Chapter 3 BLM Answers

BLM 3–1 Chapter 3 Math Link Introduction

1. Example:

Name of Shape	Formula for Perimeter/ Circumference	Formula for Area
a) rectangle	$2l + 2w$	$l \times w$
b) circle	$2\pi r$	πr^2
c) square	$4s$	s^2

2. a) cube **b)** cylinder **c)** rectangular prism

3. Example:

a) Shapes of Faces	circles rectangle	squares	rectangles squares
b) Formula(s) for Area	πr^2 $l \times w$	s^2	$l \times w$
c) Surface Area	$2(\pi r^2)$ + $l \times w$	$6s^2$	$2(l \times w)$ + $2(l \times w)$ + $2(l \times w)$

4. a) cylinder: $\pi r^2 \times h$ **b)** cube: $s^2 \times h$
c) rectangular prism: $l \times w \times h$

5. a) Example: You need to determine the area of the base.
b) Example: To determine the surface area, you add up the areas of all of the faces of the solid, and you do not need to use height in the calculation. To determine the volume, you multiply the area of the base by the height.

BLM 3–2 Chapter 3 Get Ready

1. a) 25 cm^2 **b)** 81 m^2 **c)** 9 km^2
2. a) 8 mm **b)** 6 cm **c)** 20 m
3. The perimeter is 22 m.
4.

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

5. a) Example: Area of base = 5 × 8 = 40;
height = 3
Volume = (area of base)(height)
= (40)(3)
= 120
The volume is 120 cm^3.
b) Example: Area of base = 5 × 3 = 15;
height = 9
Volume = (area of base)(height)
= (15)(9)
= 135
The volume is 135 mm^3.

6. a) Example: Area of base = $\frac{1}{2}(6)(3) = 9$;
height = 2
Volume = (area of base)(height)
= (9)(2)
= 18
The volume is 18 cm^3.

b) Example: Area of base = $\frac{1}{2}(20)(15) = 150$;
height = 8 mm
Volume = (area of base)(height)
= (150)(8)
= 1200
The volume is 1200 mm^3.

BLM 3–3 Chapter 3 Warm-Up

Section 3.1

1. –2.5, $-2\frac{3}{4}$, 2.6, $\frac{8}{3}$ **2.** 4.8 **3.** $\frac{5}{18}$
4. $\frac{1}{8}$ **5.** $\sqrt{0.49}$ **6.** –32 **7.** 81
8. 2 × 2 × 2 × 3 **9.** 4 **10.** eight pencils

Section 3.2

1. 3.5 cm **2.** Example: 
3. (–4)(–4)(–4)(–4)(–4)(–4) = 4096
4. 9 765 625
5. Base: 2, exponent: 7
6. (2 × 2 × 2 × 2) × (2 × 2 × 2)
7. $(-5)^4$ **8.** $\frac{8}{27}$
9. It equals -16 since -2^4 as repeated multiplication is $-(2 \times 2 \times 2 \times 2)$.
10. 25

Section 3.3

1. Examples: The exponent law states that when multiplying powers with the same base, you can add exponents. $(2 \times 2 \times 2 \times 2) \times (2 \times 2 \times 2) = 2^7$
2. $(-5)^6$ **3.** 1 **4.** 4^6
5. Examples: The exponent law states that when a power is raised to an exponent, you can multiply exponents. $8^3 \times 8^3 = 8^6$
6. Example: First, she subtracted 8 from 5, and then she added 10 to this answer.
7. –33 **8.** 6 ÷ (2 × 5) **9.** –13 **10.** 23

Section 3.4

1. Power: 3^4, base: 3, exponent: 4
2. 2^{17} **3.** 81 **4.** (10 – 12) × (–5) – 3^2
5. 12 **6.** Example: (6, 3), (7, 4), (8, 5)
7. Examples: The second number is double the first number. The first number is half the second number.
8. 26, $n + 5$ **9.** 8.2 **10.** $24

BLM 3–4 Chapter 3 Problems of the Week

1. $\frac{1}{2^2} = \frac{1}{4}$. If the distance is doubled, the brightness decreases by $\frac{1}{4}$.

2. Example: The value of the power increases because x is a fraction and it is in the denominator. The value of the exponent decreases because fractions whose denominator is increasing will decrease further when multiplied by themselves. For example, when $x = \frac{1}{2}$, the base is $\frac{1}{2}$ and the power is $\frac{1}{\frac{1}{2}}$, which equals 2 because $1 \div \frac{1}{2} = 2$.

$\frac{1}{2}^2 = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

3. a) $76^2 = 5776$ **b)** Example: $25^2 = 625$

4. $a^2 + b^2 = c^2$; $3^2 + 4^2 = c^2$; $5 = c$
The longest straight pole is 5 m long.

BLM 3–5 Section 3.1 Extra Practice

1. a) 6^2, 36 **b)** 4^3, 64
c) 9^5, 59 049 **d)** 2^6, 64
2. a) 5^3, 5, 3, 125 **b)** 1^7, 1, 7, 1
c) 7^6, 7, 6, 117 649
d) 305^1, 305, 1, 305
3. a) 6 × 6 × 6, 216
b) 2 × 2 × 2 × 2 × 2, 32
c) 3 × 3 × 3 × 3, 81
d) 10 × 10 × 10 × 10 × 10 × 10, 1 000 000
e) 4 × 4, 16 **f)** 20 × 20, 400
4. a) (–2) × (–2) × (–2) × (–2), 16
b) –(2 × 2 × 2 × 2), –16
c) (–4) × (–4) × (–4), –64
d) –(4 × 4 × 4), –64
e) –[(–6) × (–6) × (–6)], 216
f) –[(–6) × (–6) × (–6) × (–6)], –1296
5. Example:

Repeated Multiplication	Exponential Form	Value
a) (–3) × (–3) × (–3) × (–3)	$(-3)^4$	81
b) (–2) × (–2) ×(–2) ×(–2) ×(–2)	$(-2)^5$	–32
c) (–6) × (–6) × (–6) × (–6) × (–6)	$(-6)^5$	–7776
d) (–5) ×(–5) ×(–5)	$(-5)^3$	–125

6. a) 2^{24} **b)** 16 777 216
c) Example: That no bacteria died.

BLM 3–6 Section 3.1 Math Link

1. a) 6 × s × s; surface area; cube. Example: Substitute the side length of the cube for s, and then multiply.
b) π × r × r × h; volume; cylinder. Example: Substitute the radius of the circular base for r, substitute the height of the cylinder for h, and then multiply.
2. a) s × s. Example: square
b) π × r × r. Example: circle
c) 2 × s × s × h. Example: rectangular prism

BLM 3–7 Section 3.2 Extra Practice

1. a) 2^8, 256 **b)** $(-4)^4$, 256 **c)** 6^3, 216
d) 9^6, 531 441
2. a) $3^4 \times 3^2$, 3^6 **b)** $5^4 \times 5^6$, 5^{10}
c) $8^6 \times 8^5$, 8^{11} **d)** $11^3 \times 11^2$, 11^5
3. a) 3^2, 9 **b)** $(-5)^5$, –3125
c) $(-2)^6$, 64 **d)** 8^0, 1
4. a) $5^4 \div 5^2$, 5^2 **b)** $7^3 \div 7^3$, 7^0
c) $\frac{8^7}{8^4}$, 8^3 **d)** $\frac{2^6}{2^5}$, 2^1
5.

Repeated Multiplication	Two Powers
a) 3 × 3 × (–4) × (–4)	$3^2 \times (-4)^2$
b) 4 × 4 × 6 × 6	$4^2 \times 6^2$
c) $\frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} \times \frac{2}{3}$	$\frac{2^5}{3^5}$

6. No. $-8^2 = -(8 \times 8) = -64$; $(-8)^2 = (-8) \times (-8) = 64$

BLM 3–8 Section 3.3 Extra Practice

1. a) 135 **b)** 150 **c)** –64 **d)** –448
2. a) $4(3)^3 = 108$ **b)** $5(-2)^5 = -160$
c) $-10^8 = -100\,000\,000$ **d)** $6(-10)^5 = -600\,000$
3. a) –24 576 **b)** 3584 **c)** 2916 **d)** 2401
4. a) 60 **b)** 11 **c)** 55 **d)** 381
5. a) 94 **b)** –36 **c)** 39 **d)** 90
6. a) $3(2^4)$; $3(2^4) = 48$; $4(3^2) = 36$
b) $(10 + 10)^3$; $10^3 + 10^3 = 2000$; $(10 + 10)^3 = 8000$ **c)** They are equal.
$(5 \times 3)^2 = 225$; $5^2 \times 3^2 = 225$

BLM 3–9 Section 3.3 Math Link

1. *S.A.* (cube) = 600 cm^2
S.A. (cylinder) = 1256.6 cm^2
2. 656.6 cm^2; cylinder; 656.6 cm^2
3. 1856.6 cm^2

BLM 3–10 Section 3.4 Extra Practice

1. Volume = 4^3 = 64 cm^3
2. a) $30 \times 3 = 90$ **b)** $30 \times 3^3 = 810$ **c)** $30 \times 3^{12} = 15\,943\,230$ **d)** 30×3^n
3. *S.A.* = 6^3 = 216 cm^2 **4.** $9^2 + 12^2 = 225$; $\sqrt{225} = 15$ cm **5.** $16^2 - \pi 8^2 = 256$; 256 – 201.06 = 54.94 cm^2
6. a) $10 \times 10 \times 10 \times 10 = 10^4$ **b)** 10 000
7. a) $d = 4.9(2)^2 = 19.6$ m
b) $d = 4.9(4)^2 = 78.4$ m
8. $2 \times \pi(7)^2 + 2\pi(7)(12) = 835.66$ cm^2

BLM 3–11 Section 3.4 Math Link
1.

Expression for Surface Area of Cube	Surface Area of Cube	Expression for Surface Area of Five Cubes	Surface Area of Five Cubes
6×3^2	54 cm^2	$5 \times 6 \times 3^2$	270 cm^2
6×4^2	96 cm^2	$5 \times 6 \times 4^2$	480 cm^2
6×5^2	150 cm^2	$5 \times 6 \times 5^2$	750 cm^2

2. $5 \times 6 \times 5^2 - 5 \times 6 \times 3^2 = 480$ cm^2

BLM 3–12 Chapter 3 Test
1. D **2.** C **3.** D **4.** A **5.** D **6.** 28
7. $-\frac{1}{8}$ **8.** $-(4)^3$, $(-1)^5$, 2^3, $(-4)^2$
9. a) $3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$
b) $(-1) \times (-6) \times (-6) \times (-6) \times (-6) \times (-6)$
c) $4 \times 4 \times 4 \times 5 \times 5 \times 5$
10. a) 6^3 **b)** 7^4 **c)** 2^{12}
11. 11^3 means that a base of 11 is multiplied 3 times: $11^3 = 1331$. 3^{11} means that a base of 3 is multiplied 11 times: $3^{11} = 177\,147$.
12. a) In the third line, Austin incorrectly distributed the exponent over subtraction to the bases of 1 and 0.05. You can only distribute an exponent over multiplication: $(ab)^x = a^x b^x$.
$I = 100(0.95)^3$; $I = 100(0.857375)$; $I \approx 86$. The light intensity is approximately 86%.
b) When $d = 15$, $I = 46\%$.

BLM 3–13 Chapter 3 Math Link: Wrap It Up!
1. a) 864 cm^2 **b)** 800 cm^2 **c)** 1884.96 cm^2
2. a) 1728 cm^3 **b)** 1500 cm^3 **c)** 6283.19 cm^3