Housing Our Community



Photo by Ryan Lau via www.unsplash.com

Grade Level Focus:

• 3-5

Content Standard:

<u>CCSS.MATH.CONTENT.4.NBT.B.4</u>

Mathematical Practices:

- SMP1 Make sense of problems and persevere in solving them.
- SMP2 Reason abstractly and quantitatively.
- SMP4 Model with mathematics.

Domain Focus:

• Numbers and operation in base 10

Overview

The purpose of this 3 ACT task is to provide students with an opportunity to problem solve based on a real-world situation (Claims 2 & 4). Due to the nature of the task, there are a variety of mathematical approaches students can take to successfully complete the task. The mathematical approach presented in Act Three of the task addresses CCSS Domain of Numbers and operation in base 10. With this approach, students are shown different strategies for using mathematical operations with multi-digit numbers to analyze and compare data from a graph. The variety of strategies demonstrated and provided allows students at all proficiency levels to access the problem and reach a solution. This performance task is intended for students with prior knowledge of performing operations with multi-digit numbers in base ten and some experience working with numbers with at least three digits. It would serve well as an assessment tool at the end of a unit.

The task is modeled after the <u>3 ACT Fill 'Er Up by Graham Fletcher</u>. In the task, students are presented with a chart, "Washington Housing Costs Over Time" and are asked to generate their own questions that could be answered using the chart. Students then decide on necessary resources for analyzing the data and are given time as a group to complete their work. The task concludes by having students examine the information provided in Act 3 to see if it answers their questions. Student discussion will lead to concrete evidence for affordable housing issues in their community.

Teaching Tip: This task deals with the issue of affordable housing and may be triggering for students without permanent housing. Please be aware of your student population and their social and emotional needs. Students will be participating in discourse through the performance task; it would be pertinent to coach students in these more sensitive conversations prior to implementing this performance task.

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Grade Band:

• 3-5

Mathematical Practices:

- SMP1: Problem Solving "Students can solve a range of complex well posed problems in pure and applied mathematics, making productive use of knowledge and problem-solving strategies."
- SMP2: Reasoning "Students make sense of quantities and their relationships in problem situations."
- SMP4: Modeling and Data Analysis "Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems."

Domain Focus:

• Numbers and operation in base 10

Smarter Balanced Assessment (SBA) Targets Addressed:

• Claim 1 Target E: Use place value understanding and properties of operations to perform multi-digit

Overview of task with specified standard addressed

The purpose of this task is to give students the opportunity to use mathematics in real-world applications. In this task, students are introduced to the ongoing problem of affordable housing faced by state and national community builders and city planners. Students are presented with two data tables illustrating cost of housing and wage increases over 20 years. Students discuss questions they can ask and answer using this data. They will calculate the cost increase of housing over time and compare it to wage increase, concluding with a discussion about the comparison (<u>CCSS.MATH.CONTENT.4.NBT.B.4</u>). Student discussions will find that the housing cost has more than doubled while wage increases have gone up very little, which is why city planners need more creative solutions to the problem of affordable housing.

Learning Goal Statement

- Students will solve a range of complex well-posed problems in applied mathematics (SMP1).
- Students will solve a complex problem by making productive use of knowledge and problem-solving strategies (SMP2).
- Students will analyze complex, real-world scenarios (SMP4).

Success Criteria

- I can make sense of problems and persevere in solving them.
- I can explain what a value represents in my solution.
- I can use mathematics to solve and discuss real world problems.



Step By Step:

1. Materials

- o Recording sheet, scratch paper, whiteboards, math journal (if applicable) for each group
- Technology to show videos/PowerPoint
- Clipboards or other hard surfaces for writing while outdoors

2. Pre-Planning

- Students will be identifying and solving their own student-generated problems based on the context provided by a walk around the school and a chart of Washington Housing Costs Over Time. The chart has been inserted into the "Housing Our Community" presentation. Check that you can access this presentation successfully prior to the lesson.
- Students will need background information about affordable housing. We recommend the ReadWorks article on homelessness to introduce the topic of affordable housing.
- Additional information on affordable housing for educators and students can be found at: <u>Washington and US average wages | Office of Financial Management</u> <u>Housing Needs Assessment - Washington State Department of Commerce</u>
- This lesson will include productive discussion that will open opportunities for multiple possible questions and math concepts. Students may need scaffolded supports or routines for productive discussions.
- Prepare access to materials such as scratch paper, math manipulatives, and other materials as you see fit for use as needed through the task.

3. Act 1: Introduction

- Have volunteers read the learning goals aloud. Use the Think-Pair-Share strategy to have students respond to the prompt: "What connections or questions come to mind in relation to these learning goals?"
- Read PEI's Career Profile Card "Housing Developer" and ReadWorks article on homelessness (Maggie and the Mission) to introduce the topic of affordable housing.
 - Note: ReadWorks is a completely free web-platform, but educators do need to sign up for an account to access the articles.
 - If you use Britannica Kids (paid platform), you might find the <u>Britannica Kids "housing"</u> article useful for this task.
 - For older students, or for shared reading, Habitat for Humanity has a post <u>"The impact</u> of housing affordability on families" that might be useful for this task.
- If possible, take a walk with clipboards and scratch paper around the school building or where you can see neighborhoods. Ask, "What are some problems Housing Developers might see in our neighborhood?"
- Back in the classroom ask students to look at the chart, "Washington Housing Costs Over Time," and the "Average Household Income" table. This is available via the PowerPoint ("What do you notice and wonder?") and at the top of the Information Card which can be printed for each group of students. Ask what students notice and wonder about the chart and table and help record this on a classroom "Notice and Wonder" chart.



- Remind students that Housing Developers use information about housing costs and average income to identify housing needs in communities. Instruct students to work with their group to generate a math question that Housing Developers could answer using the provided facts.
- Allow time for students to come to a consensus about one question generated from the group ideas. Instruct students to analyze the questions generated to determine what information is needed to answer the generated questions.
- Have groups share questions with the class and discuss ideas as a whole group about what information is needed to answer the group's chosen question. Display the slide "City planners need your helping answering these questions" in the presentation. Make connections to groups who have already posed these or similar questions. Reinforce that these are questions the Housing Developers are looking to answer. Students are welcome to answer these questions but are encouraged to pursue their own generated questions as long as they stay connected to the facts provided.
- Prompt students to generate predictions for answers to the Housing Developers' questions and post where visible to the class. These can be estimations; no calculation is required.
- Instruct students to write the final question on their group recording sheets.

4. Act 2: Conflict

- Ask students, "Do you have everything you need to solve your problem?" Give students time to create list of materials they will need on their group recording sheets
- Show how the slide "Helpful Information and Tools" and the Information Card provide examples of various strategies for performing arithmetic with numbers with multiple digits. Show students where to find this information.
- Instruct student groups to record their thinking and math work on the recording sheet and other materials as needed. Inform students that this work will be collected as evidence of their learning.
- As students are working, be sure to ask questions about their thinking. You may choose to use the Discussion Rubric. Take note of different strategies students are using.
- Choose at least three (3) students to share their strategies with the class during Act 3. Make sure the strategies demonstrate math learning that align with learning goals.
- When student groups agree on an answer, instruct groups to fill in the "Final Answer" on their group recording sheets.
- Remind students of access to sentence frames on the Information Card for complete responses.
- Students can work with a partner to answer the questions, using their sentence stems.

5. Act 3: Resolution

• Display the slide "Remember to talk about your ideas with each other." Allow at least three (3) students to share their groups' answers with a complete description of how they completed the task. Remind students of access to discussion frames for complete responses.

Note: Students find that housing costs have more than doubled while the income has only gone up a little. Most students agreed that no, the housing costs have gone up so much that regular people cannot afford to buy a house.

• Ask questions that allow students to make connections between the different answer statements to the learning goal. For example: How were these approaches similar/different?



- Display the "Resolution" slides that provide answers to the questions from the initial prediction.
 If a group's question was the same, have students determine possible reasons for any
 differences between the answers. If a group's question was different, have students determine
 strategies that could have been used to find the answer to their problem.
- Have students complete a self-reflection.
 - Ask students to rate their learning of the learning goals 0-10 (0 being you made no connection to the learning goals, 10 being you could teach this content) and record what they learned.
 - Ask students to summarize their learning in 1-3 sentences.

Teaching Tip: You may choose to use the "Self-Reflection" slide and ask students to complete this task on the provided Post-It or note card that will be collected with the group recording sheet.

Accessibility Strategies Used

- Scratch paper or white boards: Students can use blank paper to record thinking, complete calculation, create diagrams, etc.
- Manipulatives: Students can use any math manipulatives (such as place value charts, base-ten blocks, etc.) to support their problem solving.
- Small group collaboration: Students can work with peer groups which may be differentiated by skill level by the teacher.

Things to Consider

- The lesson can take different turns depending on the questions generated. Use this as an opportunity to reteach or extend different math concepts.
- There is opportunity for differentiation with intentional grouping of students by skill level, however this is not essential for students to meet the learning targets.
- The lesson can be split into two days where students create and find solutions to their questions on the first day and share their responses and discuss solutions on the second day.

Formative Assessment Process

- Clarify learning targets throughout the lesson. This is specifically done at the beginning and end, but is helpful at any point to further students' learning.
- Evidence of student learning is found in multiple areas of the lesson. The Group Recording Sheet and individual responses are concrete options. Teacher observations, student questions, and student discussion provide additional evidence of students meeting learning targets.
- Use observations of student thinking and other evidence as an opportunity for purposeful discussions around the math concepts. These can be opportunities to reteach or extend learning of math concepts.
- Feedback based on evidence of student learning should be provided to students throughout the lesson. This can happen as the teacher circulates the room, during class discussion, or on group or individual response sheets.



Strategies Used: In-depth look at teaching strategies used in the lesson

- o 3 ACT Task
 - This is a whole-group task made up of three parts: Act 1 is an engaging situation that piques students' curiosity. Act 2 is where students seek information and work toward a solution, and Act 3 finishes the task by discussing solutions and tying the work back to the learning targets.
- Think-Pair-Share
 - With this strategy, students are given the opportunity to examine a prompt as an individual, then with a partner or small group, and finally share and listen to responses among the whole class.
- Notice/Wonder
 - This strategy allows students to unpack a problem or prompt before beginning to solve the problem or respond to the prompt. The purpose is to create a common experience and provide access for all students in an environment where students share their thoughts freely because there is no expectation to find the answer.

Extensions and Connections learned from teacher implementation

- Repeat the entire 3 Act Task, but ask students to find data from their home county on the
 <u>https://ofm.wa.gov/washington-data-research/county-and-city-data</u>, and then compare the numbers to
 the state level data. How do housing prices in your county compare to the rest of Washington State?
- Connection to Social Studies content: The entire task encourages and teaches civic mindedness and economic responsibility, a Washington State K-12 Learning Standard for Social Studies. A good extension for this would be to engage students in a civics lesson about why it is important to have a voice and advocate for positive change in your community. Students could come up with potential solutions to the housing crisis in our state and look for ways to share these solutions. Here are some resources with ideas for social studies applications:
 - Kid Citizen <u>https://www.kidcitizen.net/</u>
 - WA State Council for SS (Civics Integration Site) <u>https://www.wscss.org/elementary-integration</u>
 - Civics for All Lessons https://civicsforall.org/pedagogy/15-interdisiplinary-lessons/



Samples of Student Work













Discussion Rubric

Use this rubric during Act 2 while students are actively trying to solve the problem or answer the question. Listening to student discussion will give insight about their skills in contributing to productive conversation, ability to communicate disagreement, and about their ability to work through conflict. This may also help to identify any skill deficits, misconceptions, or areas that may require extra support or reteaching.

Rubric		Student Score		
Components	3	2	1	and Rationale
Critical Thinking	Student discussion shows that the student thought about the topic of housing costs and how it relates to income. Students answer the discussion questions and support their statement with numerical data.	Student discussion connects some of the ideas about housing costs and income. Students attempt to answer the question but may need support and prompting from the teacher.	Student discussion needs a significant amount of prompting and teacher support. Discussion may be off topic or unrelated to the data presented.	
Speaking	Students take part in the discussion and use talk moves or sentence stems to engage in discussion. Students contribute ideas about how to solve and what the numbers mean.	Students discuss the topic and sometimes use appropriate sentence stems or discussion tools. Student contribution needs some support and prompting.	Students do not use appropriate discussion tools to communicate ideas or are not contributing to the discussion topic.	
Listening	Students listen to each other carefully and take turns sharing ideas. Students respond using appropriate sentence stems or talk moves to show agreement or disagreement.	Students mostly listen and take turns. Students may need reminders about how to listen without waiting to respond. Some teacher intervention was needed.	Students needed lots of teacher intervention and reminders about how to listen to each other's ideas.	





Formative Assessment Rubric

Rubric		Student Score		
Components	3	2	1	and Rationale
Student understands how to analyze complex, real-world scenarios.	Identify the applicable information from the chart and table. Accurately set-up and solve equations using strategies that demonstrate understanding of complex mathematical approaches and numbers with digits not regularly practiced in class.	Identify the applicable information from the chart and table and choose appropriate operations to find an answer to the group's question. Accurately set-up and solve equations using strategies and numbers with digits regularly practiced in class.	Requires support in pulling out appropriate information from the chart and table and determining appropriate operation to find an answer to the group's question. May or may not accurately set up and solve the equation.	
Student solves a complex problem by making productive use of knowledge and problem-solving strategies.	Analyze, explain, and demonstrate solving a problem with multiple representations in multiple ways. Learn from previous attempts to solve problems.	Explain and understand the process in solving a problem and representing it in several ways. Plan a solution pathway.	Explain and understand solving a problem one way. Only uses concrete objects or pictures to help conceptualize and solve a problem.	
Student applies different operations to help solve a real-world problem.	Independently determine appropriate operation and create one or more accurate equations. Demonstrate multiple strategies to find a solution.	Independently determine appropriate operation and create an accurate equation to find the correct solution.	Require support to create an equation and determine appropriate operation to find a solution. Unable to independently find a mathematically correct solution.	
Student solves problems involving whole numbers with multiple digits.	Use a strategy involving creation of equations to accurately find a solution. Numbers used in the equation are above grade-level place values.	Use a strategy involving creation of equations to accurately find a solution. Numbers used in the equation are at grade-level place values.	Only uses concrete objects or pictures to help conceptualize and solve a problem.	





Presentation Materials - PowerPoint Slides

What's the Problem?

Exploring Affordable Housing in Washington State

3 ACT MATH TASK 3rd - 5th

Learning Goals:

- ★ Students will solve a range of complex well-posed problems in applied mathematics (SMP1).
- ★ Students will solve a complex problem by making productive use of knowledge and problem-solving strategies (SMP2).
- ★ Students will analyze complex, real-world scenarios (SMP4).

Success Criteria:

1

- \star I can make sense of problems and persevere in solving them.
- ★ I can explain what a value represents in my solution.
- \star I can use mathematics to solve and discuss real world problems.



What do you notice and wonder?

When you walk around your community, observe the types of homes people live in. How many cars do you notice parked in front of the living spaces? Can you estimate how many adults live in the home?



What do you notice and wonder?







Vocabulary

Household Income - The amount of money a family makes in 1 year.

"But my mom gets paid on Fridays, not once a year." Household income would be all the Friday paychecks added up over the course of the year.

What questions can we answer with this data?



City planners need your helping answering these questions:

What do you notice and wonder?

I noticed...

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★ How much more does a home in Washington state cost in 2019 than it did in 1999?

I am wondering...

- ★ How much more income do families have in 2019 than they did in 1999?
- ★ Do you think the increase in income is enough compared to the increase in housing costs?

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Recording Sheet

Name:	Group:	Date:

Notice	Wonder

1. Group Question: _____

2. Materials List:

3. Solution thinking:

4. Final answer:



Information Card



Strategies for working with multi-digit numbers

Using a Place Value Chart:

hundred thousands
ten thousands
thousands
hundreds
tens
ones

The strategy I used was ______ because ______.

- My strategy is like yours because _____.
- I used a different strategy because ______.
- Can you explain your thinking?
- I disagree with the solution because ______.

This answer makes the most sense because ______.

Using a Standard Algorithm:

- 1. Line up each place value.
- 2. Add or subtract starting in the ones place.
- 3. Remember to regroup!







Additional Resources

Career Connections

Isabel Garcia's career profile card can also be found on the PEI website at https://pacificeducationinstitute.org/wpcontent/uploads/2020/10/CPC-Misc-Isabel-Garcia.pdf.



Community Resources Connection

Washington and US average wages | Office of Financial Management



projects