 2^{-10}; $\frac{1}{1024}$ **f)** 5^6; 15 625
g) $\left(\frac{1}{4}\right)^{-2}$; 16 **h)** $(-5)^2$; 25
i) 4^{-6}; $\frac{1}{4096}$ **j)** $\left(-\frac{1}{3}\right)^{-2}$; 9

6. a) 25 mg **b)** 0.39 mg

7. Answers may vary. Sample answer: No, the amount of material left is halved every 8 h, which will always leave an amount.

8. a) $\frac{5^4}{5^3}$; 5 **b)** $\frac{4^4}{4^2}$; 4^2 **c)** $\frac{3^8}{3^5}$; 3^3 **d)** $\frac{7^3}{7^2}$; 7

9. Answers may vary. Sample answer:
$\frac{5^3}{5^3} = 5^0$; $\frac{5^3}{5^3} = \frac{5 \times 5 \times 5}{5 \times 5 \times 5}$; so, $5^0 = 1$

BLM 7-5 Section 7.3 Investigate Exponential Relationships

1. a) No **b)** Yes

2. a) No **b)** No **c)** Yes **d)** Yes

3. a) \$26 600 **b)** \$13 034
c) \$6386.66 **d)** \$1533.44

4. a) \$1.28 **b)** \$5242.88 **c)** \$335 544.32

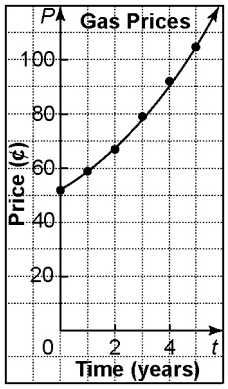
5. a) $\frac{1}{4}$ of the pond

b) 12 days since $\frac{1}{16} \times 2^4 = 1$, this means that 4 doubling periods are needed and $4 \times 3 = 12$

6. a) exponential **b)** horizontal line **c)** 67°C
d) The water was heated to a temperature of 100°C, then held at that temperature, the boiling point of water.

7. a) 51.2% **b)** approximately 7 years

8. a), b)



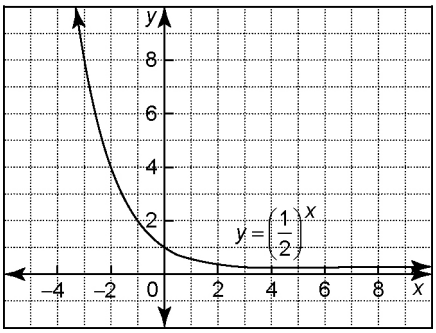
c) Yes **d)** 138¢

BLM 7-8 Section 7.4 Exponential Relations

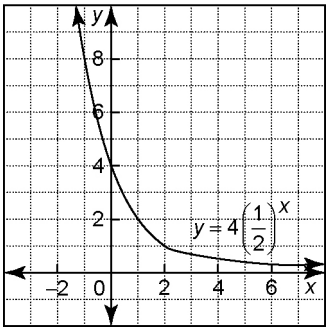
1. a) linear **b)** quadratic
c) exponential **d)** linear

2. The graph of each relation is the image of the other relation after a reflection in the y-axis.

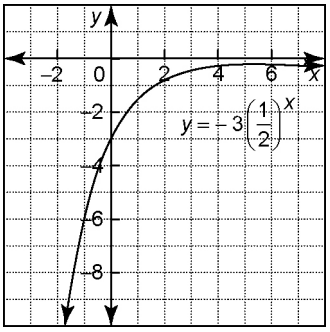
3. a)



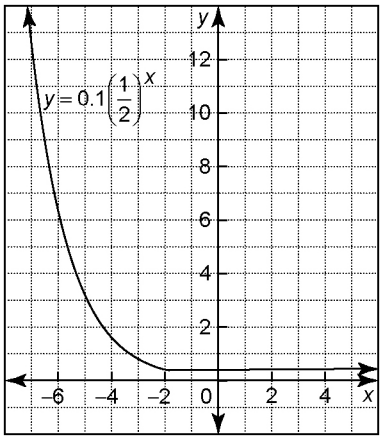
b)



c)



d)



4. Graphs will vary depending on scales chosen.

a)

x	$y = 2^x$	$y = 3(2^x)$
–3	0.125	0.375
–2	0.25	0.75
–1	0.5	1.5
0	1	3
1	2	6
2	4	12
3	8	24
4	16	48
5	32	96

b)

x	$y = (0.3)^x$	$y = \frac{1}{2}(0.3)^x$
–4	123.5	62
–3	37	18.5
–2	11	5.6
–1	3.3	1.7
0	1	0.5
1	0.3	0.15

c)

x	$y = 4^x$	$y = 4^{\left(\frac{x}{2}\right)}$
–2	0.0625	0.25
–1	0.25	0.5
0	1	1
1	4	2
2	16	4
3	64	8
4	256	16
5	1024	32
6	4096	64

d)

x	$y = \left(\frac{1}{3}\right)^x$	$y = \left(\frac{1}{3}\right)^{3x}$
–3	27	19 683
–2	9	729
–1	3	27
0	1	1
1	0.3	0.04

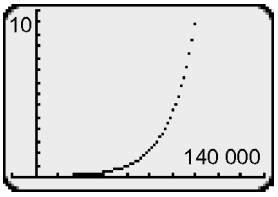
e)

x	$y = 3^x$	$y = -2(3^{2x})$
–1	0.3	–0.2
0	1	–2
1	3	–18
2	9	–162
3	27	–1458

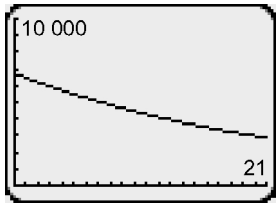
5. a) Graphs may vary.
b) \$8000; the initial value of the investment
c) \$9969.46; \$12 423.76 \$15 482.26
6. a) exponential **b)** quadratic **c)** linear
d) exponential **e)** quadratic **f)** exponential
7. a) The pattern is linear; $y = 3x + 1$, where x represents the number of types of animals and y represents the number of 50-ft sections of fencing. **b)** 19
8. a) Since both a quadratic and an exponential function grow rapidly as t increases, Suzanne is correct.
b) 1977 **c)** 1975
d) From the graph: 1997; from the equation: 1995; both values are very close to each other.

BLM 7-10 Section 7.5 Modelling Exponential Growth and Decay

1 a)



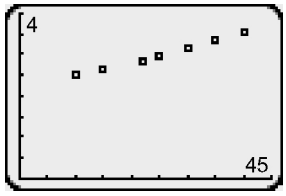
b) 265 **c)** 1565 **d)** 132 584
2. a) 3.5 h **b)** 6 h
c) No, as at some point after the sun sets, the temperature will most likely start to decrease.
3. a)



b) 6720 **c)** 5050; 3795 **d)** approximately 17 days
4. a)

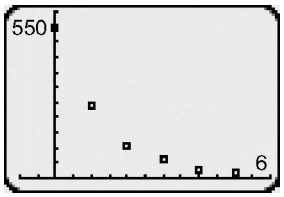
Temperature (°C)	Length (m)
10	2.5
15	2.65
22	2.81
25	2.98
30	3.15
35	3.35
40	3.55

b)

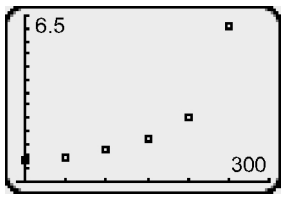


c) $y = 2.224(1.012)^x$ **d)** 49.2°C

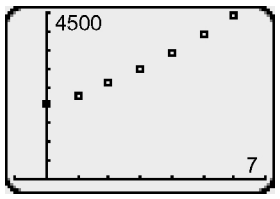
5. a)



$y = 462.997\ (0.513)^x$
b) 0.04 mg **c)** 19.5 days
6. a)



$y = 0.6599(1.0076)^x$
b) 6.40 billion **c)** 2062
7. a)



$y = 1993.97\ (1.14)^x$
b) 9607; 46 284 **c)** 35 h
8. a) 2041 **b)** approximately 657 000

BLM 7-12 Section 7.6 Solve Problems Involving Exponential Growth and Decay

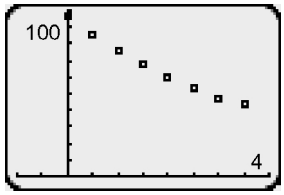
1. a) $P = 12\ 600(0.91)^t$ **b)** 10 434; 8640 **c)** 2013
2. 5.5 min
3. a) the doubling time of 60 months **b)** 528 **c)** 1625
4. a) 6.49 gigawatt hours **b)** 1570.8 gigawatt hours
c) mid 1989
5. a) 36.8 days **b)** 1416 mg or 1.416 g
6. a) 0.697 mg **b)** 100 days **c)** 191 days
7. \$4214.78
8. a) $y = 4200(1.4396)^t$ **b)** 12 531

BLM 7-13 Chapter 7 Review

1. a) 5^4; 625 **b)** 4^2; 16 **c)** $2^8 = 256$
d) $(-3)^{-1}$; $-\frac{1}{3}$ **e)** $\left(\frac{2}{3}\right)^4$; $\frac{16}{81}$ **f)** $\left(\frac{1}{4}\right)^4$; $\frac{1}{256}$
2. a) 27 cm^3 **b)** $\frac{27}{64}$ $in.^3$
3. a) 1 **b)** $\frac{1}{8}$ **c)** $\frac{1}{9}$ **d)** 5
e) 16 **f)** 48 **g)** 9 **h)** $\frac{1}{25}$
4. a) quadratic **b)** linear **c)** exponential
5. \$50 000; \$100 000; \$800 000
6. a) C **b)** A **c)** D **d)** B

7. a) Graphs may vary.
b) 12 000 **c)** 13 979 **d)** 2016
e) It is assumed that the current rate of growth continues.

8. a)



$y = 96.134(0.793)^t$

b) 33.9 ft
c) No, as the dawn comes, the distance would start to increase

9. a) 775 **b)** 864 **c)** 4 years
10. a) 9.375 mg **b)** 0.0308 mg **c)** 119 min
11. a) 34 437 **b)** 56 584

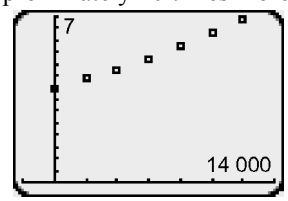
BLM 7-14 Chapter 7 Practice Test

1 a) F **b)** F **c)** F **d)** F
2. a) 3^6; 729 **b)** 2^5; 32 **c)** 7^1; 7
d) $\left(\frac{1}{2}\right)^6$; $\frac{1}{64}$ **e)** 6^2; 36 **f)** 5^0; 1

3. When $b > 1$, the relation represents exponential growth. When $0 < b < 1$, the relation represents exponential decay.

4. a) 3.165 m **b)** 230 m **c)** 0.16 m **d)** 0.314 m
5. a) \$2 042 863 **b)** \$1 208 258 928
6. 2620 bees
7. approximately 40 times more intense

8. a)



$y = 7999.9\ (1.094)^t$

b) 30 785; 203 099 **c)** 28.1 h

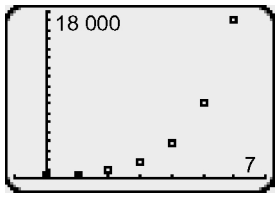
BLM 7-15 Chapter 7 Test

1. a) F **b)** T **c)** T **d)** F
2. a) 6^1; 6 **b)** 7^2; 343 **c)** 2^{12}; 4096
d) $\left(\frac{1}{3}\right)^6$; $\frac{1}{729}$ **e)** 9^2; 81 **f)** 6^4; 1296

3. Answers may vary. Sample answers:
a) $y = -2(3^x)$
b) $y = -2\left(\frac{1}{3}\right)^x$

4. a) 4.525 g **b)** 6290 g
5. approximately 14 624
6. a) \$3 299 658 **b)** 1999
7. approximately 2.5 times more intense

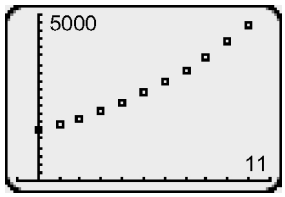
8. a)



$y = 221.8(2.050)^t$

b) 90 696 343; 3 283 666 811 **c)** about 9.5 h

9. a)



$V = 1500(1.12)^t$

b) \$1500.00 **c)** after 12 years **d)** \$8210.30