Contents

Acknowledgments

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Answer Key

Unit 1 Exponents and Radicals

Lesson 1 *Exponents* pp. 8–11

1. C [8.EE.1]
2. D [8.EE.1]
3. B [8.EE.1]
4. D [8.EE.1]
5. D [8.EE.1]
6. A [8.EE.1]
7. C [8.EE.1]
8. B [8.EE.1]
9. C [8.EE.1]
10. Constructed response [8.EE.1]
    $\frac{3}{5}$
11. Constructed response [8.EE.1]
    No. *Explanations may vary but should say something like the following:* $5^2 = 5 \cdot 5 = 25$ and $2^5 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 32$, $25 \neq 32$.
12. Constructed response [8.EE.1]
    Multiplication: $\frac{1}{7} \cdot \frac{1}{7} \cdot \frac{1}{7}$
    Division: $1 \div 7 \div 7 \div 7$
13. Constructed response [8.EE.1]
    Yes. *Explanations may vary but should say something like the following:* $(^-3)^3 = (^-3)(^-3)(^-3) = ^-27$ and $^-3^3 = ^-(3)(3)(3) = ^-27$.
14. Extended response [8.EE.1]
    Part A: 10^2, 6^3, 3^5
    Part B: *Explanations may vary but should say something like the following:* $6^3 = 6 \cdot 6 \cdot 6 = 216$, $3^5 = 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 = 243$, and $10^2 = 10 \cdot 10 = 100$. Since $100 < 216 < 243$, $10^2 < 6^3 < 3^5$.
15. Extended response [8.EE.1]
    Part A: $\frac{1}{81}$
    Part B: No. *Explanations may vary but should say something like the following:* $(^-9)^2 = 81$ and $9^{-2} = \frac{1}{81}$, $81 \neq \frac{1}{81}$.

Lesson 2 *Laws of Exponents* pp. 12–15

1. A [8.EE.1]
2. C [8.EE.1]
3. D [8.EE.1]
4. D [8.EE.1]
5. A [8.EE.1]
6. D [8.EE.1]
7. B [8.EE.1]
8. Constructed response [8.EE.1]
    $\frac{1}{4^8}$
9. Constructed response [8.EE.1]
    64 $\quad 2^3 \cdot 2^{(4-1)} = 2^3 \cdot 2^3 = 2^{(3+3)} = 2^6 = 64$
10. Constructed response [8.EE.1]
    Yes. *Explanations may vary but should say something like the following:* $\frac{(3^{-2})^2}{3^{-3}} = \frac{3^{-4}}{3^{-3}} = 3^{-4-(-3)} = 3^{-4+3} = 3^{-1} = \frac{1}{3}$
11. Extended response [8.EE.1]
    Part A: 256
    Part B: *Answers may vary. Example:* $\frac{4^6}{4^2}$
12. Extended response [8.EE.1]
    Part A: 9 $\quad \left(\frac{3^0}{3^2}\right)^{-1} = (3^{0-2})^{-1} = (3^{-2})^{-1} = 3^2 = 9$
    Part B: Yes. *Explanations may vary but should say something like the following:* Troy's value will be $\left(\frac{3^0}{3^2}\right)^{-1} = (3^{0-2})^{-1} = (3^{-2})^{-1} = 3^2 = 9$. Marni's value will be $\left(\frac{3^0}{3^2}\right)^{-1} = \left(\frac{3^{0(-1)}}{3^{2(-1)}}\right) = \frac{3^0}{3^{-2}} = 3^{0-(-2)} = 3^2 = 9$.

Lesson 3 *Scientific Notation* pp. 16–19

1. C [8.EE.3]
2. D [8.EE.3]
3. B [8.EE.3]
4. A [8.EE.3]
5. C [8.EE.3]
6. C [8.EE.3]
7. B [8.EE.3]
8. Constructed response [8.EE.3]
    1.345×10^7
9. Constructed response [8.EE.3]
    0.00000593
10. Constructed response [8.EE.3]
    1.8×10^{-27} kg $\quad 2{,}000 \times 9.0 \times 10^{-31} = 1.8 \times 10^4 \times 10^{-31} = 1.8 \times 10^{-27}$
11. Constructed response [8.EE.3]
    1,000,000 $\quad 2.0 \times 10^4 \div 2.0 \times 10^{-2} = (2.0 \div 2.0) \times (10^4 \div 10^{-2}) = 1 \times 10^6 = 1{,}000{,}000$
12. Extended response [8.EE.3]
    Part A: 300,000
    Part B: *Explanations may vary but should say something like the following:* An elephant weighs about 228,000 ounces. A mouse weighs about 0.73 ounce. I rounded these amounts to compatible numbers and divided: $225{,}000 \div 0.75 = 300{,}000$.

Common Core State Standards for Mathematics, Grade 8

The Number System 8.NS

Know that there are numbers that are not rational, and approximate them by rational numbers.

1. Understand informally that every number has a decimal expansion; the rational numbers are those with decimal expansions that terminate in 0s or eventually repeat. Know that other numbers are called irrational.
2. Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). *For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*

Expressions and Equations 8.EE

Work with radicals and integer exponents.

1. Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $3^2 \times 3^{-5} = 3^{-3} = \frac{1}{3^3} = \frac{1}{27}$.
2. Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.
3. Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3×10^8 and the population of the world as 7×10^9, and determine that the world population is more than 20 times larger.*
4. Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

Understand the connections between proportional relationships, lines, and linear equations.

5. Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.*
6. Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.

Skills Analysis for Practice Test

MC = Multiple Choice = 1 pt
CR = Constructed Response = up to 2 pt
ER = Extended Response = up to 3 pt

Student Name	The Number System MC: #5, 11, 15, 24 CR: #34, 42 *8 points possible*	Expressions and Equations MC: #1, 2, 7, 8, 10, 22, 27, 28, 30 CR: #31, 36, 38, 39, 40, 41, 43, 45, 50 ER: #51 *30 points possible*	Functions MC: #4, 13, 16, 23, 29 CR: #32, 35 *9 points possible*	Geometry MC: #3, 9, 12, 14, 17, 18, 19, 20, 25, 26 CR: #33, 37, 44, 47, 48, 49 ER: #53 *25 points possible*	Statistics and Probability MC: #6, 21 CR: #46 ECR: #52 *7 points possible*	TOTAL SCORE *79 points possible*