MathLinks 9 Practice and Homework Book Chapter 3 Answers

3 Get Ready

1. a) 25 cm² b) 81 m² 2. a) 8 mm b) 6 cm

3.

m (kg)	0	3	5	6	9
t (°C)	24	48	64	72	96

4. 120 cm³ 5. 18 cm³

3.1 Using Exponents to Describe Numbers

1. a) power, multiplication b) exponent, base
2. a) $3^4 = 81$ b) $(-5)^3 = -125$ c) $2^9 = 512$
3. a) $4^3 = 64$ b) $(-7)^4 = 2401$ c) $8^3 = 512$
4. a) $6 \times 6 \times 6 = 216$
   b) $(-10) \times (-10) \times (-10) \times (-10) \times (-10) = -100\,000$
   c) $-(4 \times 4 \times 4 \times 4) = -256$

5–6. Look for one of the following answers for each part.
   a) 9×9, 9^2; $(-9) \times (-9)$, $(-9)^2$; $3 \times 3 \times 3 \times 3$, 3^4; $(-3) \times (-3) \times (-3) \times (-3)$, $(-3)^4$
   b) 16×16, 16^2; $(-16) \times (-16)$, $(-16)^2$; $4 \times 4 \times 4 \times 4$, 4^4; $(-4) \times (-4) \times (-4) \times (-4)$, $(-4)^4$

7. a) 1024 b) 625 c) −64
8. No. Example: $-3^6 = -729$ because the base is 3, and $(-3)^6 = 729$ because the base is −3 and a negative number multiplied by itself an even number of times results in a positive number.
9. $8^3 = 512$ mm³
10. 3^4, 4^3, 2^5, 5^2
11. Example: $45 = 3 \times 3 \times 5$. The number 45 is not a square because there is not an equal number of prime factors that multiply to make 45. If the prime factorization had two 5s as well as two 3s, then the number would work. $3 \times 3 \times 5 \times 5 = 225$ or 15^2.
12. \$1.28, \$327.68, \$335 544.32, \$10 737 418.24
13. $9 \times 9 \times 9$; 9^3

3.2 Exponent Laws

1. b) 2. d) 3. a) 4. c)
5. a) $3^5 = 243$ b) $(-2)^7 = -128$
   c) $4^8 = 65\,536$ d) $(-3)^8 = 6561$
6. a) $7^2 = 49$ b) $(-5)^3 = -125$
   c) $8^4 = 4096$ d) $(-6)^3 = -216$
7. a) $(5^3)^4$ or 5^{12} b) $[(-9)^2]^5$ or $(-9)^{10}$
8. a) $5^4 \div 5^3 = 5^1$ b) $\frac{(-2)^6}{(-2)^4} = (-2)^2$
9. Tony should have subtracted the exponents in step 3, not divided them. $\frac{6^{12}}{6^2} = 6^{10}$. The correct answer is 60 466 176.
10. Example: Any number (except 0) divided by itself equals 1. Since $\frac{4^3}{4^3} = 1$ and $\frac{4^3}{4^3} = 4^{3-3}$, then 4^{3-3} (or 4^0) must also equal 1.
11. a) 25^3 or 5^6; 15 625 b) $(-4)^6$ or $(-64)^2$; 4096
12. $10^{17} = 100\,000\,000\,000\,000\,000$
13. Example: $6^7 \times 6^9$; $6^2 \times 6^5$; $6^4 \times 6^3$

3.3 Order of Operations

1.

Expression	Coefficient	Power	Repeated Multiplication	Value
$-3(7)^2$	−3	7^2	$-3 \times 7 \times 7$	−147
$2(5)^4$	2	5^4	$2 \times 5 \times 5 \times 5 \times 5$	1250

2. Step 1 c), Step 2 a), Step 3 d), Step 4 b)
3. a) 108 b) 32 c) 700 000 d) −108
4. a) $2(3)^3$ b) $5(-7)^5$ c) $-2(8)^4$ d) $6(9)^5$
5. a) 16 b) −17 c) 3 d) 0.7
6. Example: In Step 2, Juan should have multiplied 8 by 8, not by 2. The correct answer is 140.
7. a) −199 b) 225
   c) undefined; cannot divide by 0 d) 20
8. a) 136 b) 73
9. 216 mm² 10. −233
11. a) $-5^2 = -25$, $(-5)^2 = 25$
   b) Example: The expression -5^2 has an exponent of 2, a base of 5, and a coefficient of −1, so evaluating the power and then multiplying by the coefficient gives an answer of −25. The expression $(-5)^2$ has an exponent of 2, a base of −5, and a coefficient of 1, so the expression has a value of 25.

3.4 Using Exponents to Solve Problems

1. False. A power in a formula represents repeated multiplication.
2. True
3. False. Patterns involving repeated multiplication can be modelled by an expression that contains only powers.
4. 864 cm² 5. 5 mm
6. a) $100(2)^n$ b) 3200 c) 102 400
7. 2 m 8. 15.1 cm² 9. a) $6s^2$ b) $h^2 = a^2 + b^2$ c) s^3
10.

Power(s)	Base(s)	Exponent(s)	Coefficient
a) s^2	s	2	6
b) h^2	h	2	
a^2	a	2	1
b^2	b	2	
c) s^3	s	3	1

11. a) 3.38 m² b) 22.5 m²

3 Chapter Link

1.

Time (h)	Population of Bacteria in Sample	
	A	B
0	50	600
1	150	1 200
2	450	2 400
3	1 350	4 800
4	4 050	9 600
5	12 150	19 200
6	36 450	38 400
7	109 350	76 800
8	328 050	153 600

2. a) A, 6 b) $50(3)^6$ c) 50
3. a) $50(3)^n$ b) $600(2)^n$
4. Example: Shortly after hour 6, the populations would be equal since the population of Sample A overtakes that of Sample B during hour 7.
5. a) $600(2)^5 - 50(3)^5$ b) 7050
6. a) $50(3)^n + 600(2)^n$ b) 74 850 c) 3 566 850

3 Vocabulary Link

Across

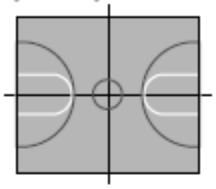
6. exponential form

Down

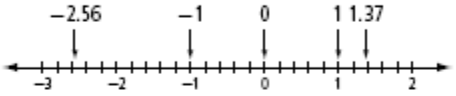
1. factored form
2. power
3. exponent
4. base

Chapters 1–3 Review

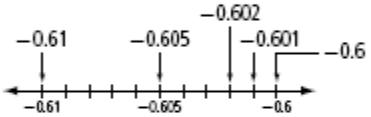
1. $3^{10} = 59\,049$
2. vertical and horizontal symmetry, rotational symmetry of order 2



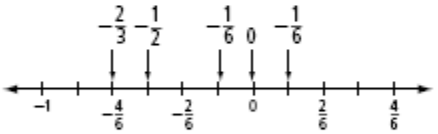
3. a) Examples: −1, 0, 1



b) Examples: −0.605, −0.602, −0.601



c) Examples: $-\frac{1}{2}, -\frac{1}{6}, 0$



4. a) 64 b) $-\frac{61}{36}$ or $-1\frac{25}{36}$ c) $\frac{19}{243}$
5. Yes. 6, 60°
6. a) $-5\frac{14}{15}$ b) $-2\frac{145}{168}$ c) $6\frac{1}{9}$ d) $\frac{43}{72}$
7. a) $(-4)^3 + (-3)^2 = -55$
   b) $[(5)^2(2)^2(-1)^3]^2 \div (5)^3 = 80$
8. a) 474 cm² b) 186.92 cm²
   c) 583.96 cm². The surface area of the new figure is the same as the total surface area of the two figures minus the area of two of the circular ends of the cylinder.
9. 5
10. a) −3.13 b) −11.44 c) −941.12
11. a) 35.2 m² b) 7