

9. 6
8. 4⁵
7. 258.2
6. 4.8
5. 1.8
4. 8²¹
3. 7⁶
2. 5⁸
1. 14³
15. 30¹
14. 21⁷
13. 9⁴
12. 12⁵
11. 10³⁶ (c) 1,048,576
(b) 6,561
10. 14³ (a) 16,807

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BASIC MATH

The Complete Course
Lesson Fifteen

Exponents & the Order of Operations KA8415

Teaching Guide & Worksheet

HOW TO USE THE VIDEO AND TEACHING GUIDE

1. The "STOP TO THINK" signal means pause to think.
2. The "STOP TO WORK" signal means work the problem(s).
3. Rewind the tape and watch the lesson again if the concept is not clear.
4. Use "Learning Strategies" section of the Teachers Guide as memory aids and topics for classroom discussion.
5. Students should complete the exercises on the worksheet to confirm their understanding of this lesson.

Instructors may duplicate the worksheets as needed

THE MEANING OF EXPONENT

- A. The meanings of base and power
- The base is the number being multiplied
 - The power is the number of bases being multiplied
- B. The meaning of squaring
- The area of a square is the side of the square multiplied by itself
 - The side to the second power is the squaring of the side
 - The second power is called the square
- C. The meaning of cubing
- The volume of a cube is obtained by raising the length of an edge to the third power
 - The third power is called the cube
- D. Looking for patterns in powers of 2 and 8
- E. Looking for patterns in powers of 3 and 7
- F. Looking for patterns in powers of 10
- Powers of ten are the place values
 - Use this observation to define 10^0
-

PROPERTIES OF EXPONENTS

- A. Multiplying numbers in exponential form
- If the numbers have the same base,
 - Keep the base and add the exponents
- B. Using the calculator to raise a number to a power
- C. Dividing numbers in exponential form
- If the numbers have the same base,
 - Keep the base and subtract the exponents
- D. The method for raising an exponential number to a power
- $(4^5)^3 = 4^5 \times 4^5 \times 4^5$
 - Keep the base and multiply the powers
- E. Finding the meaning of the zero power
-

ORDER OF OPERATIONS

- A. The rationale for the rule
- B. Why do we multiply and divide before adding and subtracting?
- C. What if you want to add first? Use parentheses
- D. The order of operations with exponents: P E M D A S
- E. Examination of problems

1. Use the calculator to find:
- 7^5
 - 3^8
 - 2^{20}
12. $(12^7 \times 12^8)^2$
13. $(9^5 \times 9^{-3})^2 \div 9^8$
14. $21^5 \times 21^3 \times 21^{-7} \times (21^{-2})^3$

For questions 2-4, leave answers in exponential form.

15. $(30^{-2} \times 30^7)^3 \div (30^{-3} \times 30^4)^2$
2. $5^3 \times 5^7 \div 5^2$
3. $(7^6 \div 7^4)^3$
4. $(8^5 \div 8^2)^2 \times (8^3 \times 8^2)^3$
5. $5 + 3 \times 2^3 \div 5 - 8 = \underline{\hspace{2cm}}$
6. $(5 + 3) \times 2^3 \div 5 - 8 = \underline{\hspace{2cm}}$
7. $(5 + 3 \times 2)^3 \div 5 - 8 = \underline{\hspace{2cm}}$

For questions 8-15, leave answers in exponential form.

8. $4^3 \times 4^7 \times 4^{-5} = \underline{\hspace{2cm}}$
9. $6^2 \div 6^{-8} \div 6^3 = \underline{\hspace{2cm}}$
10. $14^{11} \div (14^5 \times 14^3) = \underline{\hspace{2cm}}$
11. $(10^9 \div 10^{-2} \times 10^7)^2$