LESSON TITLE: Shower vs Bath Task

STANDARDS ALIGNMENT:

Grade 3	Grade 4	Grade 5
3.OA: Represent and solve problems involving multiplication and division. **3.OA 3**: Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities. **3.MD.1:** Solve word problems involving addition and subtraction of time intervals in minutes. **3.MD.2:** Measure and estimate liquid volumes using standard units. Add, subtract, multiply, or divide to solve one-step word problems involving volumes that are given in the same units.	**4.OA.1** Use the four operations with whole numbers to solve problems. **4.OA.3** Solve multistep word problems posed with whole numbers and having whole number answers using the four operations, including problems in which remainders must be interpreted...Assess the reasonableness of answers using mental computation and estimation strategies including rounding. **4.NF 4:** Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. **4.MD.1:** Know relative sizes of measurement units. Express measurements in terms of a larger or smaller unit. **4.MD.2:** Use the four operations to solve word problems involving intervals of time and liquid volumes	**5.OA.1-2** Write and interpret numerical expressions. **5.NBT.5** Perform operations with multi-digit whole numbers and with decimals to hundredths. **5.NF 4:** Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. **5.MD.1**: Convert among different-sized standard measurements units and use these conversions in solving multi-step, real world problems. **5.MD.3**: Understand concepts of volume. Recognize volume as additive
MP: 1 Make sense of problems and persevere in solving them. **MP: 3** Construct viable arguments and critique the reasoning of others. **MP: 4** Model with Mathematics	**MP: 1** Make sense of problems and persevere in solving them. **MP: 3** Construct viable arguments and critique the reasoning of others. **MP: 4** Model with Mathematics	**MP: 1** Make sense of problems and persevere in solving them. **MP: 3** Construct viable arguments and critique the reasoning of others. **MP: 4** Model with Mathematics

CONNECTIONS (Consider while planning):

• Previous Math Knowledge: *What prior math knowledge and experiences does this lesson consider and/or build on?*

Four operations (addition, subtraction, multiplication and division) using numbers between 0-1000.

Estimating quantities
Knowledge about fractions
Knowledge of (a simplified version of) rates
Knowledge of equality and inequality

• Cultural/Community/Family Connections: *How does the lesson connect to, or build on the knowledge, practices, or experiences of children and families? On community contexts??*

Taking a shower or a bath, running water from a faucet or shower head and thinking about the flow (rate) of water, timing how long you bathe and how often, talking to family members about their bathing habits, being mindful of water conservation

• Language Considerations: *How does this lesson connect and distinguish between everyday language and math language? What might be specialized vocabulary used in this lesson? Connections to home language?*

Language related to showerhead pressure/flowrate: e.g. 3 gallons per minute

Language related to bathtub capacity: e.g. the capacity of the tub is 40 gallons when filled to the top

TASK Variations (to numbers, contexts, structure):

Routine 1: Mathematizing World - Open Ended (10 minute) - [Show video of someone running the water during a shower and for a bath, or image of water used during bathing - see ppt file with possible videos/images]

- What do you notice? What does this video/image make you wonder about? Brief class discussion.
- What questions do you have? What would you need to do to answer those questions?

Routine 2: Mathematizing World - Specific Questions (20 minute) Sensemaking and assumption building [Show image related to water used during bathing and elicit and/or pose specific questions that can be answered using mathematics; consider using anchor chart to record "math" questions using questions stems - How much? How many? How much more/less? How quickly?]:

- What mathematical questions can you ask? Or What questions do you have that you can use mathematics to answer?
- How long are your shower? How much water comes out of your shower each minute?
- How much water can fit in your tub? Do you fill the tub all the way?

Routine 3: **Full Modeling Task (60-90 minute) Students participate in entire modeling cycle**
VERSION A/WARM-UP TASK: Individual bathing habits
How much water do you use when you take a bath? How much water do you use when you take a shower?

Questions to think about:
- What do you know?
- What do you need to find out?
- What do you need to *assume*?

Work with your table to figure out how much water you use while bathing.

- Use pictures, numbers, and words
- Think about what might cause a shower or a bath to use more water.

VERSION B/MAIN TASK: Which is better, a shower or a bath?

Some people say a shower uses less water. Other people say a bath uses less water. Who do you think is right?

Questions to think about:
- What do you know?
- What do you need to find out?
- What do you need to *assume*?

Make a plan to find out who is right.
- Compare the two options, and show which uses less water, and how you know.
- You can use tables, pictures, numbers and words in your explanation.
- Think about your own bathing habits and what might cause a shower or bath to use more water.

VERSION C/EXTENSION TASK: Bathing habits of families

What if your family only took baths. How much water would you use in a week?

What if your family only took showers? Then how much water would you use in a week?

Which option conserves more water, and why?

Explain which option conserves more water for your family.
- Use pictures, numbers, and words
- Think about the bathing habits of each member of your family.
- Ask questions like How long? and How often?

MATERIALS

Shower vs Bath_Student Task

Shower vs Bath_Lesson Slides