

Chapter 16: Identification Numbers

For All Practical
Purposes



Mathematical Literacy in
Today's World, 9th ed.

Section 16.1 Check Digits (American Express Checks)

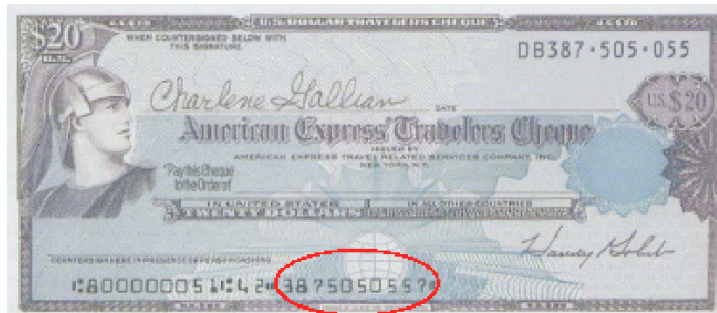
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Check Digits

- Check Digit
 - A digit included in an identification number for the purpose of error detection.
 - Mathematical calculations or schemes are used on the digits of the identification number to assign the check digit.
 - Computers use the check digit to help detect typing errors during data entry to prevent and detect fraud and to find other errors.

Example American Express Checks



The check digit is chosen so that the sum of the digits, including the check digit, is evenly divisible by 9.

Identification number = 3875055, check digit = 7

$$3+8+7+5+0+5+0+5+5=38$$

$$38+7 \text{ is evenly divisible by } 9$$

Example 2:

Suppose an American Express Travelers Cheque is numbered #293019225, where the first digit is obliterated. What is the missing digit?

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Solution:

$$? + (2 + 9 + 3 + 0 + 1 + 9 + 2 + 2 + 5) = 33$$

The sum of the 9 existing digits is 33. Since the sum of all 10 digits must be divisible by 9, a first digit of 3 would change the total to 36, which is divisible by 9.

Try the example without reading the answer first.