

MathSmart
Guide
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Chapter 1

Numbers

The area of this square rug is 6 m^2 . So, its side length is $\sqrt{6}$ m, which is about 2.45 m.

Topics to be covered in this chapter:

1.1 Exponential Notation

e.g. 3 to the power of $4 = 3^4$
 $= 3 \times 3 \times 3 \times 3$
 $= 81$

1.2 Whole Numbers

e.g. $40\,807 = 4 \times 10^4 + 8 \times 10^2 + 7 \times 10^0$

1.3 Integers

e.g. $(-9) \times (-2) = +18$

1.4 Order of Operations

e.g. $(23 - 20)^2 \times 8 \div (2 + 4)$
 $= 3^2 \times 8 \div 6$
 $= 9 \times 8 \div 6$
 $= 12$

1.5 Common Factors and Common Multiples

e.g. The GCF and LCM of 15 and 20 are 5 and 60 respectively.

1.6 Squares and Square Roots

e.g. $\sqrt{6}$ is about 2.45.

1.7 Rational Numbers

e.g. 102 is a rational number but $\sqrt{10}$ is not.



1.1

Exponential Notation

Write each answer in exponential notation or in words.

1. $5 \times 5 \times 5 \times 5 = \underline{\hspace{2cm}}$

2. $3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 = \underline{\hspace{2cm}}$

3. $10 \times 10 \times 10 \times 10 \times 10 = \underline{\hspace{2cm}}$

4. $7 \times 7 \times 7 \times 7 \times 7 \times 7 = \underline{\hspace{2cm}}$

5. $12 \times 12 \times 12 = \underline{\hspace{2cm}}$

6. 9 to the fifth power = $\underline{\hspace{2cm}}$

7. 4 to the power of 8 = $\underline{\hspace{2cm}}$

8. 5 to the sixth power = $\underline{\hspace{2cm}}$

9. 10 to the power of 3 = $\underline{\hspace{2cm}}$

10. 6 to the seventh power = $\underline{\hspace{2cm}}$

2^3 ← exponent
↑
base

$2^3 = 2 \times 2 \times 2 = 8$
2 multiplies itself 3 times.

2^3 is read as "2 to the power of 3" or "2 to the third power".

11. **A** 10^2 **B** 5^3 **C** 6^8

A $\underline{\hspace{2cm}}$

B $\underline{\hspace{2cm}}$

C $\underline{\hspace{2cm}}$

Write each multiplication as a product of powers.

12. $5 \times 5 \times 7 \times 7 \times 7 = \underline{5^{\square} \times 7^{\square}}$

13. $2 \times 9 \times 9 \times 2 \times 2 \times 9 = \underline{2^{\square} \times 9^{\square}}$

14. $3 \times 3 \times 4 \times 3 \times 3 = \underline{\hspace{2cm}}$

15. $10 \times 10 \times 6 \times 10 \times 6 = \underline{\hspace{2cm}}$

16. $5 \times 3 \times 5 \times 5 \times 3 \times 3 \times 2 \times 5 \times 2 = \underline{\hspace{2cm}}$

17. $10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 3 \times 3 \times 3 = \underline{\hspace{2cm}}$

18. $9 \times 10 \times 10 \times 9 \times 9 \times 9 \times 10 \times 9 \times 10 = \underline{\hspace{2cm}}$

19. $8 \times 7 \times 8 \times 6 \times 7 \times 8 \times 6 \times 6 \times 7 = \underline{\hspace{2cm}}$

Write the powers as integers and the integers as powers.

20. $2^5 = \underline{\quad}$ $3^3 = \underline{\quad}$ $6^1 = \underline{\quad}$
 $19^0 = \underline{\quad}$ $12^2 = \underline{\quad}$ $5^4 = \underline{\quad}$
 $7^3 = \underline{\quad}$ $15^3 = \underline{\quad}$ $8^0 = \underline{\quad}$

Any number raised to the power of zero equals one.

e.g. $5^0 = \underline{1}$; $21^0 = \underline{1}$

21. 1000
 $= 10 \times \underline{\quad}$
 $= \underline{\quad}$
 $= \underline{10^3}$

22. 1024
 $= 4 \times \underline{\quad}$
 $= 4 \times 4 \times \underline{\quad}$
 $= \underline{\quad}$
 $= \underline{4^5}$

Write 81 as a power of 3.

$81 = 3 \times 27$ ← Rewrite 27 as 3×9 .
 $= 3 \times 3 \times 9$ ← Rewrite 9 as 3×3 .
 $= 3 \times 3 \times 3 \times 3$
 $= \underline{3^4}$

23. $128 = \underline{2^7}$

24. $729 = \underline{3^6}$

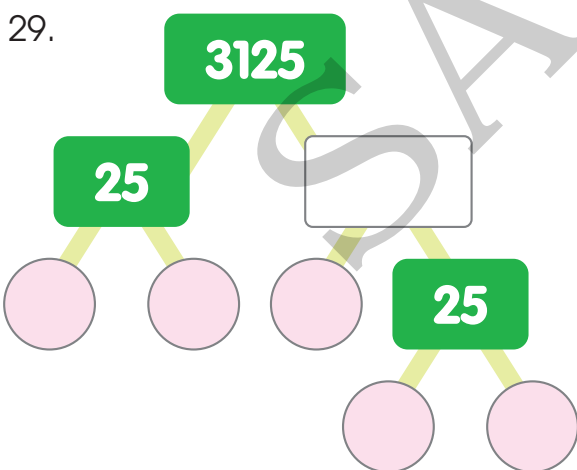
25. $7776 = \underline{6^5}$

26. $1296 = \underline{6^4}$

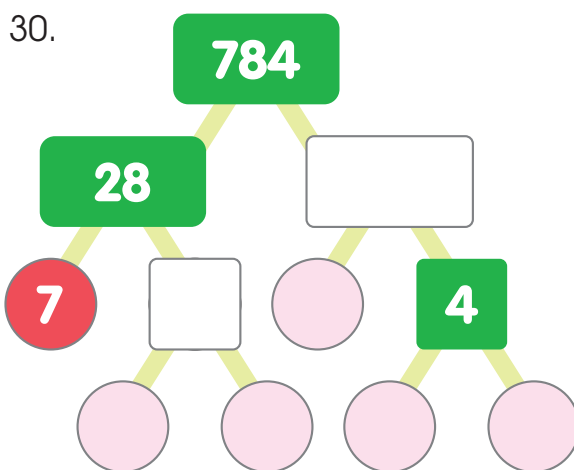
27. $4096 = \underline{4^8}$

28. $59\,049 = \underline{9^5}$

Complete each factor tree. Then write the prime factors in exponential notation.



$3125 = \underline{5^5}$



$784 = \underline{2^3 \times 7 \times 2^2}$

31. $72 = \underline{2^3 \times 3^2}$

32. $200 = \underline{2^3 \times 5^2}$

33. $8575 = \underline{\quad}$

34. $2250 = \underline{\quad}$

Solve the problems. Show your work.

35. Are “4 to the power of 5” and “5 to the power of 4” the same? Explain your answer.

36. Describe the mistake Kevin made. Then find the correct answer.

$$5^3 = \underline{5 \times 3}$$

$$= \underline{15} \quad \times$$

37. A bacterium splits into two bacteria every 15 minutes. How many bacteria will there be in 2 hours?

38. The side length of a cube is 1 m. Find the volume of the cube in m^3 , cm^3 , and mm^3 using an exponent.

Application

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What are the missing exponents? What is the relationship between the number of zeros in multiples of 10 and the exponents?

1	=	$\underline{10^0}$
10	=	$\underline{10^1}$
100	=	$\underline{10^2}$
1000	=	$\underline{10^3}$
10 000	=	$\underline{10^{\quad}}$
100 000	=	$\underline{10^{\quad}}$
1 000 000	=	$\underline{10^{\quad}}$
10 000 000	=	$\underline{10^{\quad}}$