PERFORMANCE TASK: Fishy Math

Approximately 1-2 days

STANDARDS FOR MATHEMATICAL CONTENT

MCC1.NBT.2 Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases:

a. 10 can be thought of as a bundle of ten ones — called a "ten."
b. The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.
c. The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).

MCC1.NBT.4 Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Students should have had prior experience with the steps involved in problem solving and a variety of problem solving situations. If this is the first time that the students are using the problem solving steps, then conversations should develop around each stage to help build understanding. Students should be familiar with how to use a variety of manipulatives to help with representations in problem solving.

ESSENTIAL QUESTIONS

- How can large quantities be counted efficiently?
- How can making equal groups of objects deepen your understanding of the base-ten number system?
- How can words be used to illustrate the comparison of numbers?
- How are problem-solving strategies alike and different?
- How can problem situations and problem-solving strategies be represented?

MATERIALS

- "Fishy Math" student task sheet
- "Pet Store" student task sheet
- Small manipulatives (counters, base ten blocks, unifix cubes, etc.)
- highlighters
- Small fish cut outs for intervention or as needed

GROUPING

Whole Group, Individual

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

(problem solving steps are adapted from Exemplars)

Part I

Part I of this task will be completed as a whole group activity. The class will work through the problem solving steps below and engage in mathematical conversations to solve this task. Conversations about the individual problem solving steps may need to be revisited for clarification. Pass out a task sheet, fish cut outs and highlighter to each student. Allow the students to cut out the fish before starting the task. Read the task aloud and then have students read it silently. Proceed through the following steps, allowing the class to work together in each stage. The teacher may also complete a task sheet using an overhead projector or document camera to allow guidance for students.

40 fish have arrived at the aquarium. You need to put the fish into fish tanks.
Each fish tank must have the same number of fish. How many fish tanks do you need?
Show at least 2 different ways the fish can be put into fish tanks. Use pictures, words, and numbers to show your math thinking.

During the *Understand* step of problem solving the students will develop an understanding of what the problem is asking. They will use a highlighter to indentify the question to be answered and locate any additional information that is important in solving the problem. *Why do you think this*

information is important? How will it help you solve the problem? Do not allow students to highlight the entire problem, the highlighted portions should be the "important" information only. The students will then write an "I have to…" statement. This statement is redefining the understanding of the question. Example: I need to figure out how many fish tanks I need to keep 40 fish.

During the *Think and Plan* step of problem solving the students will brainstorm and develop a plan to solve the task. During this stage the students will identify strategies that will help them solve the problems. It may be necessary to provide students with suggested strategies and let them choose which will work best for them. (draw a picture, act it out, make a list, guess and check, find a pattern, create a chart, work backwards, etc.) Students will then create an "I will…" statement. This statement will identify "how" the student intends to solve the problem. Example: I will draw a picture of the tanks and fish to solve this problem.

During the *Solve* step of problem solving, the students will use the strategy chosen to solve the problem. Students should work through the problems using the fish cut outs or manipulatives first. It is important to encourage students to work with manipulatives prior to pencil paper because they can easily rearrange the manipulatives to develop a solution. Students may become frustrated easily after too many attempts on paper. After a solution has been found using manipulatives, have them record the solution with a picture. Students may use an easy representation such as a square to represent a tank and a circle to represent a fish.

During the *Math Words* step of problem solving, the students will use math language to explain their thinking. The students should be encouraged to explain their thinking, along with the solution. Encourage students to write at least a couple sentences and keep in mind that someone reading their paper should know exactly what they were thinking. Example: I drew four squares to show my tanks. Next I drew 10 fish in each tank. I knew that ten fish would fit in each tank because I handed them out one by one and ran out of fish.

During the *Connections* step of problem solving, the students will make connections or identify relationships to other mathematical ideas and check their solution. Students may like to think of this stage as "thinking outside the box". Example: After I drew the fish in the tanks, I noticed that they were in groups of tens. I can add groups of tens because they are an easy benchmark number for me. 10 fish plus 10 fish plus 10 fish plus 10 fish equals 40 fish. 10+10+10+10=40

Part II

Students will now work independently to create their own problem to solve. Each student will roll two dice to create a 2 digit number and choose an animal to use. The 2 digit number identifies how many animals for the problem. Example: A student rolls 62 and chooses a mouse. Their problem will have 62 mice. Each student will write a story about their animal being delivered to the pet store. They will have to decide how to separate the animals into cages making sure no more than ten go into one cage. The teacher may allow students to write their own problem using the above information as a guide or a template has been provided if needed. Be sure to discuss and review the steps of problem solving and how these problems can be solved (using blocks to represent an animal and

circles or boxes to represent cages, making drawings etc.) Share strategies that might be appropriate for a similar problem if needed.

Guide and observe students as they work independently on their own problem. The teacher should remind the students to use pictures, words, and numbers to explain their solutions and justify their thinking.

After ample work time, have students share their ideas. Discuss the similar plans and the unique plans. This is an open-ended question and will have different combinations of responses.

FORMATIVE ASSESSMENT QUESTIONS

- How did drawing pictures help you solve this problem?
- Can you explain how you solved the problem?
- Can you identify the amount of tens and ones in your 2 digit number?

DIFFERENTIATION

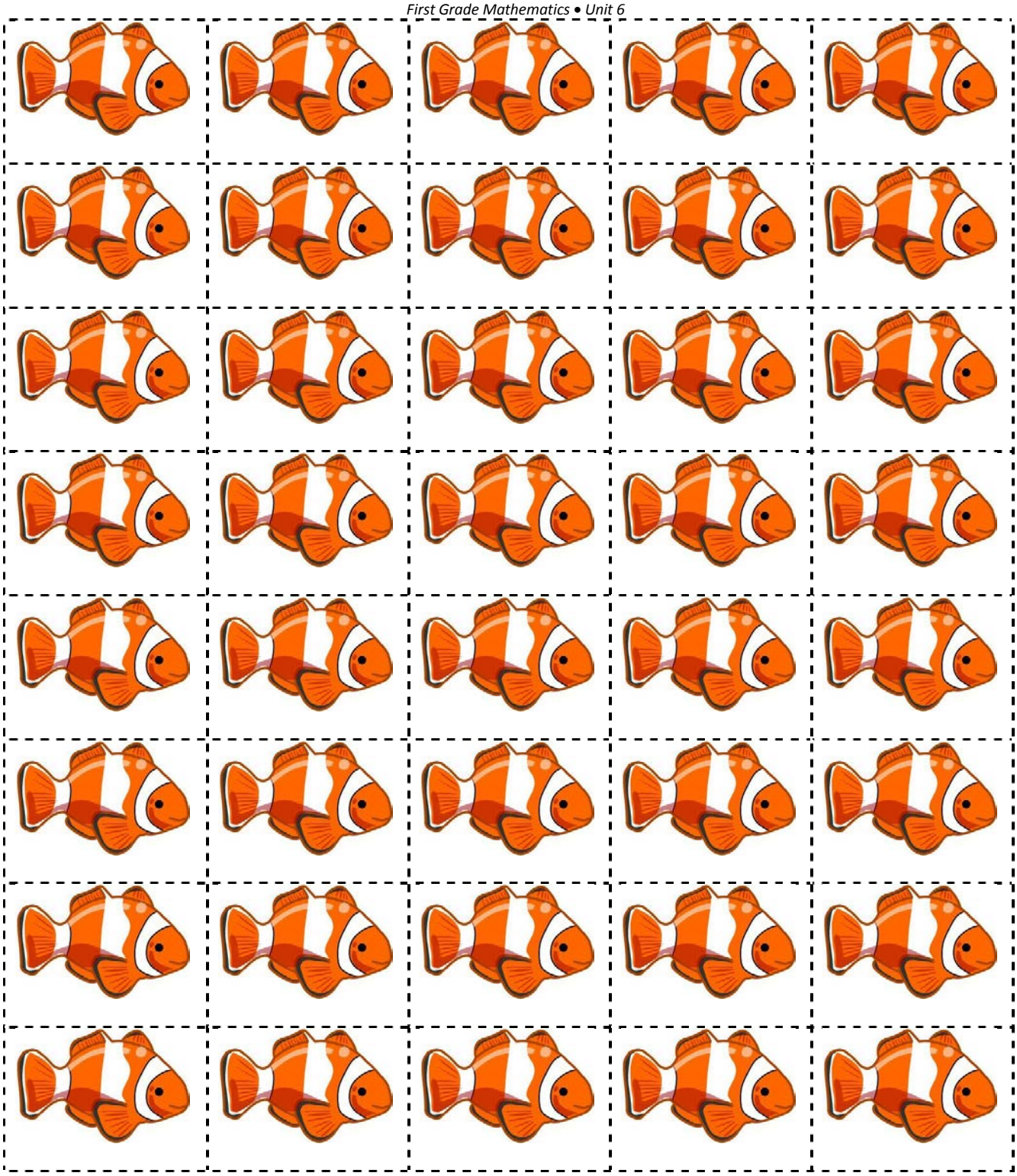
Extension

- Present this problem to the students:

  You have 54 starfish. How many different ways can you arrange these creatures and always have the same number of starfish in each aquarium?
- Students can create their own scenarios for others to solve.

Intervention

- Provide students with paper fish and rectangles to represent the aquariums. Allow students to work with a partner.



Name _____

Fishy Math

40 fish have arrived at the aquarium. You need to put the fish into fish tanks. Each fish tank must have the same number of fish. How many fish tanks do you need?
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Name _____

Pet Store

_____ _____ have arrived at the pet store. You need
number *animal*
to put the animals into cages. Each cage must have the same number of animals. How many cages do you need?

Show 2 different ways the animals can be put into cages. Use pictures, words, and numbers to show your math thinking.