GEORGIA MIDDLE SCHOOL Instructional Resources

CAREER, TECHNICAL, & AGRICULTURAL EDUCATION

BUSINESS & COMPUTER SCIENCE

COURSE: Business and Computer Science

UNIT: Making Connections with Number Patterns

INTRODUCTION

Annotation:

This unit includes lessons in Algebra. Students will investigate relationships between two quantities. They will write and solve proportions and simple one-step equations that result from problem situations. It will also provide instructions on how to use the results of investigation with the Microsoft Excel program to show and compare relationships between varying quantities. Students will be able to decide which Excel graph/chart should be used for the results he/she would like to show. This unit is designed to incorporate student comprehension, application, analysis, and synthesis.

Grade(s):

X	6th
	7th
	8th

Time:

4+ hours

Author:

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Students with Disabilities:

For students with disabilities, the instructor should refer to the student's IEP to be sure that the accommodations specified are being provided appropriately. Instructors should also familiarize themselves with the provisions of Behavior Intervention Plans that may be part of a student's IEP. Frequent consultation with a student's special education instructor will be beneficial in providing appropriate differentiation. Many students (both with and without disabilities) who struggle with reading may benefit from the use of text reading software or other technological aids to provide access to printed materials. Many of these are available at little or no cost on the internet.

FOCUS STANDARDS

GPS Focus Standards: ALGEBRA -- Students will investigate relationships between two quantities. They will write and solve proportions and simple one-step equations that result from problem situations.

M6A2. Students will consider relationships between varying quantities.

a. Analyze and describe patterns arising from mathematical rules, tables, and graphs.

M6P4. Students will make connections among mathematical ideas and to other disciplines.

a. Recognize and use connections among mathematical ideas.
b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.
c. Recognize and apply mathematics in contexts outside of mathematics.

MRC. Students will enhance reading in all curriculum areas by:

c. Building vocabulary knowledge
- Demonstrate an understanding of contextual vocabulary in various subjects.
- Use content vocabulary in writing and speaking.
- Explore understanding of new words found in subject area texts.

MSBCS-BCSII-9. Student will develop and apply basic spreadsheet skills.

a. Identify and explain basic spreadsheet terminology (cell, column, row, formula, label, function, etc..)
b. Label the parts of a spreadsheet.
c. Create and save a basic spreadsheet.
d. Change column width and row height.
e. Retrieve, edit, manipulate, and print a spreadsheet.
f. Format the contents of a cell – change fonts and font sizes, align text, format numbers, and apply borders.
g. Use the autosum feature.
h. Create and print a basic chart/graph using spreadsheet data.

GPS Academic Standards:

- **M6A2a. Students will consider relationships between varying quantities.**
- **M6P4a-c. Students will make connections among mathematical ideas and to other disciplines.**
- **MRC. Students will enhance reading in all curriculum areas by: Building vocabulary knowledge.**

National / Local Standards / Industry / ISTE:

- **MSBCS-BCSII-9. Student will develop and apply basic spreadsheet skills.**

UNDERSTANDING & GOALS

Enduring Understandings:

Algebra is a mathematical system that… (1) uses symbols to represent numbers and operations; (2) allows us to graphically represent and analyze mathematical concepts; (3) has a logical foundation; and (4) gives us a powerful problem solving tool.

As a result, to think algebraically, a student needs to be able to understand patterns, relations, and functions; represent and analyze mathematical situations and structures using algebraic symbols; use mathematical models to represent and understand quantitative relationships; and analyze change in various contexts.

Essential Questions:

- What is a pattern?
- What is a proportional relationship? Explain how proportional relationships are represented with use of rules, tables, and graphs?
- Describe how an algebraic expressions can be used to model real-world situations?
- Explain how to solve algebraic equations and how to interpret the meaning of the solution.
- What role does counting sequences play in helping you understand number concepts?
- How can you use representations to help communicate your mathematical understanding?
- What is a spreadsheet/worksheet and describe some of its uses?
- Explain the differences between a cell, row, and column.
- Demonstrate and explain formatting one or multiple cells in a spreadsheet/worksheet.
- Demonstrate how to enter spreadsheet/worksheet data.
- Demonstrate how to use spreadsheet/worksheet data to create a chart/graph.
- Demonstrate how to format an existing chart with new/updated and/or existing data.

Knowledge from this Unit:

- Understand that proportional relationships can be represented using rules, tables, and graphs.
- Understand number patterns, rules and sequences.
- Build intuitive understandings of patterns and number relationships.
- Understand how to recognize order and make predictions.
- Understand the problem-solving strategy for word problems and writing equations.
- Describe how to format cells in a spreadsheet.
- Understand what a formula is and which formula to apply for desired results.
- Understand what type of chart/graph to create to display existing data/results.

Skills from this Unit:

- Identify patterns/sequences and apply appropriate rules.
- Read and solve word problems.
- Write one-step equations.
- Identify and utilize basic Excel features, functions, and shortcuts.
- Demonstrate formatting cells and creating a basic spreadsheet/worksheet.
- Demonstrate applying spreadsheet formulas.
- Demonstrate creating chart/graph with existing spreadsheet data.

ASSESSMENTS

Assessment Method Type:

_____ Pre-test
_____ Objective assessment - multiple-choice, true- false, etc.
_x_ Quizzes/Tests
___ Unit test
_____ Group project
x Individual project
_____ Self-assessment - May include practice quizzes, games, simulations, checklists, etc.
_x_ Self-check rubrics
__ Self-check during writing/planning process
__ Journal reflections on concepts, personal experiences and impact on one's life
__ Reflect on evaluations of work from teachers, business partners, and competition judges
__ Academic prompts
_x_ Practice work/activities
x Subjective assessment/Informal observations
__ Essay tests
__ Observe students working with partners
__ Observe students role playing
_____ Peer-assessment
__ Peer editing & commentary of products/projects/presentations using rubrics
__ Peer editing and/or critiquing
_____ Dialogue and Discussion
__ Student/teacher conferences
__ Partner and small group discussions
__ Whole group discussions
__ Interaction with/feedback from community members/speakers and business partners
x Constructed Responses
__ Chart good reading/writing/listening/speaking habits
_x_ Application of skills to real-life situations/scenarios
x Post-test (Projects)

Assessment(s) Title:

Exam: **Word Problems Assessment**
Project #1: Using Letters to Represent Numbers

Project: **Excel Spreadsheet w/Chart**

Assessment(s) Description/Directions:

Students should create a 'Basic' Excel spreadsheet and chart. Data used to create the spreadsheet and chart will be provided by an activity completed by the students earlier 'Using Letters to Represent Numbers.' Students will demonstrate applying basic Excel formatting features to one or multiple cells. Students will demonstrate applying borders and inserting a basic Excel formula – which they will fill (copy) to additional cells (instead of retying/reapplying the formula to each individual cell). Students will use the data in the spreadsheet to create a chart. The students will refer to the handout 'How to choose…' to decide which type of chart/graph would best display this spreadsheet data.

Attachments for Assessment(s): Please list.

*Handouts: **Unit Outline, Unit Standards, Unit Essential Questions, Unit Key Terms, Problem-Solving Strategy, Excel KEY Terms, Labeled Excel BASIC Parts, BASIC Excel Keyboard Shortcuts, BASIC Excel Formulas, How to Choose A Graph,**
*'Patterns & Rules' Demonstration with Warm-Up Activities 1 and 2 (with Answer Key)
*'Guess My Rule' Warm-Up Activity
*'Patterns and Rules Word Problems' Assessment (with Answer Key)
*'Using Letters to Represent Numbers' Project #1 (with Answer Key)
*'Excel Spreadsheet Formula Activity' (with Answer Key)
*'Using Letters to Represent Numbers' Spreadsheet - Project #2 (with Answer Key)
*'Using Letters to Represent Numbers' Chart – Project #3 (with Answer Key)

LESSON PLANS

Instructional planning: Teacher should discuss number relationships, number patterns, rules, problem-solving word problems, writing equations, spreadsheets and charts.

Sequence of Instruction

- **INTRODUCTION**

  - **Identify the Standards. Standards should be posted in the classroom for each lesson.**
  - **Review the essential questions for the lesson.**
  - **Identify and review key terms.**
  - **Introduce and demonstrate number relationships and patterns.**
  - **Introduce and demonstrate rules.**
  - **Introduce and demonstrate problem-solving strategy for word problems and writing equations.**
  - **Assess students' understanding of word problems.**
  - **Identify, introduce and discuss Excel key terms and parts.**
  - **Identify, introduce, and demonstrate basic Excel keyboard shortcuts.**
  - **Assess students' understanding of using letters to represent numbers.**
  - **Introduce and demonstrate basic Excel formulas.**
  - **Assess students' understanding of applying/inserting appropriate basic Excel formulas.**
  - **Assess students' understanding of creating and formatting a basic Excel spreadsheet/worksheet.**
  - **Introduce and demonstrate how to choose which type of chart/graph to use.**
  - **Assess students' understanding of creating and formatting a basic Excel chart/graph.**

- **LESSON 1 | LEARNING ABOUT NUMBER RELATIONSHIPS AND PATTERNS**

  Discussion

  1. Ask students to describe in their own words what a pattern is.
  2. Write on the board: 5 + 5 + = 10 + 5 = 15 + … and ask students to identify the pattern.
  3. Ask students to identify the rule for the above example: *start with 5 and add 5 repeatedly.*
  4. Provide some other examples to help students understand patterns and to show how patterns help to recognize order and make predictions.

5. Show and discuss how using a software such as Excel can help link numerical patterns through visual display.

6. Show and discuss how using a software such as Excel can be used for calculating by inserting/ applying formulas.

7. Have students demonstrate understanding of patterns and rules by completing Warm-Up Activity #1 and Warm-Up Activity #2.

8. Discuss and demonstrate Warm-Up activities by allowing student participation. Provide further examples and demonstration as the need arise.

9. Provide further demonstration on rules. Use 1 or all 4 Warm-Up #3 activities.

- **LESSON 2 | PROBLEM-SOLVING STRATEGY: Word Problems and Writing Equations**

Discussion

1. List and discuss the 4 step process in the Problem-Solving Strategy.

2. Provide and discuss an example utilizing the Problem-Solving Strategy.

3. Have students complete assessment to show understanding of patterns, rules, and problem-solving.

4. Discuss and evaluate (check for understanding) by allowing student participation. Provide further examples and demonstration as the need arise.

- **LESSON 3 | USING LETTERS TO REPRESENT NUMBERS**

Discussion

1. Review the Problem-Solving Strategy, Writing A One-Step Equation, and Word Problems.

2. Have students to complete Unit 1 Activity/Project #1.
3. Review and discuss Unit 1 Activity/Project #1 by allowing student participation. Provide further demonstration as needed.

- **LESSON 4 | INSERTING/APPLYING BASIC EXCEL FORMULAS**

Discussion

1. Have students to open a new Excel spreadsheet while introducing and identifying basic Excel key terms.

2. Provide hands-on demonstration while discussing/introducing the basic Excel parts.

3. Introduce some basic Excel keyboard shortcuts. Explain that there are thousands of keyboard shortcuts, but these are basic and used more frequently.

4. Pass out handout 'Excel Spreadsheet Formulas' - discuss and explain each formula's set-up, symbols, operators, and location.

5. Have students to complete Excel Formulas assessment.

6. Review and discuss answers for Excel Formula assessment. Provide further examples and/or demonstration as needed.

- **LESSON 5 | CREATE AND FORMAT A BASIC EXCEL SPREADSHEET - WITH A BASIC FORMULA**

Discussion

1. Provide a direction sheet 'Unit 1 Activity/Project #2' and have students to create and format a basic Excel spreadsheet/worksheet utilizing answers/results from Unit 1 Activity/Project #1.

2. Have students to check and compare their finished spreadsheet with by rubric.

- **LESSON 6 | CREATE AND FORMAT A BASIC EXCEL CHART**

Discussion

1. Pass out and discuss handout: 'How To Choose Which Type Of Graph To Use? Discuss each chart/graph type and how each should be used depending on the data needing to be displayed.

2. Provide a direction sheet 'Unit 1 Activity/Project #3' and have students to create and format a basic Excel bar chart utilizing spreadsheet created in previous lesson for Unit 1 Activity/Project #2.

3. Have students to check and compare finished spreadsheet and chart by rubric and Unit 1 Activity/Project #3 answer key.

Attachments for Learning Experiences: Key Terms, Warm-Up Activities, Problem-Solving Strategy handout, Assessment, Excel Key Terms, Labeled Excel Parts, Excel Keyboard Shortcuts, Projects #1, Formulas Activity, Project #2, and Project #3

Notes & Reflections:

One of the most important steps in this unit is that the student be able to understand the correlation between number relationships and patterns. Student does not have to be experienced in Excel to complete the Excel projects in this unit. The direction sheets are very thorough and user-friendly.

CULMINATING PERFORMANCE TASK

Culminating Unit Performance Task Title:

Students complete the Using Letters to Represent Numbers and Excel rubric.

Culminating Unit Performance Task Description/Directions/Differentiated Instruction:

The rubric requires students to create a identify, create a spreadsheet, insert/apply formulas, and create/format charts.
Students will describe number relationships and patterns. Use data to create a spreadsheet. Decide what type of results need to be displayed and insert/apply the appropriate formula to calculate results. Decide what type of chart would best display the desired results and create/format the appropriate chart.

NOTE: Students could also create an electronic presentation to demonstrate the characteristics necessary for completing this unit.

Attachments for Culminating Performance Task: Please list.

- Key Terms
- Demo & Warm-Up Activities 1 and 2
- Demo & Warm-Up Activities 1 and 2 Answer Key
- Demo & Warm-Up Activity 3
- Demo & Warm-Up Activity 3 Answer Key
- Problem-Solving Strategy: Word Problems and Writing Equations
- Assessment #1: Word Problems Patterns and Rules
- Assessment #1: Word Problems Patterns and Rules Answer Key
- Excel Key Terms
- Labeled Excel Spreadsheet BASIC Parts
- BASIC Excel Keyboard Shortcuts
- Project #1: Using Letters to Represent Numbers
- Project #1: Using Letters to Represent Numbers Answer Key
- BASIC Excel Formulas Handout
- Excel Formulas Activity
- Excel Formulas Activity Answer Key
- Project #2: Create A BASIC Spreadsheet
- Project #2: Create A BASIC Spreadsheet Answer Key
- How To Choose Which Type Of Graph/Chart To Use? Handout
- Project #3: Create A BASIC Chart/Graph
- Project #3: Create A BASIC Chart/Graph Answer Key

UNIT RESOURCES

Web Resources:

- google.com (picture for Excel Formulas Activity)

Materials & Equipment:

- worksheets, handouts, white board/active board, pen/pencil, computer, software

21st Century Technology used in this unit:

	Slide Show Software		Graphing Software		Audio File(s)
x	Interactive Whiteboard	x	Calculator		Graphic Organizer
	Student Response System		Desktop Publishing	x	Image File(s)
	Web Design Software		Blog		Video
	Animation Software		Wiki		Electronic Game or Puzzle Maker
x	Email	x	Website	x	Microsoft Word
x	Microsoft Excel				