Chapter 4 BLM Answers

BLM 4–1 Prerequisite Skills

1. a) 5^5, 3125 **b)** $(-4)^7$, –16 384

c) $\left(\frac{1}{2}\right)^7$, $\frac{1}{128}$ **d)** $\left(-\frac{1}{3}\right)^5$, $-\frac{1}{243}$

2. a) 8^2, 64 **b)** 2^5, 32

c) $\left(\frac{1}{4}\right)^4$, $\frac{1}{256}$ **d)** $\left(-\frac{1}{2}\right)^6$, $\frac{1}{64}$

3. a) 5^6, 15 625 **b)** 2^8, 256

c) $(-3)^6$, 729 **d)** $\left(\frac{1}{2}\right)^9$, $\frac{1}{512}$

4. a) 1 **b)** $\frac{1}{3}$ **c)** $\frac{1}{36}$

d) $\frac{1}{32}$ **e)** $-\frac{1}{125}$ **f)** –1

5. a) x^9 **b)** a^3 **c)** b^{11}

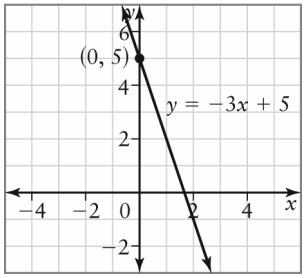
d) $\frac{1}{t^{12}}$ **e)** $\frac{1}{k^5}$ **f)** n^9

6. a) –11 **b)** 2

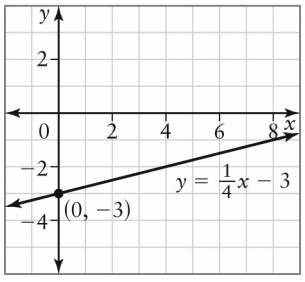
7. a) $r = \sqrt{\frac{V}{\pi h}}$ **b)** $m = \frac{y-b}{x}$ **c)** $a = \frac{2A-bh}{h}$

8. a) \$5624.32 **b)** 8.0 cm **c)** 82.4 °F

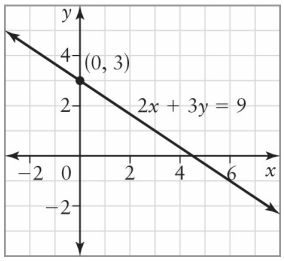
9. a)



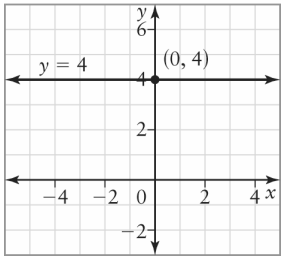
b)



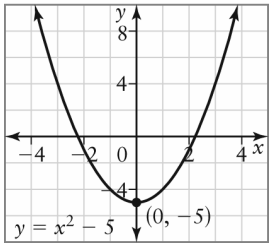
c)



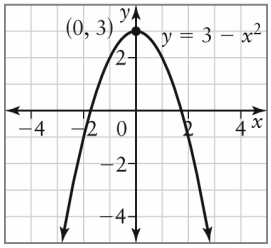
d)



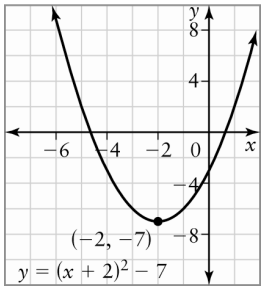
10. a)



b)



c)



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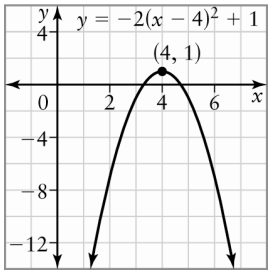
d) 

11. a) quadratic **b)** neither

BLM 4–3 Chapter 4 Review

1. a) 8^8 **b)** 4^{15} **c)** 0.4^5 **d)** $125a^6b^{12}$

2. a) $\frac{1}{x^{35}}$ **b)** $\frac{1}{z^{12}}$ **c)** $\frac{9u^2}{49v^6}$

d) $\frac{12}{x^6}$ **e)** $-\frac{p^{21}}{125q^3}$ **f)** $\frac{9b^{12}}{4a^2}$

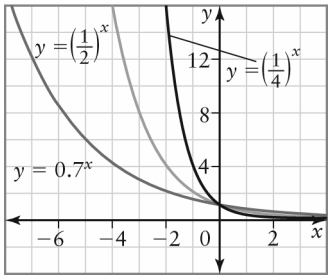
3. a) 0.0865 **b)** 0.7059 **c)** 10.4209

d) –0.0049 **e)** 13.8004 **f)** –26.2279

4. a) $u^{\frac{3}{5}}$ **b)** $n^{\frac{1}{4}}$ **c)** $\frac{1}{h^{\frac{1}{2}}}$

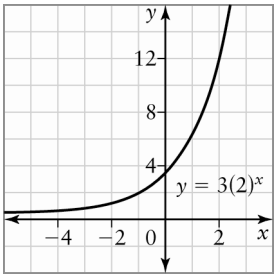
d) $\frac{1}{x^{10}}$ **e)** $\frac{1}{d^{\frac{4}{21}}}$ **f)** $\frac{1}{a^{\frac{1}{2}}b^{\frac{11}{12}}}$

5. equal; $3^{-1} = \frac{1}{3}$

6. a) 

b)

	$y = \left(\frac{1}{4}\right)^x$	$y = \left(\frac{1}{2}\right)^x$	$y = 0.7^x$
Domain	$\{x \in \mathbb{R}\}$	$\{x \in \mathbb{R}\}$	$\{x \in \mathbb{R}\}$
Range	$\{y \in \mathbb{R}, y > 0\}$	$\{y \in \mathbb{R}, y > 0\}$	$\{y \in \mathbb{R}, y > 0\}$
Asymptote	$y = 0$	$y = 0$	$y = 0$
***y*-intercept**	1	1	1
***y*-value when $x = 1$**	2	5	10
Rate of decrease	decreases fastest	decreases faster	decreases fast

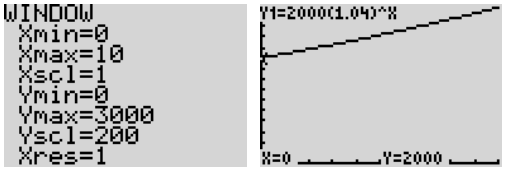
7. a) Example: 

b) Yes. If the base is greater than 1 and the *y*-intercept is 2, there are infinite possible curves.

8. –2

9. a) Example: $x \doteq 2.8$ because $4^2 = 16$ and $4^3 = 64$, and 50 is much closer to 64 than 16

b) 2.8

10. a) 

b) the *y*-intercept **c)** $2433.31

d) approximately 17.7 years

11. a) 4 **b)** 3 **c)** 3

d) 2 **e)** 2 **f)** 1

12. a) 1.3 **b)** 3.4

c) 2.6 **d)** 1.5

13. a) $-\frac{3}{2}$ **b)** –1 **c)** $-\frac{5}{2}$

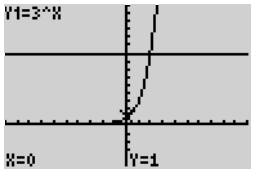
d) $-\frac{59}{7}$ **e)** –14

14.a) $A = 80\left(\frac{1}{2}\right)^{\frac{t}{3}}$ **b)** 7.9 mg

c) 12 days

15. a) (6, 512) **b)** (1, 27)

c) (–2, 1) **d)** no solution

16. a) 

b) (2, 9) **c)** 2

d) by solving the equation $3^x = 9$; because at the point of intersection the *y*-values are equal

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17. **a)** $A = 35\,000(1.02)^n$ **b)** \$40 204
c) 2018

18. **a)** $2^5 = 32$ **b)** $10^{-3} = 0.001$
c) $9^{\frac{1}{2}} = 3$

19. **a)** 3 **b)** 5
c) –8 **d)** 0

20. **a)** Graph $y = 3^x$ and estimate the x-value when $y = 18$.
b) 2.6

21. **a)** 2.015 **b)** 1.295

22. **a)** 2.15 **b)** 46.90

23. **a)** $A = 2500(1.018\,75)^{2t}$
b) approximately 37.3 years

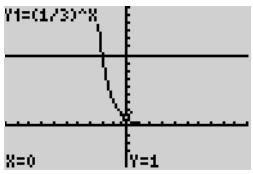
BLM 4–4 Chapter 4 Practice Test

1. **a)** $\frac{1}{w^6}$ **b)** $\frac{1}{x^{12}}$ **c)** $8h^6$
d) $\frac{a^8}{36b^6}$ **e)** $\frac{x^2y^2}{81}$ **f)** $\frac{64c^6d^3}{27}$

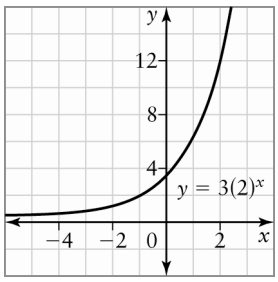
2. **a)** $-\frac{16}{9}$ **b)** 1
c) 8 **d)** $\frac{5}{4}$

3. **a)** $\frac{1}{v^{10}}$ **b)** $n^{\frac{7}{6}}$
c) $\frac{1}{x^{\frac{1}{6}}}$ **d)** $\frac{s^{\frac{1}{12}}}{t^{\frac{1}{9}}}$

4. 65 km

5. **a)** 

b) (–2, 9) **c)** –2

6. **a)** Example: 

7. **a)** –3 **b)** –3
c) $-\frac{3}{2}$ **d)** $\frac{10}{7}$

8. **a)** $n = 2^d$ **b)** March 8 **c)** March 11

9. **a)** $V = 24\,000(0.85)^n$
b) approximately 14 years
c) \$3600; \$1879.22. As the value goes down, the amount of depreciation goes down because 15% of a smaller quantity is calculated each year.

10. 9.4

11. (2, 65 536)

12. $x = 2$. The graphs intersect at the point (2, 27).

13. **a)** Let n represent the number of months after January. Let E represent the monthly earnings, in dollars. $E = 3100(1.01)^n$
b) \$3356.86
c) Example: No, because it is unlikely his monthly earnings will continue to rise.

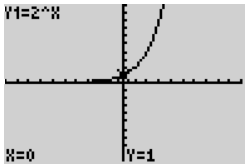
14. **a)** $\log_3 81 = 4$
b) $\log_2\left(\frac{1}{8}\right) = -3$
c) $\log_7 2401 = 4$
d) $\log_5 1 = 0$

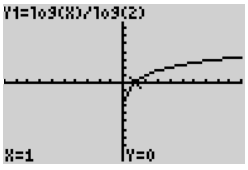
15. **a)** 3
b) 7
c) –4
d) 7

16. $\sqrt{b} = b^{\frac{1}{2}}$

17. Example: A negative base with a non-integer exponent is undefined, $\log_0 0$ has an infinite number of solutions, and $\log_1 x$ has meaning only for $x = 1$, in which case it has an infinite number of values.

18. **a)** Solve $2^x = 75$ or evaluate $\frac{\log 75}{\log 2}$.
b) 6.23

19. **a)** 



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b)	$y = 2^x$	$y = \log_2 x$
Domain	$\{x \in \mathbb{R}\}$	$\{x \in \mathbb{R},\ x > 0\}$
Range	$\{y \in \mathbb{R},\ y > 0\}$	$\{y \in \mathbb{R}\}$
***x*-intercepts**	none	1
***y*-intercepts**	1	none
Vertical asymptote	none	$x = 0$
Horizontal asymptote	$y = 0$	none
Intervals of increase	$\{x \in \mathbb{R}\}$	$\{x \in \mathbb{R},\ x > 0\}$
Intervals of decrease	none	none

20. a) $A = 3000(1.0175)^{2t}$

b) $3568.33

c) approximately 20 years

21. a) 31 623 **b)** 5

22. a) 3.3 **b)** 10^{-7} mol/L

BLM 4–5 Chapter 4 Case Study

1. a) Example: 10, because there is a ten-fold increase in H^+ ions for each single-point difference in the pH scale.

b) Yes; 7.4

c) 0.000 000 3 mol/L

2. a) $C = 5000(2)^{\frac{t}{2}}$

b) 20 480 000 organisms/mL

c) approximately 1.2 organisms/mL

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