

Name:

Eden 

Date:

Fall 2023 Semester

Instructor:

Samuel Chukwuemeka

Project:

Number Theory Application: Check Digits for International Standard Book Numbers (ISBNs)

Book Title:

Ready Classroom Mathematics

Copyright Year, Edition, and ISBNs:

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Volume 1

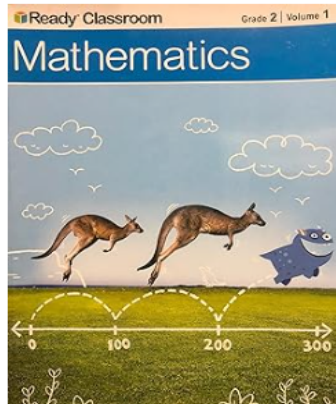
ISBN-10: 1495780341

ISBN-13: 9781495780349

Objectives:

- (1.) Verify the check digit for ISBN-10
- (2.) Verify the check digit for ISBN-13
- (3.) Convert ISBN-10 to ISBN-13
- (4.) Covert ISBN-13 to ISBN-10

Calculations:



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Ready Classroom Mathematics Grade 2 | Volume 1 Paperback – January 1, 2020

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1st Objective: Verify the check digits for ISBN-10 (modulo 11)

Given: 1495780341

Approach: Multiplication-Modulo Approach

$$1 \times 1 = 1$$

$$4 \times 2 = 8$$

$$9 \times 3 = 27$$

$$5 \times 4 = 20$$

$$7 \times 5 = 35$$

$$8 \times 6 = 48$$

$$0 \times 7 = 0$$

$$3 \times 8 = 24$$

$$4 \times 9 = 36$$

Sum of the Products

$$1 + 8 + 27 + 20 + 35 + 48 + 0 + 24 + 36 = 199$$

Sum divided by Modulo

$$199 \div 11 = 18 \text{ Remainder } 1$$

$$\text{Check digit} = \text{Remainder} = 1$$

This is the correct check digit.

2nd Objective: Verify the check digit for ISBN-13 (modulo 10)

Given: 9781495780349

Approach: Multiplication-Modulo-Subtraction Approach

$$9 \times 1 = 9$$

$$7 \times 3 = 21$$

$$8 \times 1 = 8$$

$$1 \times 3 = 3$$

$$4 \times 1 = 4$$

$$9 \times 3 = 27$$

$$5 \times 1 = 5$$

$$7 \times 3 = 21$$

$$8 \times 1 = 8$$

$$0 \times 3 = 0$$

$$3 \times 1 = 3$$

$$4 \times 3 = 12$$

Sum of the Products

$$9 + 21 + 8 + 3 + 4 + 27 + 5 + 21 + 8 + 0 + 3 + 12 = 121$$

Sum divided by 10

$$121 \div 10 = 12 \text{ Remainder } 1$$

Modulo – Remainder

$$10 - 1 = 9$$

This is the correct check digit.

3rd Objective: Convert ISBN-10 to ISBN-13

Given: ISBN-10: 1495780341

To Convert: to ISBN-13

- (1.) Remove the check digit, 1: we have 149578034
- (2.) Replace it with the check digit for ISBN-13: we have 1495780349
- (3.) Append 978 in front of the remaining digits: we have 9781495780349

ISBN-13 is 9781495780349

4th Objective: Convert ISBN-13 to ISBN-10

Given: ISBN-13: 9781495780349

- (1.) Remove the check digit, 9: we have 978149578034
- (2.) Replace it with the check digit for ISBN-10: we have 9781495780341

(3.) Remove the number, 978, from the front of the remaining digits: we have
1495780341

ISBN-10 is 1495780341

References (APA):

Chukwuemeka, S. (2023). Check digits for International Standard Book Number (ISBN). *Mathematics Education Courses*

<https://www.mathematicseducation.appspot.com/>

Ready Classroom. (2020). *Ready classroom mathematics*. Curriculum Associates