

# X-treme Review



**Math**  
Test Preparation

**7**

Authors

**Celestine Marie Milanese & Carolyn Peck**

Editors

**Wayne Garnsey & Paul Stich**  
Judith Shuback - Associate Editor



**N&N Publishing Company, Inc.**

18 Montgomery Street

Middletown, New York 10940-5116



For Ordering & Information

**1-800-NN 4 TEXT**

Internet: [www.nn4text.com](http://www.nn4text.com)

email: [nn4text@nandnpublishing.com](mailto:nn4text@nandnpublishing.com)

NO PERMISSION HAS BEEN GRANTED BY N&N PUBLISHING COMPANY, INC TO REPRODUCE ANY PART OF THIS BOOK BY ANY MECHANICAL, PHOTOGRAPHIC, OR ELECTRONIC PROCESS.

## DEDICATION

This book is dedicated to our husbands, Sandro and Aaron, for putting up with all the craziness that surrounded this endeavor. We love you!

## ACKNOWLEDGEMENTS

The authors would like to acknowledge Isabel Lynch for suggesting we take on this "little project"; thanks to the N&N production crew for their patience and talent in converting our "symbols," and Wayne Garnsey and Paul Stich for their unlimited support.

Thanks to Janice Lawler and Rosellen Hardt for your Science "expertise." To the following Math teachers at Wappingers Junior High School, thanks for all your help and support: John March, Patrice Stabile, Bernadette Murphy, Ceris Valesey, Lynn Candelli, and Salvatore Manteria.

And last but definitely not least, many thanks to our proofreaders and problem solvers: Jean Bruyn, Toni Forsythe, Kathleen Haug, Judith Shuback, and Maureen Van Ackooy.

We thank all of you from the bottom of our hearts.

---

Front Cover: Photo courtesy of Image100 Ltd 2001©

### CHELLIE MILANESE & CAROLYN PECK

Teachers: Wappingers Junior High School  
Wappingers Falls, NY

No part of this book may be reproduced by any mechanical, photographic, or electronic process, nor may it be stored in a retrieval system, transmitted, shared, or otherwise copied for public or private use, without the prior written permission of the publisher.



© Copyright 2006, Revised 2009, 3rd Edition

N&N Publishing Company, Inc.

Internet: [www.nn4text.com](http://www.nn4text.com) phone: 1-800-NN 4 TEXT email: [nn4text@nandnpublishing.com](mailto:nn4text@nandnpublishing.com)

SAN # - 216-4221

ISBN # - 0935487-83-2

3 4 5 6 7 8 9 10 BookMart Press 2013 2012 2011 2010 2009

NO PERMISSION HAS BEEN GRANTED BY N&N PUBLISHING COMPANY, INC TO REPRODUCE ANY PART OF THIS BOOK BY ANY MECHANICAL, PHOTOGRAPHIC, OR ELECTRONIC PROCESS.

# TABLE OF CONTENTS



| Lesson       | Topic  | Page |
|--------------|--|------|
|              | <i>To the Student</i>  | 6    |
| <b>One</b>   | <b>Number Systems</b>  | 7    |
|              | Vocabulary   | 7    |
|              | <b>1.1 Number Systems</b>  | 8    |
|              | • 7.N.1 - Distinguish between the various subsets of real numbers (counting/natural numbers, whole numbers, integers, rational numbers, and irrational numbers). |      |
|              | • 7.N.2 - Recognize the difference between rational and irrational numbers.  |      |
|              | • 7.N.3 - Place rational and irrational numbers (approximations) on a number line and justify the placement of the numbers.                                      |      |
|              | <b>1.2 Laws of Exponents</b>   | 10   |
|              | • 7.N.4 - Develop the laws of exponents for multiplication and division.   |      |
|              | <b>1.3 Scientific Notation</b>   | 10   |
|              | • 7.N.5 - Write numbers in scientific notation.  |      |
|              | • 7.N.6 - Translate numbers from scientific notation into standard form.   |      |
|              | • 7.N.7 - Compare numbers written in scientific notation   |      |
|              | Test Prep  | 12   |
| <b>Two</b>   | <b>Number Theory</b>   | 17   |
|              | Vocabulary   | 17   |
|              | <b>2.1 Numbers</b>   | 18   |
|              | <b>2.2 Prime Factorization</b>   | 19   |
|              | • 7.N.10 - Determine the prime factorization of a given number and write in exponential form.  |      |
|              | <b>2.3 Greatest Common Factor</b>  | 20   |
|              | • 7.N.8 - Find the common factors and greatest common factor of two or more numbers.   |      |
|              | <b>2.4 Least Common Multiple</b>   | 22   |
|              | • 7.N.9 - Determine multiples and least common multiple of two or more numbers.  |      |
|              | Test Prep  | 23   |
| <b>Three</b> | <b>Operations</b>  | 27   |
|              | Vocabulary   | 27   |
|              | <b>3.1 Absolute Value</b>  | 28   |
|              | • 7.N.11 - Simplify expressions using order of operations. Expressions may include absolute value and/or integral exponents greater than 0.                      |      |
|              | <b>3.2 Order of Operations</b>   | 28   |
|              | • 7.N.11 - Simplify expressions using order of operations. Expressions may include absolute value and/or integral exponents greater than 0.                      |      |
|              | <b>3.3 Integer Operations</b>  | 29   |
|              | • 7.N.12 - Add, subtract, multiply, and divide integers.   |      |
|              | • 7.N.13 - Add and subtract two integers (with and without the use of a number line).  |      |
|              | <b>3.4 Exponents with Base Ten Relating to Fractions and Decimals</b>  | 33   |
|              | • 7.N.14 - Develop a conceptual understanding of negative and zero exponents with a base of ten and relate to fractions and decimals.                            |      |
|              | <b>3.5 Squares and Square Roots</b>  | 34   |
|              | • 7.N.15 - Recognize and state the value of the square root of a perfect square (up to 225).   |      |
|              | • 7.N.16 - Determine the square root of non-perfect squares using a calculator.  |      |
|              | • 7.N.17 - Classify irrational numbers as non-repeating/non-terminating decimals.  |      |
|              | Test Prep  | 35   |

|              |  |           |
|--------------|--|-----------|
| <b>Four</b>  | <b><i>Algebra</i></b> . . . . .  | <b>39</b> |
|              | <b>Vocabulary</b> . . . . .  | <b>39</b> |
|              | <b>4.1 Changing Verbal Expressions into Algebraic Expressions</b> . . . . .  | <b>40</b> |
|              | • 6.A.3 - Translate two-step verbal expressions into algebraic expressions.  |           |
|              | <b>4.2 Changing Verbal Sentences into Algebraic Equations</b> . . . . .  | <b>41</b> |
|              | • 7.A.1 - Translate two-step verbal sentences into algebraic equations.  |           |
|              | <b>4.3 Evaluating Algebraic Expressions</b> . . . . .  | <b>42</b> |
|              | • 6.A.2 - Use substitution to evaluate algebraic expressions (may include exponents of one, two and three).  |           |
|              | <b>4.4 Solving Two-step Equations</b> . . . . .  | <b>43</b> |
|              | • 6.A.4 - Solve and explain two-step equations involving whole numbers using inverse operations.   |           |
|              | <b>4.5 Simple Proportions</b> . . . . .  | <b>45</b> |
|              | • 6.A.5 - Solve simple proportions within context.   |           |
|              | <b>4.6 Solving One-step Inequalities</b> . . . . .   | <b>46</b> |
|              | • 7.A.5 - Solve one-step inequalities (positive coefficients only).  |           |
|              | <b>4.7 Evaluating Formulas</b> . . . . .   | <b>47</b> |
|              | • 7.A.6 - Evaluate formulas for given input values (surface area, rate, and density problems).   |           |
|              | <b>Test Prep</b> . . . . .   | <b>48</b> |
| <b>Five</b>  | <b><i>Geometric Shapes and Relationships</i></b> . . . . .   | <b>53</b> |
|              | <b>Vocabulary</b> . . . . .  | <b>53</b> |
|              | <b>5.1 Circumference and Area of a Circle</b> . . . . .  | <b>54</b> |
|              | • 7.G.1 - Calculate the radius or diameter, given the circumference or area of a circle.   |           |
|              | <b>5.2 Volume of Prisms and Cylinders</b> . . . . .  | <b>56</b> |
|              | • 7.G.2 - Calculate the volume of prisms and cylinders, using a given formula and a calculator.  |           |
|              | <b>5.3 Identifying Solids And Nets</b> . . . . .   | <b>58</b> |
|              | • 7.G.3 - Identify the two-dimensional shapes that make up the faces and bases of three dimensional shapes (prisms, cylinders, cones, and pyramids).         |           |
|              | <b>5.4 Surface Area of Prisms and Cylinders</b> . . . . .  | <b>60</b> |
|              | • 7.G.4 - Determine the surface area of prisms and cylinders, using a calculator and a variety of methods.   |           |
|              | <b>5.5 Missing Angles of a Quadrilateral</b> . . . . .   | <b>62</b> |
|              | • 7.G.7 - Find a missing angle when given angles of a quadrilateral.   |           |
|              | <b>Test Prep</b> . . . . .   | <b>63</b> |
| <b>Six</b>   | <b><i>Coordinate Geometry</i></b> . . . . .  | <b>67</b> |
|              | <b>Vocabulary</b> . . . . .  | <b>67</b> |
|              | <b>6.1 Coordinate Plane</b> . . . . .  | <b>68</b> |
|              | • 6.G.10 - Identify and plot points in all four quadrants.   |           |
|              | • 6.G.11 - Calculate the area of basic polygons drawn on a coordinate plane (rectangles and shapes composed of rectangles having sides with integer shapes). |           |
|              | <b>6.2 Graphing Inequalities</b> . . . . .   | <b>72</b> |
|              | • 7.G.10 - Graph the solution set of an inequality (positive coefficients only) on a number line.  |           |
|              | <b>6.3 Test Prep</b> . . . . .   | <b>73</b> |
| <b>Seven</b> | <b><i>Measurement</i></b> . . . . .  | <b>75</b> |
|              | <b>Vocabulary</b> . . . . .  | <b>75</b> |
|              | <b>7.1 Systems of Measurement</b> . . . . .  | <b>76</b> |
|              | • 7.M.2 - Convert capacities and volumes within a given system.  |           |
|              | • 7.M.3 - Identify customary and metric units of mass.   |           |
|              | • 7.M.4 - Convert mass within a given system.  |           |
|              | <b>7.2 Making Circle Graphs</b> . . . . .  | <b>77</b> |
|              | • 7.M.8 - Draw central angles in a given circle using a protractor (circle graphs).  |           |
|              | <b>7.3 Tools of Measurement</b> . . . . .  | <b>79</b> |
|              | • 7.M.9 - Determine the tool and technique to measure with an appropriate level of precision: mass.  |           |
|              | • 7.M.12 - Determine personal references for customary/metric units of mass.   |           |
|              | <b>7.4 Relative Error And Magnitude</b> . . . . .  | <b>80</b> |
|              | • 7.M.10 - Identify the relationship between relative error and magnitude when dealing with large numbers.   |           |
|              | <b>7.5 Estimating Surface Area</b> . . . . .   | <b>81</b> |
|              | • 7.M.11 - Estimate surface area.  |           |
|              | <b>7.6 Mass And Weight</b> . . . . .   | <b>82</b> |
|              | • 7.M.13 - Justify the reasonableness of the mass of an object.  |           |
|              | <b>Test Prep</b> . . . . .   | <b>83</b> |



# TO THE STUDENT

Hello Seventh Grader! This *X-treme Math 7 Review* is designed to help you achieve success on the New York State 7th Grade Math Assessment Test.

Each chapter contains:

- **VOCABULARY**

These words and phrases help you identify ideas and operations in Math and are often used as correct responses to questions throughout the lesson.

- **SPECIFIC TOPICS**

Specific Topics are the "Strands", also called the Key ( Main) Ideas. They are to be learned in preparation for the 7th Grade Math Test.

- **PRACTICE**

Each Lesson has many practice questions which are the "Bands," also called the Performance Indicators. You must be able to understand and do for success on the 7th Grade Math Test.



- **X-TREME NOTES, HINTS, AND REMEMBER**

These special "Notes" and "Remember" hints give you pointers and mental aids to remember the main ideas used on the 7th Grade Math Test.

- **TEST PREPS**

These questions are similar to the questions you will have to answer correctly on the 7th Grade Math Test found at the end of this book.

- **TWO COMPLETE TESTS**

These practice tests give you the opportunity to rehearse with questions on the level of the Assessment Test - what you need to know in order to do well on the 7th Grade Math Test.

- **SYMBOLS AND REFERENCES**

These are a guide to many of the standard signs and symbols used in math operations (page 109).

Make Your Study *X-treme!*

Good luck!

# LESSON TWO

# NUMBER THEORY



## Vocabulary

These words and phrases are associated with Number Theory and may be used when answering questions in this chapter. Definitions can be found in the *Glossary/Index* at the back of this *X-treme Review*.

Composite Number  
Common Factor  
Common Multiple  
Divisibility  
Factors

Greatest Common Factor (GFC)  
Least Common Multiple (LCM)  
Prime Factorization  
Prime Number



## Practical Use of the Number Theory

The annual family reunion is this weekend. All your relatives are coming. Your mom has made a very large cake and is going to decorate a cake with whipped cream and fruit. She wants to alternate blueberries and strawberries in a circular pattern over the cake, using an equal number of both berries. She sends you to the grocery store. Your plan is to purchase 100 blueberries and 100 strawberries.

When you get to the produce department of your store, you find that the berries are already in small boxes packaged and sold by weight, not by individual count. You do not want to waste money by buying more berries than your mom wants, so you need to figure out how to get the number of blueberries and strawberries needed without having too many wasted.

In other words, how can you be sure that you have the same number of blueberries and strawberries, if the numbers in the boxes are different?

One of the things you will review in this lesson, is how to “factor” problems like the one above.

Source: <http://www.childsblueberries.com>

Source: <http://www.mccullagh.org/image/10d-14/west-virginia-strawberries.html>

NO PERMISSION HAS BEEN GRANTED BY N&N PUBLISHING COMPANY, INC TO REPRODUCE ANY PART OF THIS BOOK BY ANY MECHANICAL, PHOTOGRAPHIC, OR ELECTRONIC PROCESS.

# LESSON 2: NUMBER THEORY

## 2.1 INTRODUCTION TO NUMBERS

\_\_\_\_\_ are numbers that are multiplied.

Ex: In  $3 \cdot 4 = 12$ , 3 and 4 are the factors. 12 is known as the product.



**Remember:** To help find factors of a particular number, you can use the \_\_\_\_\_ rules.

A whole number is divided by:

- 2 if the ones' digit is 0, 2, 4, 6, or 8
- 3 if the sum of the digits is divisible by 3
- 4 if the last two digits are divisible by 4
- 5 if the ones' digit is 0 or 5
- 6 if the number is divisible by both 2 and 3
- 8 if the last three digits are divisible by 8
- 9 if the sum of the digits is divisible by 9
- 10 if the ones' digit is a zero

Ex: Find the factors of 36

List all of the ways that you can multiply two numbers to get 36.

$$1 \cdot 36 = 36$$

$$2 \cdot 18 = 36$$

$$3 \cdot 12 = 36$$

$$4 \cdot 9 = 36$$

$$6 \cdot 6 = 36$$

The factors of 36 are: 1, 2, 3, 4, 6, 9, 12, 18, and 36.



**Hint:** When finding factors of a number, start with 1, then 2, and so on, until you get a factor that repeats. Remember to list the factors in numerical order.

Ex: By which of these numbers is 192 divisible: 2, 3, 4, 5, 6, 10 ?

Test for 2: The ones' digit is 2, so 192 is divisible by 2.

Test for 3:  $1 + 9 + 2 = 12$ , and 12 is divisible by 3. Therefore 192 is divisible by 3.

Test for 4:  $92 \div 4 = 23$ . Since 4 goes into 92 with no remainder, the 192 is divisible by 4.

Test for 5: The ones' digit is not 0 or 5, so 192 is not divisible by 5.

Test for 6: Because 192 is divisible by both 2 and 3, then 192 is divisible by 6.

Test for 10: The ones' digit is not 0, so 192 is not divisible by 10.

192 is divisible by 2, 3, 4, and 6.

## Practice

For questions 1 through 4, list all the factors of each of the following

1 28 \_\_\_\_\_

2 56 \_\_\_\_\_

3 108 \_\_\_\_\_

4 100 \_\_\_\_\_

5 By which of the following is 72 divisible? 2, 3, 4, 5, 6, 10

Answer: \_\_\_\_\_

6 By which of the following is 144 divisible? 2, 3, 4, 5, 6, 10

Answer: \_\_\_\_\_

## 2.2 PRIME FACTORIZATION

A \_\_\_\_\_ is a positive integer greater than 1 with exactly two factors, 1 and the number itself.

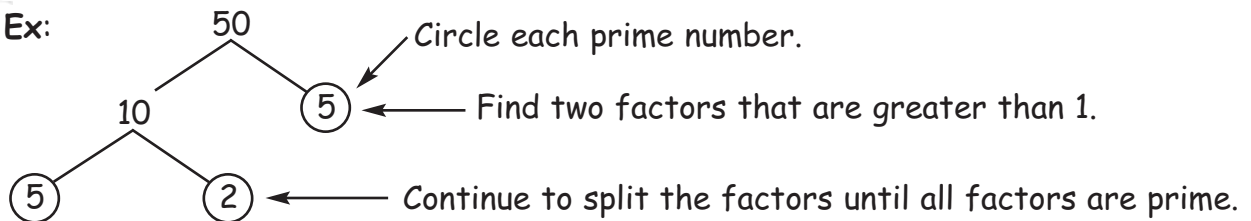
A \_\_\_\_\_ is a positive integer greater than 1 with more than two factors. 1 is neither prime nor composite.

The \_\_\_\_\_ of a number is the expression of the number written as a product of its prime factors.



**Remember:** To find the prime factorization of a number, use a factor tree.

Ex:



$2 \times 5 \times 5$  is the prime factorization of 50.

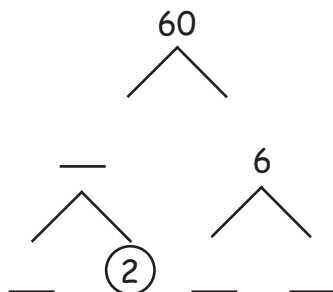
Use exponents to simplify the prime factorization.

$$2 \times 5 \times 5 = 2 \times 5^2$$

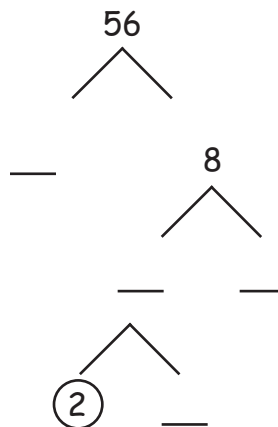
## Practice

For questions 1 and 2, find the prime factorization of each number by filling in the appropriate numbers in each factor tree blank.

1 prime factorization  
of 60: \_\_\_\_\_



2 prime factorization  
of 56 \_\_\_\_\_



For questions 3 through 7, write the prime factorization of each number using exponents.

3 12: \_\_\_\_\_

4 28: \_\_\_\_\_

5 88: \_\_\_\_\_

6 96: \_\_\_\_\_

7 189: \_\_\_\_\_

## 2.3 GREATEST COMMON FACTOR

The \_\_\_\_\_ of a group of numbers is the largest factor that all numbers have in common.



**Remember:** When finding the Greatest Common Factor (GCF) of two or more numbers, list all the factors of each number and locate the greatest factor that they all have in common.

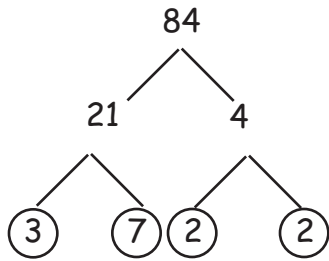
**Ex:** Find the GCF of 40 and 60.

List all the factors of 40: 1, 2, 4, 5, 8, 10, (20), 40

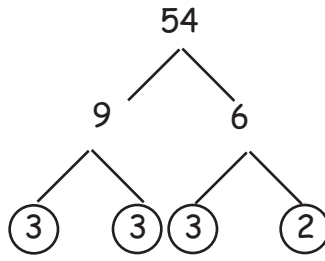
List all the factors of 60: 1, 2, 3, 4, 5, 6, 10, 12, 15, (20), 30, 60

The largest factor both have in common is 20, therefore, the GCF of 40 and 60 is 20.

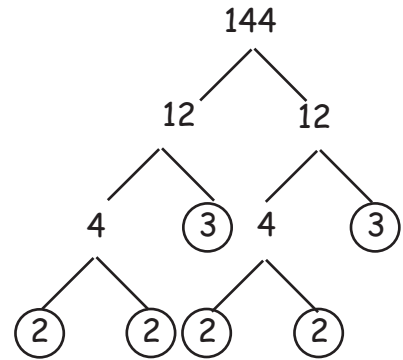
Ex: Use prime factorization to find the GCF of 54, 84, and 144.



$$84 = 2^2 \times 3 \times 7$$



$$54 = 2 \times 3^3$$



$$144 = 2^4 \times 3^2$$

Find the common factors, and use the smallest power of the common factor.

$$\begin{aligned} \text{GCF} &= 2 \times 3 \\ &= 6 \end{aligned}$$

**Practice:**

For questions 1 through 3, find the greatest common factor by listing the factors of each number.

1 24: \_\_\_\_\_ GCF = \_\_\_\_\_  
42: \_\_\_\_\_

2 36: \_\_\_\_\_ GCF = \_\_\_\_\_  
48: \_\_\_\_\_

3 8: \_\_\_\_\_ GCF = \_\_\_\_\_  
16: \_\_\_\_\_  
20: \_\_\_\_\_

For questions 4 through 6, find the GCF by using their prime factorizations.

4 80, 128

5 90, 108

6 12, 18, 21

GCF = \_\_\_\_\_

GCF = \_\_\_\_\_

GCF = \_\_\_\_\_

## 2.4 LEAST COMMON MULTIPLE

The \_\_\_\_\_ of two or more numbers is the smallest number that is a common multiple.



**Remember:** When finding the Least Common Multiple (LCM) of a group of numbers, list the multiples of each number given. The first multiple that all numbers have in common is the least common multiple.

**Ex:** Find the least common multiple of 4 and 5.

4: 4, 8, 12, 16, **(20)**, 24, ...

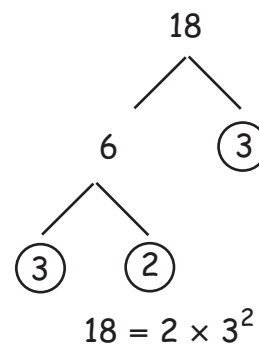
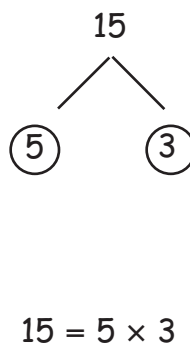
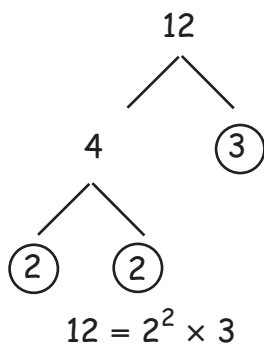
5: 5, 10, 15, **(20)**, 25, ...

LCM: 20



**Hint:** Another way of finding the LCM of a group of numbers is by using prime factorization. First, write the prime factorizations of each number. Then, use the largest power of each factor and multiply.

**Ex:** Use prime factorization to find the LCM of 12, 15, and 18.



$$\text{LCM} = 2^2 \times 3^2 \times 5 = 180$$

### Practice:

For questions 1 through 3, find the LCM by listing the multiples of each number.

1 20: \_\_\_\_\_ LCM = \_\_\_\_\_  
30: \_\_\_\_\_

2 6: \_\_\_\_\_ LCM = \_\_\_\_\_  
10: \_\_\_\_\_

3 7: \_\_\_\_\_ LCM = \_\_\_\_\_  
14: \_\_\_\_\_  
20: \_\_\_\_\_

For questions 4 through 6, use prime factorization to find the LCM.

4 36, 45

5 15, 40

6 45, 120, 150

LCM = \_\_\_\_\_

LCM = \_\_\_\_\_

LCM = \_\_\_\_\_

### TEST PREP

1 Which of the following is the prime factorization for 150?

- A  $15 \times 10$
- B  $5^2 \times 6$
- C  $2 \times 3 \times 5^2$
- D  $2 \times 3 \times 5$

2 Which one of the following is divisible by 3?

- A 1,234
- B 2,144
- C 3,212
- D 4,320

3 The expression  $2^5 \times 3$  represents which number?

- A 30
- B 48
- C 64
- D 96

4 For what value of  $n$  is the following statement true?

$$2^n = 256$$

- A 8
- B 7
- C 6
- D 5

5 Which number is a prime number?

- A 61
- B 63
- C 65
- D 69

6 Sam is thinking of an even number between 1 and 100. Use the following statements to determine the number.

- The number is greater than the square root of 121.
- The number is less than the square root of 400.
- The number is a factor of 196.

- A 11
- B 14
- C 16
- D 18

7 Which of the following is divisible by 6?

- A 5,231
- B 3,140
- C 4,512
- D 6,405

8 Alex has 136 marbles. Which expression equals the number of marbles?

- A  $2^3 \times 17$
- B  $3^2 \times 17$
- C  $2 \times 2 \times 6^2$
- D  $4 \times 6 \times 8$

9  $2^4 \times 3^2 = ?$

- A 72
- B 136
- C 144
- D 164

10 Which is the LCM of 15 and 24?

- A 9
- B 3
- C 360
- D 120

11 Which is the GCF of 24 and 40?

- A 8
- B 4
- C 960
- D 120

12 90 is not divisible by which number?

- A 2
- B 4
- C 6
- D 10

---

13 Boxes that are 8in. tall are stacked next to boxes that are 15in. tall. Find the least number of each size box that could be stacked next to each other so that both stacks are the same height.

**Show your work.**

Answer: \_\_\_\_\_

14 In the space below, make a factor tree to show the prime factorization of the number 240.

Answer: \_\_\_\_\_

15 Juan used exponents to write this prime factorization of a number:  $2^4 \times 3^2 \times 5^3$ . What is the standard form for this number?

**Show your work.**

Answer: \_\_\_\_\_

16 Sally's age is a common factor of both 68 and 102. She is a teenager. How old is Sally?

Show your work.

Answer: \_\_\_\_\_

17 Strawberries come 12 to a basket. Blueberries come 30 to a basket. What is the fewest number of baskets of each would you have to buy so that you have exactly the same number of strawberries and blueberries?

Show your work.

Answer: \_\_\_\_\_

18 Write 196 as a product of prime factors.

Answer: \_\_\_\_\_

19 Erica and Bob are describing the same number. Erica states, "The number is a positive odd integer less than 30." Bob says, "The number is divisible by 3." If Bob gave a false statement, but Erica's statement is true, what are all the possible numbers?

Answer: \_\_\_\_\_

Explain how you arrived at your answer.

---

---

---

---

20 Which of the following numbers are prime?

46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58

Answer: \_\_\_\_\_

Explain why the remaining numbers are composite.

---

---

---

---