Numerical Patterns & Paired Number Tables

Unit

4th Grade

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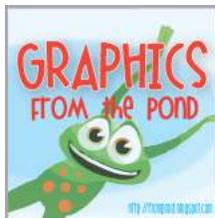
Table of Contents

To The Teacher

Thank you for purchasing this resource! Within it you will find a complete unit for teaching the fourth grade standards for <u>numerical patterns</u> including pre-assessment, content vocabulary, daily warm-ups and exit tickets, daily lessons with student activities, and a post assessment.

While this unit is laid out over an <u>eight day</u> time span do not feel that you must rigidly stick to the timeline. As a teacher you know what is best for your students, and should follow your gut, as some classes may require more time to reach understanding of a concept.

To save on ink and decrease prep time, every page of this unit is created in black and white. To create a more colorful unit print or copy on color paper.

Standards

TEKS

4.5B represent problems using an input-output table and numerical expressions to generate a number pattern that follows a given rule representing the relationship of the values in the resulting sequence and their position in the sequence

CCSS

4.OA.C.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.

ALL About This Unit

This unit is made up of unique elements that can be used independently or together to provide a complete unit of math instruction.

Content Vocabulary

Vocabulary for this <u>numerical patterns</u> unit is included in a few forms.

- Word wall cards make it easy to add your content vocabulary to your word wall
- The word and definition list make a great reference for student math notebooks and teachers alike
    - This list is included completed as well as with blank areas for definitions and examples
- Double-sided word and definition cards are great for review and small group remediation

Pre-Assessment and Student Standard Checklist

To be used as an informal assessment to check students' prior knowledge as well as determine any misconceptions. The data that you gather from this pre-assessment can be recorded on the Student Standards Checklists and used to set student learning goals, form small groups, or partner students based on ability. Checklists fit 11 students per page.

ALL AbOUt THiS UNiT

DAiLy WARM-UPS

Eight days of half-page daily warm-ups are provided along with answer keys. Each day has one standards-based question for students to think through their learning. A student tracking sheet is also included for students to record their own grow and glow areas. To save paper you may choose to project the warm up each day and have students complete their work in math notebooks.

EXit TickeTS

Eight days worth of exit tickets and answer keys, with two questions each, are included two to a page for easy copying. Each of the questions is based on how that standard is tested, providing a test bridge and exposing students to test style language. This serves to build familiarity with standardized testing without overwhelming students.

Exit tickets can be checked as a class, or by the teacher. A checklist of questions is included to track how students are doing on their exit tickets.

AssessmenT

An end of unit assessment is included to check for student mastery on the <u>numerical patterns</u> standards included. This assessment is meant to be used informally. While students should do their best work, it is best to not place too much importance on the test.

Daily Lessons

Eight daily lessons are included in this unit. Each lesson includes:

- Guiding question(s)
- Objectives
- List of necessary materials
- Overview of the lesson
- Student activity sheets when applicable
- Suggestions for small group activity

Day 1   Pre-assessment and Shape Patterns

Day 2   Finding Patterns in Sets of Numbers

Day 3   Creating a Set of Numbers to Fit a Pattern

Day 4   Numerical Patterns in Tables (Addition & Subtraction)

Day 5   Numerical Patterns in Tables (Multiplication & Division)

Day 6   Creating Tables to Fit a Pattern

Day 7   Creating Your Own Patterns

Day 8   Assessment

content Vocabulary

Vocabulary for <u>numerical patterns</u> unit is included in a few forms.

- Word wall cards make it easy to add your content vocabulary to your word wall
- The word and definition list make a great reference for student math notebooks and teachers alike
  - This list is included completed as well as with blank areas for definitions and examples
  - TIP: print/copy definition list at 80% to fit perfectly in math notebooks
- Double-sided word and definition cards are great for review and small group remediation
  - To complete these cards print, fold along the dotted line with the word and definition on the outside, then tape or glue to secure the card.

input output table

a table which represents how a numerical rule acts on the input resulting in the output

numerical pattern

a repeated process that follows a rule

number relationship

the way two or more numbers are connected

rule

a process that acts on the input resulting in an output

Multi-Step Problem Solving Vocabulary

input output table	a table which represents how a numerical rule acts on the input resulting in the output
numerical pattern	a repeated process that follows a rule
number relationship	the way two or more numbers are connected
rule	a process that acts on the input resulting in an output
sequence	an ordered list of numbers

input output table

a table which represents how a numerical rule acts on the input resulting in the output

numerical pattern

a repeated process that follows a rule

number relationship

the way two or more numbers are connected

Answer Key

1 Given the rule +8, write a number pattern beginning with 14 and consisting of at least three numbers.

14, 22, 30, 38,...

2 Given the rule ×4, write a number pattern beginning with 10, and consisting of at least three numbers.

10, 40, 160, 640,...

3 Name the rule shown in the table.

x	5	10	15	20
y	12	17		27

X+7=y

4 Name the rule shown in the table.

x	16	30	54	87
y	7	21	45	78

X−9=y

5 Name the rule shown in the table.

x	4	12	20	28
y	12	36	60	84

X×3=y

6 Name the rule shown in the table.

x	100	200	300	400
y	25		75	100

X÷4=y

7 Determine the rule and complete the table.

	16	24	27	**29**
	30	35	41	43

8 Determine the rule and complete the table.

x	100	65	42	20
y	83	**48**	25	3

9 Determine the rule and complete the table.

x	1	2	3	4
y	15	30	**45**	60

10 Determine the rule and complete the table.

x	25	45	65	85
y	5	**9**	13	17

Numerical Patterns Pre-assessment
Student Standards Checklist

Student	1. Generate a Pattern Given a Rule	2 Generate a Pattern Given a Rule	3. Name the Rule Addition	4. Name the Rule Subtraction	5. Name the Rule Multiplication	6. Name the Rule Division	7. Complete the Table Addition	8. Complete the Table Subtraction	9. Complete the Table Multiplication	10. Complete the Table Division
w										

Daily Warm-Ups

Eight days of half-page daily warm-ups are provided along with answer keys.

Each day has two standards-based questions for students to think through their learning.

A student tracking sheet is also included for students to record their own grow and glow areas.

To save paper you may choose to project the warm up each day and have students complete their work in math notebooks.

Name _____

Numerical Patterns

Write a four number pattern that begins with the number 7 and follows the pattern +11.

Input Output Tables

Identify the rule.

x	100	120	140	160
y	5	6	7	8

Daily Warm-Up Answer Key

Name _____

Numerical Patterns
Write a four number pattern that begins with the number 7 and follows the pattern +11.

7, 18, 29, 40, ...

Input Output Tables
Identify the rule.

x	100	120	140	160
y	5	6	7	8

X÷20=y

Name _____

Numerical Patterns
Name the rule the pattern follows.
4, 12, 36, 108,...

×3

Input Output Tables
Complete the missing element in the table.

x	5	11		26
y	104	110	117	125

18

Name _____

Personal Daily Warm Up Tracking Sheet

	Numerical Patterns	Input Output Tables
Day 1		
Day 2		
Day 3		
Day 4		
Day 5		
Day 6		
Day 7		
Day 8		

Exit Tickets

Eight days worth of exit tickets and answer keys, with one question each, are included two to a page for easy copying.

Each of the questions is based on how that standard is tested, providing a test bridge and exposing students to test style language. This serves to build familiarity with standardized testing without overwhelming students.

Exit tickets can be checked as a class, or by the teacher. A checklist of questions is included to track how students are doing on their exit tickets.

EXit Ticket Day 1

Name _____

The rule +7 is used to show the relationship between the position of a number in a pattern and the value of that number. Which table shows this relationship?

a.

Position	Expression	Value
7	7+1	8
7	7+2	9
7	7+3	10

b.

Position	Expression	Value
1	1+7	8
2	2+7	9
3	3+7	10

c.

Position	Expression	Value
7	7×1	7
7	7×2	14
7	7×3	21

d.

Position	Expression	Value
1	1+7	8
2	2+6	8
3	3+8	11

Numerical Patterns

EXit Ticket Day 1

Name _____

The rule +7 is used to show the relationship between the position of a number in a pattern and the value of that number. Which table shows this relationship?

a.

Position	Expression	Value
7	7+1	8
7	7+2	9
7	7+3	10

b.

Position	Expression	Value
1	1+7	8
2	2+7	9
3	3+7	10

c.

Position	Expression	Value
7	7×1	7
7	7×2	14
7	7×3	21

d.

Position	Expression	Value
1	1+7	8
2	2+6	8
3	3+8	11

Numerical Patterns

Exit Ticket Answer Key

Day 1	B
Day 2	A
Day 3	C
Day 4	D
Day 5	A
Day 6	B
Day 7	C
Day 8	D

Exit Ticket Student Checklist

Student	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8

Daily Lessons

Eight daily lessons are included in this unit. Each lesson includes:

- Guiding question(s)
- Objectives
- List of necessary materials
- Overview of the lesson
- Student activity sheets when applicable
- Suggestions for small group activity

Day 1 Pre-assessment and Shape Patterns

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Day 6 Creating Tables to Fit a Pattern

Day 7 Creating Your Own Patterns

Day 8 Assessment

Pre-Assessment & Shape Patterns

Guiding Question

How can I show my prior knowledge of numerical patterns?

Materials

- Pre-assessment
- Anchor chart poster
- Shape Pattern Examples
- Partner Quiz Directions
- Shapes Patterns Partner Quiz Cards

Learning Objective

We will use our prior knowledge of identifying and creating numerical patterns.
We will identify what comes next in a shape pattern.

Lesson

Begin by giving students the pre-assessment as a check for prior understanding.

As a class, take a look at the shape pattern examples and practice identifying which shape will come next. Lead students through each example and share your thinking out loud. As you progress through examples have students share their own thinking.

For practice, students will complete a round of Partner Quiz with shape pattern cards.

For an extension activity, have students create their own shape patterns to trade with their classmates to identify.

Small Group Ideas

Using the shape pattern examples as well as the Partner Quiz cards have students practice identifying the next shape in the pattern. Take turns thinking out loud.

Sweets Pattern Partner Quiz

- **To create the deck of cards:**
  - Print set of cards on colorful paper (laminate for durability)
  - 30 cards are included
  - Cut along the bold lines
  - Fold on the dashed lines so that the pattern is on one side and the next shape in the pattern on the other
  - Tape or glue to secure card

- **To play Partner Quiz**
  - Each student gets a card that they hold with the pattern facing out and the next shape in the pattern facing them
  - Students stand up, put their hand in the air, and find a partner
  - Partners greet one another
  - The tallest partner (or some other predetermined trait, shorter, longer hair, birthday closest to today...) goes first
    - This partner views the pattern their partner is holding and identifies the next shape in the pattern
    - Students may point to the shape in the pattern to identify what they believe comes next
    - If they need help their partner can give them tips
    - When they correctly identify the next shape in the pattern their partner praises them and roles reverse
  - The process is repeated with the second partner
  - Partners trade cards and thank one another
  - With their new card, they find a new partner to repeat the process
  - Continue for as long as time allows

- **Tips for the teacher:**
  - Explicitly model the process of Partner Quiz
  - Show students what a proper greeting, praise, and thank you looks and sounds like
  - Explain the proper voice level for working with a partner
  - Circulate and assist or praise students as they work

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Sweets Pattern Partner Quiz
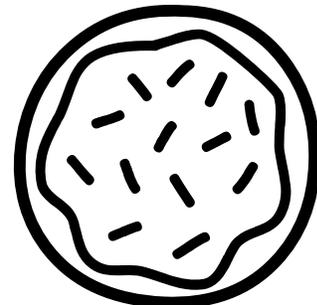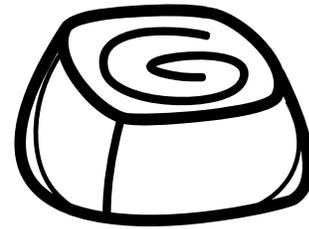
Sweets Pattern Partner Quiz

Sweets Pattern Partner Quiz

Sweets Pattern Partner Quiz

Sweets Pattern Partner Quiz

Answer Key

1 Given the rule -3, write a number pattern beginning with 87 and consisting of at least three numbers.

87, 84, 81, 78,...

2 Given the rule ÷2, write a number pattern beginning with 120, and consisting of at least four numbers.

120, 60, 30, 15

3 Name the rule shown in the table.

x	16	29	47	68
y	25	44		83

X+12=y

4 Name the rule shown in the table.

x	21	99	117	205
y	1	79	97	185

X−20=y

5 Name the rule shown in the table.

x	7	12	21	33
y	21	36	63	99

X×3=y

6 Name the rule shown in the table.

x	64	48	32	16
y	8		4	2

X÷8=y

7 Determine the rule and complete the table.

10	10	127	**138**
134	139	157	168

8 Determine the rule and complete the table.

x	29	56	87	121
y	2	**29**	60	94

9 Determine the rule and complete the table.

x	5	9	13	17
y	45	81	**117**	153

10 Determine the rule and complete the table.

x	200	**250**	300	350
y	4	5	6	7

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