Word Problems Galore! Differentiated Math Centers

This lesson contains center rotations based on student ability of below, on or above grade level, including differentiated materials for each. It includes a diagnostic assessment and an exit slip to ensure each student's needs are being met. Students will work directly with the teacher for explicit instruction, they will work in a writing center to create a plan for solving word problems and in an independent center applying the skills.

General Information

**Subject(s):** Mathematics  
**Grade Level(s):** 2  
**Intended Audience:** Educators  
**Instructional Time:** 1 Hour(s) 30 Minute(s)  
**Resource supports reading in content area:** Yes  
**Suggested Technology:** Document Camera  
**Freely Available:** Yes

**Keywords:** math, addition, subtraction, strategies, take apart, put together, adding to, taking from, putting together, two step word problems, one step word problems, comparing, unknown, equations, equation, within 100, unknown number, word problem, word problems, within one hundred

**Instructional Component Type(s):** Lesson Plan, Problem-Solving Task, Assessment, Instructional Technique, Formative Assessment, Student Center Activity

**Resource Collection:** FCR-STEMLearn Mathematics General

Attachment

- Math_byMyselfDirections.pdf
- Math_byMyselfWordProblems.pdf
- Math_Rotations.pdf
- Teacher_CenterWordProblemsKey.pdf
- Teacher Center Word Problems Student Page.pdf
- TIPS_forsolvingWORDPROBLEMS.pdf
- Word_ProblemDiagnostic.pdf
- Writing in Math_activitysheet.pdf
- Writing_inMathDirections.pdf

Lesson Content

**Lesson Plan Template:** General Lesson Plan

**Learning Objectives:** What should students know and be able to do as a result of this lesson?
- Students will represent one or two step word problems using drawings or equations with a symbol for the unknown number.
- Students will make sense of word problems.
- Students will persevere in solving word problems.

**Prior Knowledge:** What prior knowledge should students have for this lesson?

**MAFS.1.OA.1.1**

Use of addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.
Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.

Guiding Questions: What are the guiding questions for this lesson?
- What do you have to find out?
- Where could you start?
- What are strategies you could use?
- Could you use objects or pictures to help solve the question?
- Can you write an equation to represent this equation?
- Is this answer reasonable? Does it make sense? Why or why not?

Teaching Phase: How will the teacher present the concept or skill to students?
Before beginning Teaching Phase, read Further Recommendations on how to set up center rotation and student groups based on the formative assessment. This Teacher Center is part of the center rotations, and where the students will be taught the skills by the teacher.

Teacher Center:
- Teacher (T): First, we will look at tips for solving word problems. These might look familiar to you because you followed the same steps in first grade! I want you to think about what you do when you read a word problem. (Give students time to think.) Who can tell me the first step in solving a word problem?
  - Possible Student Responses (PSR): Read the problem! Add. Subtract.
- T: The first thing we will do is to read the problem! (Point to the TIPS for solving word problems sheet.) What is the next step?
- T: The second step is to find what the problem is asking us to do! What is the third step?
- T: The third step is really two steps squished together. We are going to think if we have ever solved a problem like this before. If you have, think about how you solved it! Then we are going to make a plan for solving the problem. Remember the stair steps, we use to plan for a problem! What is the fourth step?
- T: We are going to solve the problem using the plan we created! This step requires us to be very careful! No silly mistakes! There is one more very important step. Does anyone know what it is?
  - PSR: Silence. Check work.
- T: We need to check our work to make sure we did all of the steps correctly.
  - Pass out example problem #1. Use answer key for possible plans and student strategies.
- T: Let's try these steps on the problem in front of you. Read the problem. (WAIT) What is the problem asking? Have you ever solved a problem like this before? Think about how you solved that problem.
- T: To make a plan for solving our problem we need to think about: How could you solve this problem? What strategies could you use? Could you use picture or objects to help you solve it? Use stair steps (example in answer key) to make a plan with student input. Ask questions listed above to help students understand.
  - Now that we have a plan, let's solve the problem!
- T: We need to check our work! We are going to work backwards using our plan to make sure we did our work correctly. (Check student work).
  - Ask questions as necessary: Can you write an equation to represent this equation? Is this answer reasonable? Does it make sense? Why or why not?
- Guided Practice: What activities or exercises will the students complete with teacher guidance?
Teacher Center Continued:
- After you finish the problem pass out the next example problem until you either run out of time or complete all five problems. Ask students who finish early if they could solve the problem in another way.
  - Pass out example problem #1. Use answer key for possible plans and student strategies.
- Allow students to share one way they solved each problem so the other students are exposed to multiple strategies.
- Record the steps as each student explains their strategy.
- Scaffold instruction as needed during small group time. This will allow students who understand the process to work on their own and you to help students who are still struggling with the basic concepts.

Independent Practice: What activities or exercises will students complete to reinforce the concepts and skills developed in the lesson?
Read Further Recommendations on how to set up center rotation and student groups based on the formative assessment. This also gives information on which group (low, middle, high) will start at each center. The center materials are differentiated, so students who haven't been to the Teacher Center yet complete "plans for solving" without having to apply skills taught at the Teacher Center.

In the Math by Myself (MbM) center you will: (Read Directions and explain to students before starting center rotations.)
1. Find the assignment in the folder with your name on it. Manipulatives and TIPS for solving the word problems are on the table for you to use. I EXPECT you to use them both.
2. Complete provided word problems independently. Be sure to show your work. Draw and write an equation for your work.
3. Check answers using the key in the folder.
4. Find and correct any mistakes you may have made. If you finish early, there are two activities listed on the bottom of the directions for you to choose from. This is a silent center. You will be working independently. Remember to persevere!

In the Writing in Math Center (WiM) you will: (Read directions and explain to students before starting center rotations.)
1. Find the assignment in the folder with your name on it.
2. Read the problem at the top of the page.
3. You will not solve it yet. Create a plan to solve the problem. You will need to use drawings and equations in your plan. Use a question mark to represent any unknown numbers. If you need help, use the TIPS for solving word problems on the table.
4. Write down your plan.
5. Place paper on your desk when completed.
There are two activities at the bottom of the directions for you to choose from when you are finished. This is a quiet center. You should be working at a whisper level if you need to ask a friend for help.

Closure: How will the teacher assist students in organizing the knowledge gained in the lesson?

After all center rotations are completed, bring students back together for whole-group review.

Teacher: Look at your assignment from Writing in Math. (Note: Students haven't solved this problem yet, they made a plan to solve in that center.) Read your plan. Make changes if you need to. Then, I want you to meet with your center group. Within your group find a partner to share your plan with. Take turns explaining your steps. When you both have shared your plan, solve the problem. You should both end up with the same answer if done correctly. When you are ready for me to check your work return to your desk and wait quietly. If I do not come to you right way, try to solve it the way your partner did. When I come check, you will have to explain to me how you solved the problem.

Allow students time to solve the problem. Help as needed. Refer students back to their plan when they are needing assistance.

Questions / statements to help students:
- What is the problem about?
- What is the question we must answer?
- What information do we have that will help us do that?
- Do we have to create any more information?
- Use the appropriate information to now solve the problem.
- Work to visualize the situation!

After students have found a solution to the problem:
- Select two students who used two different strategies to share their work from each group.
- Correct any misconceptions and ask students to explain their thinking.
- Ask students “Why did you do that?” and allow them time to explain.
- Collect papers at the end for teacher review.

Summative Assessment
Students will complete an exit slip that they started in Writing in Math. They will explain to a partner their plan and the strategy they used to solved the problem.

Teacher will monitor students sharing plans and collect at the end for review.

What should be on the exit ticket for mastery?
- A plan to solve the word problem including all of the steps (restate, think, create, solve, check).
- The ability to verbalize how they arrived at their answer.
- Correct answer.
- Non Examples: no plan, missing a step in their plan, not able to explain their plan or thinking.

Formative Assessment
Prior to the lesson:

The day before the lesson students will take an individual pretest (Word Problem Diagnostic) containing 5 word problems, two of which will be one step word problems (one addition and one subtraction) and three of which will be 2 step word problems (mixed addition and subtraction.) The teacher will review the assessment and place students into ability based groups for further instruction depending upon their computational errors. Students who have already mastered the concept will be given "challenges" to solve independently and discuss answers as a partnership.

During the lesson:

The teacher will monitor students' work and confidence level through the use of guiding questions and informal observations. As students struggle, the teacher will use their judgment to determine if a student needs assistance or should continue working. Students who are confident and successful should be given an extension activity (attached within MbM and WiM center directions) once the assignment is complete.

Feedback to Students
During small group instruction, the teacher will scaffold as necessary. She will ask guiding questions to assist students in solving word problems. She will check their work and offer support to clear any possible misconceptions (see below) or confusion. Students will use this feedback to solve word problems during small group instruction and also during a math by myself (independent practice) center.

Guiding Questions
- What do you have to find out?
- Where could you start?
- What are strategies you could use?
- Could you use objects or pictures to help solve the question?
- Can you write an equation to represent this equation?
- Is this answer reasonable? Does it make sense? Why or why not?

Possible Misconceptions: skipping second step in problem, using the wrong operation, missing a step in their plan.

Possible responses to know students are on track: correct stair step plans, correct answer, ability to verbalize their work / process of solving.

Accommodations & Recommendations

Accommodations:
- Based on needed student accommodations you may choose to reduce the amount of problems the student is expected to complete during the independent practice.
- Due to the format of the lesson in center groups, assignments are differentiated within the lesson based on the formative assessment. (Students may only do a one-step problem as opposed to a multi-step problem, for example).
Extensions:
Math by Myself:
1. Write word problems containing one or two steps for a classmate to solve.
2. Use the following equation to create two different story problems that would make you use different steps to solve. \(23 - 13 + 4 = 14\)

Writing in Math:
1. Create a Venn Diagram to explain how addition and subtraction are related. See example on back.
2. Use at least three of the numbers below to write one and two step word problems that you might use at home to solve a problem.
   - 4, 16, 24, 28, 25, 50, 75, 100, 35, 55, 75, 95

Suggested Technology: Document Camera

Special Materials Needed:

You will need:
- Document Camera (or Overhead Projector and Transparencies)
- Bell
- Base ten blocks or cuisinaire rods
- Copies of the attachments for each student at each center

Further Recommendations:
BEFORE TEACHING:

- Students will be rotating through centers in 15-20 minute intervals (this time could be lessened or extended based on the amount of time available.)
- See attachments for Center Rotation Schedule. You will need to print out and place the attachments at each center. (I put the directions in front of an 8 1/2X 11 plastic self-standing photo frame and any additional resource materials in the back.)
- Students should be placed into groups based on pretest. See below for directions on grouping students.

When giving center directions for students, say:
- You will be rotating through 3 centers: Teacher, Math by Myself (MbM) and Writing in Math (WiM) (See independent practice for directions on centers.)
- You will need to bring a pencil when you come to the teacher table.
- If I ring the bell once, it means freeze.
- When I ring the bell twice, you will rotate between centers. Before you leave your center, it should look the way it does right now. Take a look at each center to see what it should look like when you leave.
- When I ring the bell three times, you will clean up your center and quickly return to your seat.
- While at your center you should be working the entire time. The only reason you are allowed to move is to use the restroom or to gather more manipulatives.

Put the center rotation schedule under the document camera. Tell the orange group (low) they will be visiting Teacher, MbM then WiM. The green group (med) will be visiting WiM, Teacher then MbM and the blue group (high) will be visiting MbM, WiM then the teacher. Release students to go to their centers one group at a time. Once there, practice the rings of the bell and returning to their seats. The center activities are differentiated based on ability and groups that were compiled based on results of the given pretest.

Grouping students:
- Orange: This will be your lowest group. These students did not score an 80% or better on the first grade skills tested on the pretest. They will need the most assistance and will only work on One step (result unknown) word problems during this lesson.
- Green: This will be your middle group. These students have mastered the first grade skills tested on the pretest and are ready to begin working with two step word problems. They will be work with Two step (result unknown) word problems during this lesson.
- Blue: This group will be your high group. These students have mastered the first grade skills tested on the pretest and have a firm grasp on two step word problems. They will work with Two step (addend / subtrahend unknown) word problems with extension activities provided during this lesson.

Where each group starts centers:
- Orange will start at the Teacher Center because they need the most scaffolding and direct instruction before they attempt to work on their own.
- Green will begin at Writing in Math because they will be thinking about the steps required (with visual reminders) to complete word problems before working towards solving on grade level word problems with the teacher (at second center).
- Blue will begin at Math by Myself as a challenge / extension of their skills because they have already exhibited the capabilities of completing on grade level word problems.

Additional Information/Instructions

By Author/Submitter
This lesson addresses the Math Practice Standard:
- MAFS.K12.MP.1.1 Make sense of problems and persevere in solving them. The students will use this standard as they create a plan to solve word problems.

Source and Access Information
Contributed by:
## Aligned Standards

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
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<tbody>
<tr>
<td>MAFS.2.OA.1.1</td>
<td>Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.</td>
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