Title: Planetary Place Value

Brief Overview:

Blast-off into learning fun!!! Students will explore the concepts of number sense and place value through a series of space-related activities that are out of this world! Focusing on numbers through 9,999, students will work with base-ten blocks and other manipulatives to become familiar with standard and expanded forms and word names. Once students achieve a deep understanding of these concepts, they will conclude the mini-unit with exercises that involve comparing and ordering numbers.

NCTM Content Standard/National Science Education Standard:

Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals

Grade/Level:

Grade 3

Duration/Length:

3 days, 60-75 minutes each day

Student Outcomes:

Students will:

- Use models, symbols, words, and numbers in order to read, write, and represent numbers through 9,999.
- Determine the value of a number in order to compare and order numbers through 9,999.

Materials and Resources:

Lesson 1

How Much, How Many, How Far, How Heavy, How Long, How Tall is 1,000?
Nolan/Walker, Scholastic Publishing
Base ten blocks for each student
Overhead place value mat and base ten blocks
Student Resource Sheet 1-"Place Value Chart"
Student Resource Sheet 2- "Rocket Digit Cards"
Student Resource Sheet 3-"A Voyage through Space"
Student Resource Sheet 4-"Launch your Learning"

Student Resource Sheet 5-"Extra Practice"
Number words written on sentence strips (one-nineteen, twenty, thirty, forty,…hundred, thousand)

Lesson 2

Dowel rod
Teacher Resource Sheet 3-Rocket Pattern, photocopied on tag board
Scotch tape
Chalkboard/chalk OR colored electrical tape
Magnetic tape
10--8 ½ x 11 pieces of tag board
Thick black marker
Base ten blocks
Student wipe boards, markers, and erasers
Student Resource Sheet 6-"Out of this World"
Paper clips

Lesson 3

Student Resource Sheet 7-"Planet Place Value Cards"
Student Resource Sheet 8-"From Earth to the Moon"
Student Resource Sheet 9-"Order Up"
Rainbow cube for game piece

Development/Procedures:

Lesson 1

Teacher Preparation—

- Photocopy and laminate Student Resource Sheet 1, "Thousand Place Value Chart" for future use
- Photocopy and laminate Student Resource Sheet 2, "Rocket Digit Cards" for future use
- Create a word name reference wall by hanging word name sentence strips in order from least to greatest

Pre-Assessment

- Distribute sets of base ten blocks (only hundreds, tens, and ones) to pairs of students. Give them 3-4 minutes to use these blocks to show 1,000. As students work together, listen to discussions to assess who understands the concept of 1,000.
- When time expires, have several groups of students share how they created 1,000.
- Show students the 1,000 cube. Discuss how student constructions compare with this cube.

Launch –

- Read *How Much, How Many, How Far, How Heavy, How Long, How Tall is 1,000?* aloud to class. As you read, students should note something that surprises them or something that they find interesting about 1,000.
- Students discuss with partner/group their surprising/interesting fact. Allow a few students to share their ideas with the class.

Teacher Facilitation –

- Explain to students that they will journey through space the next few days as they discover ways to apply place value to real-life.
- Distribute Student Resource Sheet 3, "A Voyage through Space." Model how to complete the first problem using the overhead place value mat and base ten blocks. First, build the model with manipulatives, displaying the base-ten blocks for students to view. Discuss how this representation would be drawn as a picture, read aloud, and written in words. Be certain to emphasize the importance of using the number word wall so that words are spelled correctly. In addition, be certain to thoroughly discuss the use of zero as a placeholder. Continue to refer back to the place value mat.
- Students will then assist the teacher in completing the chart for the second Fun Space Fact.
- Students should work on number 3 individually and then check their answer with a partner. As they discuss the solution, walk around to assist those who need help and observe who has grasped the concept. Answers can be found on Teacher Resource Sheet 1.

Student Application –

- Distribute sets of rocket digit cards and place value mats to pairs of students. (Student Resource Sheet 1 & 2). Distribute Student Resource Sheet 4, "Launch your Learning" to students.

Embedded Assessment –

- Throughout the teacher facilitation and student application game, observe student performance. Record pertinent information in anecdotal records.
- Prior to leaving class, students must correctly read a number written in standard form between 1,000 and 9,999.

Reteaching/Extension –

- Pull a reteach group if necessary and guide them through Student Resource Sheet 5, "Extra Practice." The rest of the class will select 4 rocket digit cards. They will attempt to create as many numbers as possible from these four digit cards. If computers are available, students can also visit http://www.dositey.com/addsub/Mystery10.htm

  Answers can be found on Teacher Resource Sheet 2.

Teacher Preparation— **Lesson 2**

- Create a rocket pointer by taping a cut out of the rocket on Teacher Resource Sheet 3, "Rocket Pattern," to the end of a dowel rod.
- Use colored chalk or colored electrical tape to create a thousands place value mat on the chalkboard.
- Attach magnetic tape to the back of 8 ½ x 11 tag board. Write the digits 0-9 with a thick black marker to create large digit cards.

Preassessment/Launch –

- Distribute place value models, wipe board, marker, and eraser to each student.
- Display the number 3,251 in the chalkboard place value mat. "Launch" the rocket pointer and have it "land" on the 2. Ask students to build the value of that digit with their base ten blocks, and then record the value in numbers on their wipe board. Repeat this process for the 5 and the 3.

Teacher Facilitation –

- Review student answers from the launch activity. Discuss how the value is assigned to each digit, telling exactly how much that number is worth.
- Explain to students that numbers can also be represented in expanded form—written as an addition problem. Use the example, 3,251 to model how to break this number into expanded form. Depending on the level of students, it may be necessary to rebuild the number with manipulative base-ten blocks.
- Remove 3,251 from the board. Ask student volunteers to select a new number and display these digit cards on the board. If a zero does not appear in the selected digits, switch one digit out for a zero. (For lower students, continue to place the digit cards in the place value chart. If students are ready for it, simply place digits on the board, placing a comma in the correct location.) Review yesterday's concept by asking students to read the number correctly. Ask students to assist you in recording the expanded form for the new number.
- Continue the above process 2-4 more times as students work individually to record the expanded form on their wipe boards. Collect materials.

Student Application –

- Distribute Student Resource Sheet 6, "Out of this World" and Student Resource Sheet 7. Review the rules of "Out of this World," with students.

Embedded Assessment –

- Throughout the teacher facilitation and student application game, observe student performance. Record pertinent information in anecdotal records.
- Prior to leaving class, students complete a journal entry to answer:

Andy Astronaut tells his friend Sally Scientist that in 7,502, the value of the underlined digit is 50. Do you agree with Andy? Use words and/or numbers to explain why your answer is correct.

- Assess responses to identify students in need of clarification before beginning the next lesson.

Reteaching/Extension –

- Pull a reteach group if necessary. Have students spin 4 digits to create a number in standard form. Students can then record the expanded form on their wipe boards. The rest of the class can locate numbers in newspapers and magazines. Then they should record these numbers in expanded form or if computers are available, students can visit http://www.funbrain.com/funbrain/tens

Lesson 3

Teacher Preparation—

- Photocopy and laminate Student Resource Sheet 8, "Planet Place Value Cards" for future use.

Preassessment/Launch –

- Distribute Student Resource Sheet 9, "From Earth to the Moon," game board to pairs of students. Explain that students will each draw a planet card from the deck. An expression comparing these two numbers should be written in the next available game board space (Ex: 3,402>3,240). The student with the greater number then moves their pawn (rainbow cube) one space ahead. Play continues until the first student to make it to the moon wins.
- Observe the use of the greater than and less than symbols. If necessary, briefly review them with the students.

Teacher Facilitation –

- Distribute Student Resource Sheet 10, "Order Up." Model how to complete #1. Students assist with #2. Answer Key can be found on Teacher Resource Sheet 4.

Student Application –

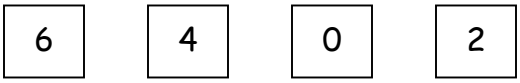
- Students use planet place value cards again. Working with a partner, they should draw four cards at a time and place the numbers from least to greatest on their desk. As students work, circulate and prompt discussions with students to understand why they are ordering their numbers in that fashion.

Embedded Assessment –

- Throughout the teacher facilitation and student application game, observe student performance. Record pertinent information in anecdotal records.
- Prior to leaving class, students should complete the following journal entry:

  David draws the following four digit cards

  .

Arrange the digits so that David has the greatest possible number. Use what you know about place value to explain why your answer is correct.

Reteaching/Extension –

- Pull a reteach group if necessary and guide them through the student application activity described above. The rest of the class will take their list of numbers made during the extension activity on Day 1and write them in order from least to greatest. Cross-curricular connection/extra-credit: Students can explore http://www.nasa.gov/audience/forkids/home/index.html to discover what activities occur at the various NASA sites.

Summative Assessment:

- Students will complete Student Resource Sheet 11, "Showcase Your Success." Selected response questions and brief-constructed response questions will address the following objectives:
- Students will use models, symbols, words, and numbers in order to read, write, and represent numbers through 9,999.
- Students will determine the value of a number in order to compare and order numbers through 9,999.

Answer Key can be found on Teacher Resource Sheet 5.

Authors:

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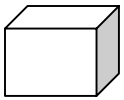
Place Value Chart

Student Resource Sheet 1

Thousands 	*Hundreds* 	*Tens*	*Ones*

Rocket Digit Cards

1	1	2	2
3	3	4	4
5	5	6	6
7	7	8	8
9	9	0	0
0	0	0	0
0	0	0	,

A Voyage through Space…

Read each fun space fact. Build each number with your place value models. Then, draw the model in the space provided. Finally, write the word name. Remember: use your resources to spell words correctly!!!

The temperature in most sun spots is about **4,032** Kelvin.

Draw your model here.

Write your word name here.

The diameter of Mars is **6,794** kilometers (km).

Draw your model here.

Write your word name here.

Some gaps in Saturn's rings are **3,520** kilometers (km) wide.

Draw your model here.

Write your word name here.

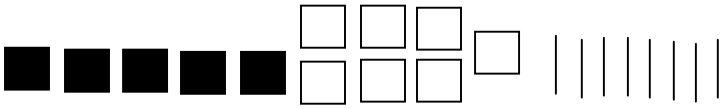
Teacher Resource Sheet 1

A Voyage Through Space…

ANSWER KEY

Read each fun space fact. Build each number with your place value models. Then, draw the model in the space provided. Finally, write the word name. Remember: use your resources to spell words correctly!!!

The temperature of the sun is 5,780 Kelvin.

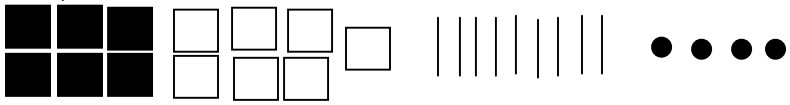


Write your word name here.

Five thousand, seven hundred eighty

The diameter of Mars is 6,794 kilometers (km).

Draw your model here.

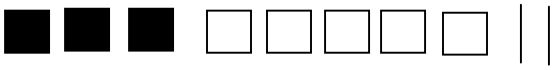


Write your word name here.

Six thousand, seven hundred ninety-four

Some gaps in Saturn's rings are 3,520 kilometers (km) wide.

Draw your model here.

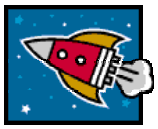


Write your word name here.

Three thousand, five hundred twenty

Student Resource Sheet 4

Launch your Learning!



Work with a partner to demonstrate what you've learned about reading, writing, and representing numbers*

Rules:

**Each person draws 4 rocket digit cards. Arrange the cards in any order and record your number below.

**Read the number to your partner aloud.

**Then, draw base ten models to represent the number.

**If your partner agrees with your answer they say, "Blast off."

**Repeat this process as many times as you can.

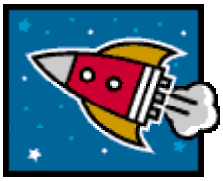
Standard Form	Standard Form
Base Ten Model	Base Ten Model

Standard Form	Standard Form
Base Ten Model	Base Ten Model

Standard Form	Standard Form
Base Ten Model	Base Ten Model

Student Resource Sheet 5

Extra Practice...

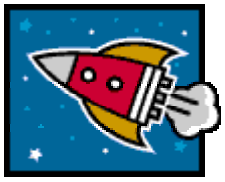


Complete the chart to demonstrate your understanding of place value.

Standard Form	Model	Word Name
5,092		
	■ ■ □ □ •••	
		Four thousand, nine hundred eighty
3,873		

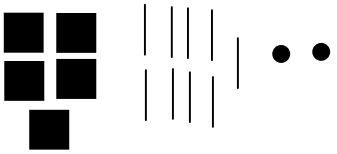
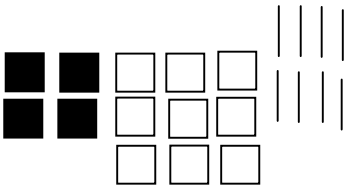
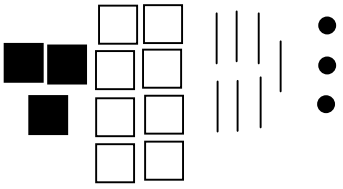
Teacher Resource Sheet 2

Extra Practice...



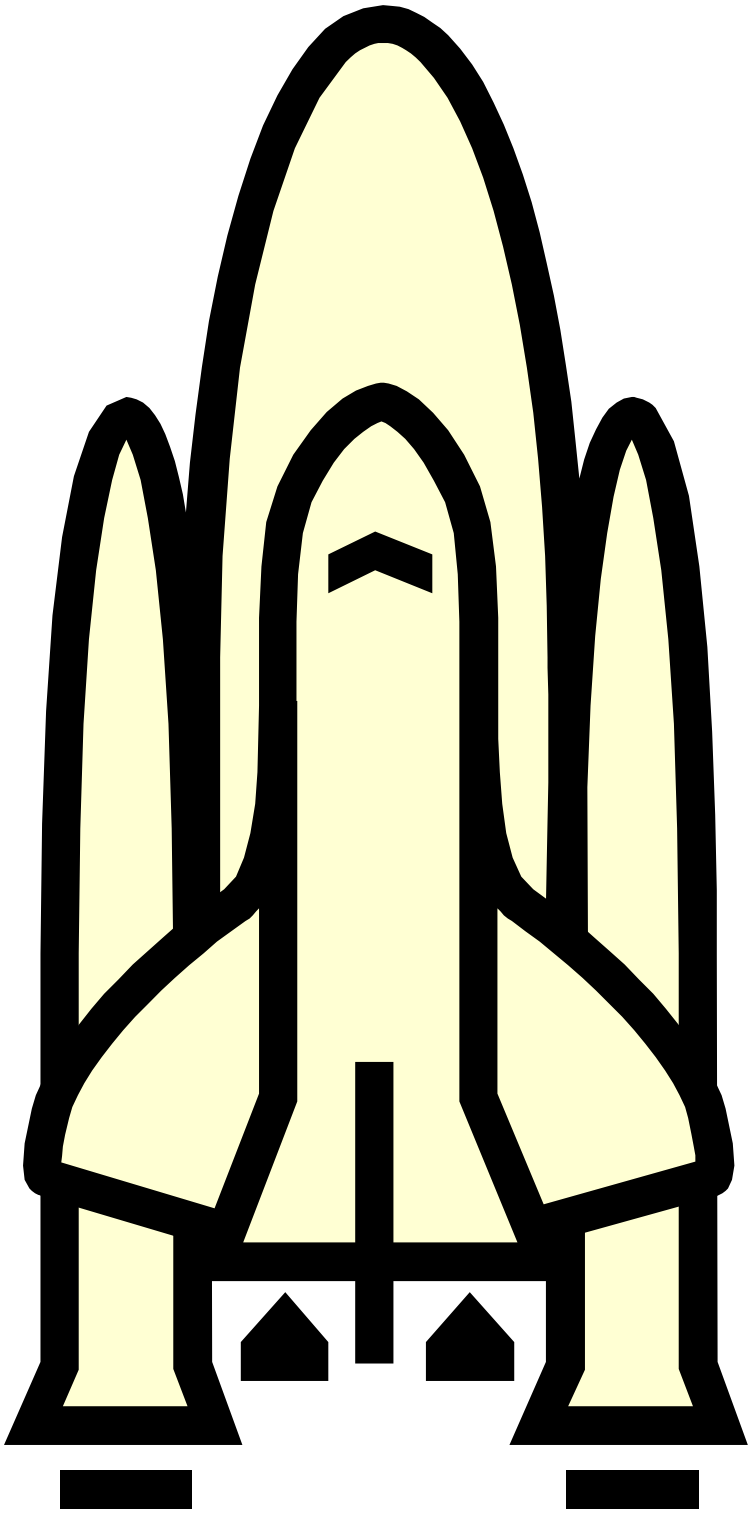
ANSWER KEY

Complete the chart to demonstrate your understanding of place value.

Standard Form	Model	Word Name
5,092		*Five thousand, ninety-two*
2,203		*Two thousand, two hundred three*
4,980		Four thousand, nine hundred eighty
3,873		*Three thousand, eight hundred seventy-three*

Teacher Resource Sheet 3

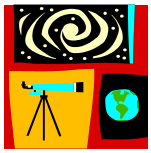
Rocket Pattern



Student Resource Sheet 6

Out of this World

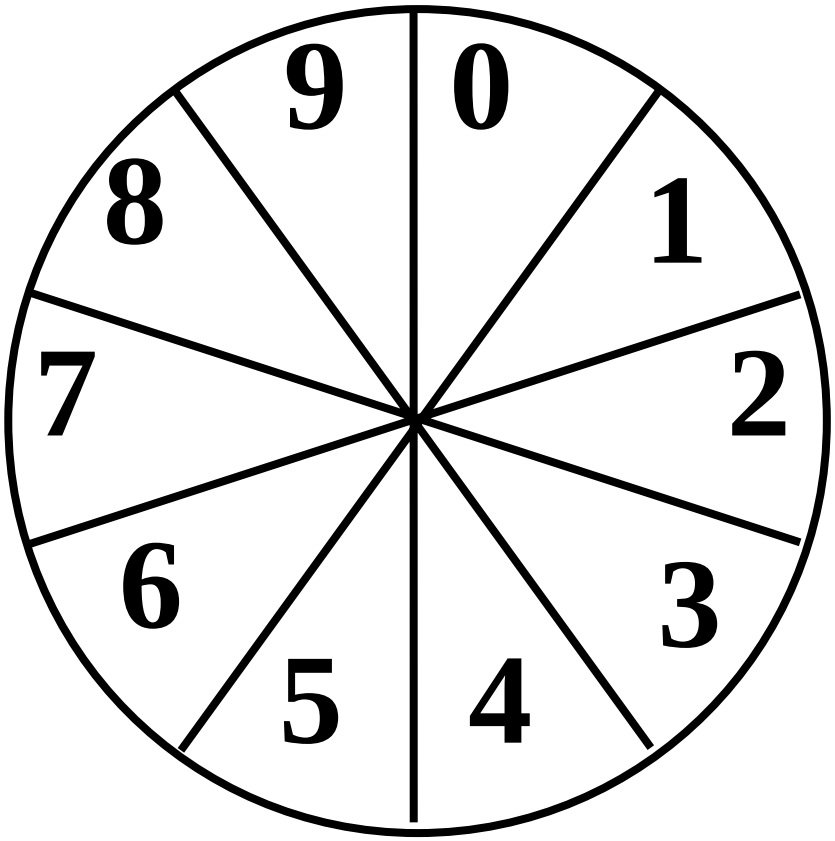
An Expanded Form Game



Use a paperclip to spin 4 numbers on the 0-9 spinner. Record each digit, in order, in the chart. Then, write the number in expanded form.

Number Spun (Standard Form)	Expanded Form

Student Resource Sheet 7

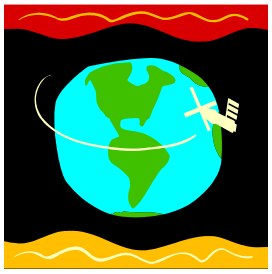


Student Resource Sheet 8

Planet Place Value Cards

 3,402	 2,430	 4,380
 3,240	 2,843	 4,832
 3,024	 8,340	 4,083
 3,042	 8,234	 2,480

From Earth to the Moon



Order Up…

NASA has 10 sites around the United States where thousands of men and women work to learn more about flight and space exploration. NASA headquarters is located in Washington, DC. These charts tell how far each space center is located from headquarters.

1. Order these distances from **least to greatest**.

Space Center	Location	Distance from headquarters (in miles)
Ames Research Center	Moffett Field, CA	2,935
Dryden Flight Research Center	Edwards, CA	2,630
Glenn Research Center	Cleveland, OH	374
Jet Propulsion Laboratory	Pasadena, CA	2,683

_____ _____ _____ _____

2. Order these distances from **greatest to least**.

Space Center	Location	Distance from headquarters (in miles)
Johnson Space Center	Houston, TX	1,416
Kennedy Space Center	Cape Canaveral, FL	869
Marshall Space Flight Center	Huntsville, AL	696
Stennis Space Center	Stennis, MS	1,068

_____ _____ _____ _____

Teacher Resource Sheet 4

Order Up…

ANSWER KEY

NASA has 10 sites around the United States where thousands of men and women work to learn more about flight and space exploration. NASA headquarters is located in Washington, DC. These charts tell how far each space center is located from headquarters.

3. Order these distances from **least to greatest**.

Space Center	Location	Distance from headquarters (in miles)
Ames Research Center	Moffett Field, CA	2,935
Dryden Flight Research Center	Edwards, CA	2,630
Glenn Research Center	Cleveland, OH	374
Jet Propulsion Laboratory	Pasadena, CA	2,683

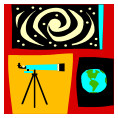
374 *2,630* *2,683* *2,935*

4. Order these distances from **greatest to least**.

Space Center	Location	Distance from headquarters (in miles)
Johnson Space Center	Houston, TX	1,416
Kennedy Space Center	Cape Canaveral, FL	869
Marshall Space Flight Center	Huntsville, AL	696
Stennis Space Center	Stennis, MS	1,068

1,416 *1,068* *869* *696*

Showcase Your Success...



1. What is the word name for **6,402**?
   - ○ a. six thousand, forty-two
   - ○ b. six thousand, four hundred twenty
   - ○ c. six thousand, four hundred two
   - ○ d. two thousand, forty-six

2. Draw the model for **1,023**.

3. Give the value of the underlined digit.

   5,<u>5</u>40

   - ○ a. 5,000
   - ○ b. 500
   - ○ c. 50
   - ○ d. 5

4. Complete writing these numbers in expanded form.

   ** **6,782** = 6,000 + _____ + 80 + _____

   ** **2,175** = _____ + 100 + _____ + _____

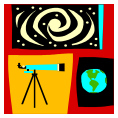
5. Compare using >, <, or =.

8,433 ◯ **8,343** **1,220** ◯ **1,022** **5,309** ◯ **5,390**

6.

7. Write one new fact you learned about space.

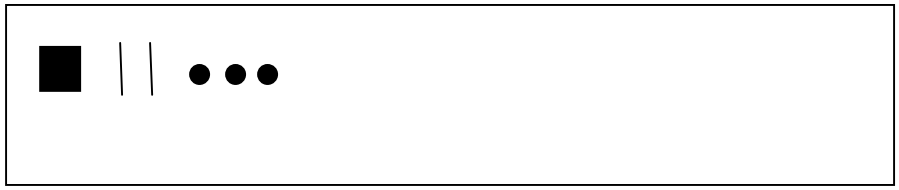
Showcase Your Success...



ANSWER KEY

1. What is the word name for 6,402?
   - ○ a. six thousand, forty-two
   - ○ b. six thousand, four hundred twenty
   - ● c. six thousand, four hundred two
   - ○ d. two thousand, forty-six

2. Draw the model for 1,023.



3. Give the value of the underlined digit.

   5,<u>5</u>40

   - ○ a. 5,000
   - ● b. 500
   - ○ c. 50
   - ○ d. 5

4. Complete writing these numbers in expanded form.

   ** 6,782 = 6,000 + _*700*_ + 80 + __*2*___

   ** 2,175 = _*2,000*_ + 100 + _*70*__ + __*5*___

5. Compare using >, <, or =.

8,433 > 8,343 1,220 > 1,022 5,309 < 5,390

6.

7.Write one new fact you learned about space.

Answers will vary.