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ABSTRACT

This teacher guide is part of the materials prepared for an individualized program for ninth-grade algebra and basic mathematics students. Materials written for the program are to be used with audiovisual lessons recorded on tape cassettes. For an evaluation of the program, see ED 086 545. In this guide, the teacher is provided with objectives for each topic area and guided to materials written for a given topic. Three short criterion tests are included for each topic covered. The work in this package deals with numeration and place value. This work was prepared under an ESEA Title III contract. (JP)

BASIC MATH I

Package # 01-01

NUMERATION

Prepared By

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NUMERATION

Numeration means "Naming Numbers". We can name numbers in many different ways. In this package you will learn how to use four of them, Standard Numerals, Exponents, Base 10 Naming, and Word Names. The ideas explained in this package will be useful to you in understanding addition, subtraction, and multiplication, found in later packages.

Goal: The goal of this package is to form a background for the understanding of the arithmetic operations of addition, subtraction, and multiplication. You can reach this goal by meeting the following objectives:

Package Objectives:

1. Given a problem in naming a number by standard numeration or expanded numeration, write a solution to the problem.

2. Given a problem in naming numbers by means of exponents, write a solution to the problem.

3. Given a problem in naming numbers by use of exponents to the base 10, write a solution to the problem.

4. Given a problem involving use of a word name for a number, write the solution to the problem.

I.U. # 01-01-01

Standard Numerals

You will need to recall that:

A *numeral* is the written name for a number, for instance, 25 is the numeral that names the number twenty-five.

OBJECTIVES:

1. Given a standard numeral, write it in expanded form.
2. Given an expanded numeral, write it in standard form.
3. Given any problem in naming a number in standard or expanded form, write the solution to the problem.

ACTIVITIES:

Study pages 3 and 4 in AMIA and do the margin exercises. Check your answers on page 388. (Objectives 1,2,3)

Do problems on page 11 and 12. Answers on page 388. (Objectives 1,2,3,)

Criterion Test 01-01-01-01

Write expanded numerals

1. 5,240
2. 3762
3. 151
4. 75
5. 8002

Write standard numerals

6. 8000 + 700 + 60 + 5
7. 6000 + 700 + 60 + 3
8. 5000 + 60
9. 400 + 2
10. 2000 + 800 + 2

Criterion Test 01-01-01-02

Write expanded numerals

1. 8372
2. 5761
3. 7072
4. 1705
5. 35

Write standard numerals

6. 5000 + 200 + 40
7. 6000 + 500 + 20 + 1
8. 3000 + 10 + 5
9. 9000 + 3
10. 400 + 30 + 2

Criterion Test 01-01-01-03

Write expanded numerals

1. 1723
2. 1896
3. 1492
4. 1972
5. 1002

Write standard numerals

6. 1000 + 900 + 20 + 2
7. 7000 + 800 + 90 + 1
8. 7000 + 1
9. 7000 + 20 + 1
10. 400 + 20 + 9

Answers to Criterion Tests

Test # 01-01-01-01

1. 5000 + 200 + 40
2. 3000 + 700 + 60 + 2
3. 100 + 50 + 1
4. 70 + 5
5. 3000 + 2
6. 8765
7. 6763
8. 5060
9. 402
10. 2802

Test # 01-01-01-02

1. 8000 + 300 + 70 + 2
2. 5000 + 700 + 60 + 1
3. 7000 + 70 + 2
4. 1000 + 700 + 5
5. 30 + 5
6. 5240
7. 6521
8. 3015
9. 9003
10. 432

Test # 01-01-01-03

1. 1000 + 700 + 20 + 3
2. 1000 + 800 + 90 + 6
3. 1000 + 400 + 90 + 2
4. 1000 + 900 + 70 + 2
5. 1000 + 2
6. 1922
7. 7891
8. 7001
9. 7021
10. 429

I. U. 01-01-02

Exponents

You will need to recall that:

An *exponent* is a small number written above and to the right of a standard numeral.

OBJECTIVES:

1. Given a product like 7 x 7 x 7 x 7, name it with an exponent like 7^4.
2. Given a number a, name it with an exponent 1 as a^1.
3. Given a number with an exponent of 1, like 13^1, name it with a standard numeral as 13.
4. Given a number with an exponent of 0, like 25^0, rename it with a standard numeral as 1.
5. Given a problem in naming a number using exponents, write the solution to the problem.

ACTIVITIES:

1. Study page 5, AAMA. Do margin exercises 11-18, (objective No. 1).
2. Study "Exponents of One" pages 5 and 6, AAMA
   Do margin exercises 19-20 (objective No. 2).
   Do margin exercises 21-22 (objective No. 3).
3. Study "Zero Exponents", page 6, AAMA
   Do margin exercises 21-24 (objective No. 4).
4. Work Exercise set 2, pages 13-14, AAMA (objective No. 5)

Answers to exercises on page 388.

Criterion Test 01-01-02-01

Name with an exponent

1. $6 \times 6 \times 6 \times 6$

2. $9 \times 9 \times 9 \times 9 \times 9$

Name without an exponent

3. 6^2

4. 2^4

5. 17^1

6. 9^0

Name with an exponent of 1

7. 35

8. 14

Name using exponents

9. $4 \times 10 \times 10$

10. $7 \times 10 \times 10 \times 10 \times 10 \times 10$

Criterion Test 01-01-02-02

(1) Name with an exponent

A. $8 \times 8 \times 8 \times 8$

B. 7×7

(2) Name with an exponent of 1

A. 28

B. 17

(3) Name as a standard numeral

A. 15^0

B. 20^1

(4) Write as a standard numeral

A. 15^0

B. 20^0

(5) Solve the following problems

A. Rename $4 \times 10 \times 10 \times 10$ using an exponent.
B. Write as a standard numeral 6×10^2

Criterion Test 01-01-02-03

(1) Name without an exponent

A. 7^2 B. 4^3

(2) Name with an exponent

A. 7 x 7 x 7 B. 12 x 12 x 12 x 12

(3) Write as a standard numeral

A. 14^1 B. 13^0 C. 12^2 D. 11^0 E. 10^1

(4) Rename 7 x 10 x 10 x 10 x 10 using an exponent.

Answers to Criterion Tests

Test 01-01-02-01

1. 6^4 2. 9^5 3. 36 4. 16 5. 17 6. 1

7. 35^1 8. 14^1 9. 4×10^2 10. 7×10^5

Test 01-01-02-02

1. (A). 8^4 (B). 7^2

2. (A). 28^1 (B). 17^1

3. (A). 1 (B). 20

4. (A). 1 (B). 1

5. (A). 4×10^3 (B). 600

Test 01-01-02-03

1. (A). 49 (B). 64

2. (A). 7^3 (B). 12^4

3. (A). 14 (B). 1 (C). 144 (D). 1 (E). 10

4. 7×10^4

I. U. 01-01-03

Base Ten

You will need to recall that:

An exponent like 10^3 means 10 x 10 x 10 which is also named 1000 in standard numeration, and that 10^2 is 100 in standard numeration, etc.

OBJECTIVES:

1. Given a standard numeral like 5284, write an expanded numeral, with exponents like $(5 \times 10^3) + (2 \times 10^2) + (8 \times 10^1) + (4 \times 10^0)$.

2. Given an expanded numeral with exponents like $(4 \times 10^3) + (3 \times 10^2) + (7 \times 10^1) + (2 \times 10^0)$, write it as a standard numeral.

3. Given any problem in naming numbers by use of exponents to the base 10, write a solution to the problem.

ACTIVITIES:

1. Study examples 1 and 2, page 7, and write margin exercises 25 and 26. (objective No. 1)

2. Study examples 3, 4, and 5, page 7, and write margin exercises 27, 28, and 29. (objective No. 2)

3. Write exercise set 3, pages 15 and 16 (objective No. 3)

Answers to exercises are on page 388

Criterion Test 01-01-03-01

1. Write an expanded numeral with exponents

(A) 3276 (B) 5732 (C) 745 (D) 28 (E) 5030

2. Write as a standard numeral

(A) $1 \times 10^3 + 5 \times 10^2 + 3 \times 10^1 + 2 \times 10^0$
(B) $2 \times 10^3 + 3 \times 10^2 + 5 \times 10^1 + 1 \times 10^0$
(C) $5 \times 10^3 + 5 \times 10^0$
(D) $3 \times 10^2 + 3 \times 10^1 + 3 \times 10^0$
(E) $4 \times 10^3 + 3 \times 10^2 + 2 \times 10^1 + 1 \times 10^0$

Criterion Test 01-01-03-02

1. Write as a standard numeral

(A) $5 \times 10^3 + 9 \times 10^2 + 7 \times 10^1$
(B) $3 \times 10^2 + 8 \times 10^0$
(C) $7 \times 10^3 + 9 \times 10^1$
(D) $1 \times 10^4 + 2 \times 10^3 + 3 \times 10^2 + 4 \times 10^1 + 5 \times 10^0$
(E) $2 \times 10^3 + 2 \times 10^1$

2. Write an expanded numeral with exponents

(A) 2752 (B) 2841 (C) 2001 (D) 9876 (E) 25

Criterion Test 01-01-03-03

1. Write an expanded numeral with exponents

(A) 1492 (B) 1914 (C) 1776 (D) 1812 (E) 1972

2. Write as a standard numeral

(A) $5 \times 10^2 + 2 \times 10^1 + 1 \times 10^0$
(B) $3 \times 10^3 + 4 \times 10^2 + 8 \times 10^1 + 9 \times 10^0$
(C) $2 \times 10^1 + 5 \times 10^0$
(D) $8 \times 10^4 + 6 \times 10^3 + 4 \times 10^2 + 2 \times 10^1 + 1 \times 10^0$
(E) $5 \times 10^3 + 5 \times 10^0$

Answers to Criterion Tests

Test 01-01-03-01

1. (A) $3 \times 10^3 + 2 \times 10^2 + 7 \times 10^1 + 6 \times 10^0$
   (B) $5 \times 10^3 + 7 \times 10^2 + 3 \times 10^1 + 2 \times 10^0$
   (C) $7 \times 10^2 + 4 \times 10^1 + 5 \times 10^0$
   (D) $2 \times 10^1 + 8 \times 10^0$
   (E) $5 \times 10^3 + 3 \times 10^1$

2. (A) 1532 (B) 2351 (C) 5005 (D) 333 (E) 4321

Test 01-01-03-02

1. (A) 5970 (B) 308 (C) 7090 (D) 12,345 (E) 2020

2. (A) $2 \times 10^3 + 7 \times 10^2 + 5 \times 10^1 + 2 \times 10^0$
   (B) $2 \times 10^3 + 8 \times 10^2 + 4 \times 10^1 + 1 \times 10^0$
   (C) $2 \times 10^3 + 1 \times 10^0$
   (D) $9 \times 10^3 + 8 \times 10^2 + 7 \times 10^1 + 6 \times 10^0$
   (E) $2 \times 10^1 + 5 \times 10^0$

Test 01-01-03-03

1. (A) $1 \times 10^3 + 4 \times 10^2 + 9 \times 10^1 + 2 \times 10^0$
   (B) $1 \times 10^3 + 9 \times 10^2 + 1 \times 10^1 + 4 \times 10^0$
   (C) $1 \times 10^3 + 7 \times 10^2 + 7 \times 10^1 + 6 \times 10^0$
   (D) $1 \times 10^3 + 8 \times 10^2 + 1 \times 10^1 + 2 \times 10^0$
   (E) $1 \times 10^3 + 9 \times 10^2 + 7 \times 10^1 + 2 \times 10^0$

2. (A) 521 (B) 3489 (C) 25 (D) 86,421 (E) 5005

I. U. 01-01-04

Word Names

You will need to recall that:

A *digit* is one of the ten numerals (0, 1, 2, 3, 4, 5, 6, 7, 8, 9) that we use to write standard numerals.

When we write numerals containing more than three digits, we separate the *periods* of three digits each with commas. Example: 83,000,000 or 5,280.

OBJECTIVES:

1. Given a standard numeral, write the word name for it.
2. Given a word name for a number, write the standard numeral for it.
3. Given a standard numeral like 25,872, write in what period 25 is.
4. Given a numeral like 275,364, explain, in writing, the meaning of each digit.
5. Given a numeral like 754,321, identify the tens digit, the hundreds digit, and so on.
6. Given any problem involving use of a word name for a number, write the solution to the problem.

ACTIVITIES:

1. Study page 8 in AAMA. Write margin exercises 30-38 (objectives 1, 2, and 3)
2. Study page 9 in AAMA. Write margin exercises 39-46 (objectives 4 and 5)
3. Do exercise set 4, pages 18-19, AAMA. (objective 5)

Criterion Test 01-01-04-01

1. Write the word name for:

   (A) 75 (B) 3,555,327

2. Write the standard numeral for:

   (A) seven thousand, three hundred thirty-six
   (B) five hundred fifty-five thousand, four hundred thirty two.

3. In what period is the digit 5?

   (A) 5,276,381 (B) 3,253,791

4. What is the meaning of the digit 5 in each of the numerals?

   (A) 3,278,521 (B) 3,258,721

5. Write the word names for the numerals.

   (A) 32,751 (B) 21,745,432

6. (A) Which digit is the tens digit in 1,735,281?
   (B) The hundreds digit?

Criterion Test 01-01-04-02

1. Write the word name for:

   (A) 3,277,144 (B) 27,000,286

2. Write the standard numeral for:

   (A) Three hundred fifty-four thousand, seven hundred two
   (B) Two million, two hundred thirty-three thousand, eight hundred twelve.

3. In what period is the digit five located?

   (A) 352,173,666 (B) 136,775,321

4. What is the meaning of the digit 5 in each of the following numerals?

   (A) 3,245,721 (B) 254

5. (A) Which digit is the thousands digit in the numeral 7,235,491?
   (B) Which digit is the hundreds digit in 7,421?

6. Write the word name for:

   (A) 72,654 (B) 3,333

Criterion Test 01-01-04-03

1. In what period do you find the digit 5 in the following standard numerals?

   (A) 4,321,576 (B) 6,577,321

2. Write the meaning of the digits 2 and 5 in the following numeral. 1,726,154

3. (A) What is the tens digit in 7,126,773,458?
   (B) What is the hundreds digit in 756,321?

4. Write the word name for the following standard numerals.

   (A) 1,276,544 (B) 75,202 (C) 70,500 (D) 700,020

5. Write the standard numeral for the following:

   (A) Six thousand, three hundred forty-two
   (B) Two million, one hundred forty-three thousand, nine hundred twenty-one.

Answers to Criterion Tests

Test 01-01-04-01

1. (A) Seventy-five
   (B) Three million, five hundred fifty-five thousand, three hundred twenty-seven.

2. (A) 7,336 (B) 555,432

3. (A) millions (B) thousands

4. (A) 5 hundreds (B) 5 ten thousands

5. (A) thirty-two thousand, seven hundred fifty-one

   (B) Twenty-one million, seven hundred forty-five thousand, four hundred thirty-two.

6. (A) 8 (B) 2

Test 01-01-04-02

1. (A) Three million, two hundred seventy-seven thousand, one hundred forty-four
   (B) Twenty-seven million, two hundred eighty-six

2. (A) 354,702 (B) 2,233,812

3. (A) millions (B) thousands

4. (A) 5 thousands (B) 5 tens

5. (A) 5 (B) 4

6. (A) Seventy-two thousand, six hundred fifty-four
   (B) Three thousand, three hundred thirty-three

Answers to Criterion Tests (Continued)

Test 01-01-04-03

1. (A) ones (B) thousands

2. (A) 2 ten thousands (B) tens

3. (A) 5 (B) 3

4. (A) One million, two hundred seventy-six thousand, five hundred forty-four

   (B) Seventy-five thousand, two hundred two

   (C) Seventy thousand, five hundred

   (D) Seven hundred thousand, twenty

5. (A) 6,342 (B) 2,143,921

END OF PACKAGE 01-01