

Teacher Guide for the Lesson on **expanded notation**

Standard:

5.2(A)

Content Objective:

We can represent numbers by showing the value of each digit using **expanded notation**.

Language Objective: Answer the following question in complete sentences using the sentence stem and the key vocabulary of the lesson:

How can you use **expanded notation** to compare two numbers?

*I can use **expanded notation** to compare two numbers by...*

Other key vocabulary: [place value](#)

expanded notation

STANDARD FORM **EXPANDED NOTATION**

625 Add each digit by the value of its place. hundreds tens ones
 $(6 \times 100) + (2 \times 10) + (5 \times 1)$

1,246.5 thousands hundreds tens ones tenths
 $(1 \times 1000) + (2 \times 100) + (4 \times 10) + (6 \times 1) + (5 \times 0.1)$
or $\frac{1}{10}$

25.73 tens ones tenths hundredths
 $(2 \times 10) + (5 \times 1) + (7 \times 0.1) + (3 \times 0.01)$
or $\frac{1}{100}$

24.658 tens ones tenths hundredths thousandths
 $(2 \times 10) + (4 \times 1) + (6 \times 0.1) + (5 \times 0.01) + (8 \times 0.001)$
or $\frac{1}{1000}$

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By studying this visual, students might:

Notice	Wonder
The number is written both in standard form and expanded notation.	Why are decimals written using fractions in expanded notation?
Each digit is labeled with its place value: tens, ones, tenths, hundredths, thousandths.	What would happen if you changed one digit—how would it change the total?
Decimal digits are written as fractions in the expanded notation.	Can expanded notation be used with very large numbers?
The value of each digit matches its place value position.	What's the difference between writing a decimal in expanded notation vs. a whole number?

• The expanded form breaks the number into separate parts using multiplication.	• Why does each part of expanded notation use multiplication?
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EXTENDING THE DISCUSSION

- After randomly calling on students, if there is anything from this list that was not mentioned, then ask the class, "Did anyone notice...?"
- After students have shared what they notice, ask the class, "Did anyone wonder...?" using the suggestions above or anything else you might think is interesting or relevant to the lesson.

Structured Conversation Prompts

OBSERVATIONAL	RELATIONAL	INFERENTIAL
What is expanded notation? Expanded notation is...	How is expanded notation related to place value? Expanded notation is related to place value because...	How can you use expanded notation to compare two numbers? I can use expanded notation to compare two numbers by...

Example Student Responses to the Observational Question

Low-Level	High-Level
Expanded notation is a way to write a number by breaking it into parts.	Expanded notation is a way to show the value of each digit in a number using place value and multiplication.

RESPONDING TO RESPONSES

Emphasize and celebrate each student's use of the key vocabulary to support a culture of "no wrong answers."

STRUCTURING STUDENT CONVERSATIONS

Have students list observations from the visual as a warm-up, then use the Q-SSS-A process to guide small-group conversations. In the slide decks, brackets can be moved to prepare the structured conversation. In the example to the right, students will be instructed: [Q-SSS-A](#).

- To put a thumb up, then lower their hand when they are ready to answer the question
- To share with their elbow/shoulder partner, and that the student with the darkest shoe will share first
- That they will be randomly called on after the conversation



[Here is an example](#) of structuring a conversation with Q-SSS-A.

Note: the inferential question is the same as the language objective. It is recommended that students answer the inferential question in a small-group discussion before answering it individually as the closure or exit ticket of the lesson.

Structured Reading

READING PURPOSE	PAT LIST	POST-READING DISCUSSION
(We're reading to see how expanded notation helps us work with place value in real world situations.)	• how each digit is described using place value • examples of expanded notation • what the characters say about each part of the number • how the characters solve the puzzle	How did Jake and Maya use expanded notation to solve the number puzzle? ☐ <i>Jake and Maya used expanded notation to...</i>

STRUCTURING THE READING

Communicate the purpose of reading to the students and instruct them to make a note every time they see something on the PAT ("Pay Attention To") list. How you have students note items on the PAT list is up to you. This could include:

- Putting an asterisk in the margin
- Underlining text that supports the PAT list

- Putting a comment in the margin

Follow the reading with the post-reading discussion. Structure this discussion using the Q-SSS-A process just like the structured conversations in this lesson.

Note: you might find the relational question is better discussed before or after the reading. This depends on whether the relational question is directly related to the reading or might make connections across units.

DIFFERENTIATING THE READING

You will notice that three different reading passages are provided with this lesson. Look at the shapes in the top-left of each passage to determine the grade level.

BELOW GRADE LEVEL	ON GRADE LEVEL	ABOVE GRADE LEVEL
 <i>Triangle is bottom-left</i>	 <i>Square is bottom-left</i>	 <i>Circle is bottom-left</i>

In a class with students at diverse reading level proficiencies, you can give the appropriate reading passage to different students, while having all students follow the same PAT list and post-reading discussion.