

CCSS-Aligned Mathematical Task

Apples or Oranges? Grade 3

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Task

The school cafeteria is buying fruit for a class with 30 students. A bag of 10 oranges costs \$4, and a bag of 6 apples costs \$3. Which costs less, 30 oranges or 30 apples? How much less? Explain how you found your answer using pictures, numbers and/or words.

Rationale for Lesson

Big Idea: Mathematics content and practices can be applied to solve problems.

Common Core State Standards for Content

3.OA.6 Understand division as an unknown-factor problem. For example, find $32 \div 8$ by finding the number that makes 32 when multiplied by 8.

3.OA.7 Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

3.OA.8 Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

Common Core State Standards for Mathematical Practice

Math Practice 1 - Make sense of problems and persevere in solving them.

Math Practice 3 - Construct viable arguments and critique the reasoning of others.

Math Practice 4 - Model with mathematics.

Math Practice 6 - Attend to Precision.

DOK Level: 3

Show and use reasoning, planning and evidence.

Enduring Understandings

Sometimes the answer to one problem is needed to find the answer to another problem. Some problems can be solved by first finding and solving a sub-problem(s) and then, using that answer(s) to solve the original problem.

Materials Needed

Task paper: Task with Math Practice standards, MP Standard student checklists, visuals of the fruit.

Manipulatives:

- Counters
- Graph paper
- Discussion stem table tents:

I'm confused about... What did you mean when you said...? _____, What I heard you say was... I would like to add... I disagree/agree with _____, because.....

- Sentence frame for the answer
- Optional: Bag of 10 oranges and another bag of 6 apples

Set-Up Phase

*The mathematical goal for this lesson is for students to understand that sometimes the answer to one problem is needed to find the answer to another problem. Some problems can be solved by first finding and solving a sub-problem(s) and then, using that answer(s) to solve the original problem.

*This task builds on previous knowledge, students need a concrete understanding of:

3.OA.1 Interpret products of whole numbers, e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5×7 .

3.OA.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

*The task can be solved in a multitude of ways: arrays, input/output tables, T-tables, tape diagrams, area model, equal groups, pictorial representations, and calculations "in their head". Students will most likely use arrays and other pictorial representations to solve the task. Students may have misconceptions when solving this problem, as they may solve the first part of the problem, but not the second part of the problem. Errors students may make could be applying the incorrect dollar amount to the fruit. They can also apply the dollar amount of bags of fruit to each individual fruit.

*When students are able to restate the task in their own words, they will have understood the task. They should be able to state that they first need to figure out how many bags of fruit to buy, for both kinds of fruit to yield a quantity of 30 fruits. Then, they need to apply the correct dollar amount to the number of bags necessary. Lastly, they must compare the dollar amounts to figure out which one is less.

Explore Phase

*Students are expected to follow classroom rules and procedures set in place. Math time norms that include using problem solving strategies, respecting independent working time, being respectful when "challenging" someone else's thinking, explaining one's own thinking, and solving problems in more than one way.

* Students will first work independently for 5 minutes, then work with their table partners (heterogeneously grouped) for 10 minutes, followed by 10 minutes of working in a small group (also grouped heterogeneously, pair squares), with a final 5 minutes of independent time. Students will record their answers on the graph paper. They will have a sentence frame available to use if they choose to explain their thinking.

*Teacher will direct students to employ the problem-solving strategies outlined on the task sheet to focus them on the activity without reducing the demands of the task.

Possible Student Strategies	Focusing Questions	Assessing Questions	Advancing Questions
Student having difficulty getting started	<p>What is the problem asking you? What is important about the picture? What is the first thing you should do? What do you already know?</p> <p>Which fruit do you want to begin with? How could you show the bags of fruit?</p>		
Student completes the	How does your work match the		

Possible Student Strategies	Focusing Questions	Assessing Questions	Advancing Questions
task incorrectly	problem?		
Student is focused on non-mathematical aspects of the problem	How might counters or tally marks give you the same information as a detailed drawing?		
Student solves first part of the problem, but not the second part	What information that you discovered can help you answer the question?		
Student applies incorrect amount to fruit	How do your numbers match the problem? Would the price apply to each piece of fruit or all the fruit in the bag?		
Student solves the problem one way		How did you solve the problem? How do you know you are correct? What did you do first? Why? What did you do next? Why?	How would you use an equation to record what you just told me?
Student solves the problem two ways			How would this work if 6 more students were in the class? How would the

Possible Student Strategies	Focusing Questions	Assessing Questions	Advancing Questions
			answer change? How do you know whether or not this pattern always works? What other patterns do you see? Where else have you used this?

Universal Access: Teachers will arrange the classroom and place students strategically. Students with disabilities will be seated near the teacher or near where the teacher will give directions or present the lesson. They may also be seated near a positive role model and near the least amount of stimuli.

Other accommodations to consider:

English Learners could discuss each other's work, strategically partnered, given visual aides, and included in a small group to preview/review directions or repeat the directions back to the teacher. They could be given sentence frames, discussion stems, or simplified directions. And, they could be asked to review the key points orally.

Students with Disabilities could be given large print, paired with a peer tutor, given cue cards or highlighters to assist the students in identifying the problem, provided with self-monitoring devices (i.e., problem-solving poster, MP standard checklist), or be included in small groups to go over "known facts" and what the problem is asking. They could also be given sentence frames, discussion stems, or simplified directions. They could also be asked to demonstrate their knowledge or how they solved the problem in a different format.

GATE students: Depth and complexity may be introduced by adding elements to the problem, not in creating extra work for the student.

Share, Discuss, and Analyze Phase

*The student work shared may move from concrete to visual to abstract to help students determine which fruit cost less. Possible strategies may include:

1. **Equal Groups-** A student who uses equal groups has a concrete understanding and uses concrete example of the bags of fruit.

2. **T-charts** to show data

Possible models may include:

1. **Arrays**- A student who uses arrays provides an accurate visual representation without necessarily showing the fruit separated by bags.
2. **Tape Diagram**- The tape diagram helps students visualize the number relationship within the problem. It also provides a visual model for comparing two quantities.

*The solutions should be presented in a very specific way. If students haven't provided one of the chosen paths intended to be shared, the teacher could share an anonymous response, and ask students what that student was thinking.

*Possible questions may include:

Why did _____ solve the problem this way?

What can we learn from doing this problem?

How do you think _____ made equal groups?

How was _____'s solution, that used equal groups similar to _____'s solution, that used arrays?

How are they different?

How is the tape diagram solution different from the arrays and equal group methods?

What is one thing all the solution paths have in common?

*When students can explain their own thinking or the thinking of others; when they can differentiate the similarities and differences of the solution paths, the teacher will know that students in the class understand the mathematical ideas that were intended for them to learn. Students must also be able to demonstrate the essential understanding of the lesson, verbally, to their partner. Finally, ask one student to summarize to the class the essential understanding of the task.

Application

*To build on this lesson, the next day, teacher might provide more opportunities for students to engage in problems that require 2-step solutions. Then, discuss how the solution paths to the problems were similar, and how they each, in their own way, needed one part to be solved first, in order to apply the answer when solving for the second part of the problem.

Summary

How did solving the first problem (how many bags of each fruit were needed) help you to determine the cost of each fruit? How did knowing how much 30 oranges or 30 apples cost, help you figure out which was less money?

Quick-Write

Write about what you learned about having to solve one part of a problem in order to solve another part of the same problem.

Student Task Sheet: Apples or Oranges?

<p>Practice Standard 1- <i>Make sense of problems and persevere in solving them.</i></p> <p><input type="checkbox"/> I worked independently for at least 5 minutes to make sense of the problem.</p> <p><input type="checkbox"/> I solved the problem in more than one way.</p>	<p>Practice Standard 3- <i>Construct viable arguments and critique the reasoning of others.</i></p> <p><input type="checkbox"/> I asked my partner questions so that I understand his/her solution.</p> <p><input type="checkbox"/> I explained my solution to my partner.</p>	<p>Practice Standard 4- <i>Model with mathematics.</i></p> <p><input type="checkbox"/> I created a representation of the problem using models, pictures, and words.</p>	<p>Practice Standard 6- <i>Attend to Precision.</i></p> <p><input type="checkbox"/> I clearly communicated my thinking and how I found my answer.</p>
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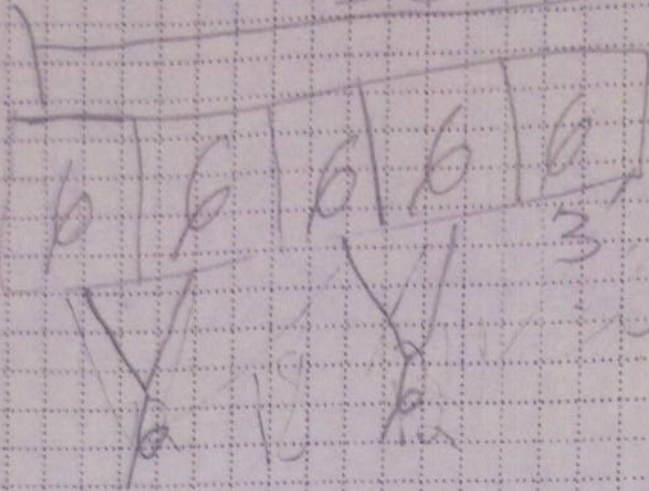
The school cafeteria wants to buy fruit for a class with 30 students. A bag of 10 oranges costs \$4, and a bag of 6 apples costs \$3. Which costs less, 30 oranges or 30 apples? How much less? Explain how you found your answer using pictures, numbers, and/or words.

COSTE 7/11/19

30

Apples

6 → 725
 12 ✓
 18 ✓
 24 ✓
 30 ✓



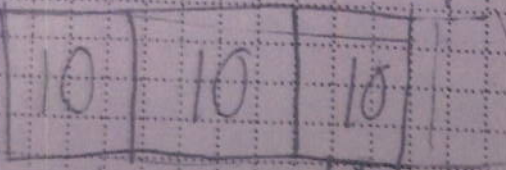
+ 6 → 12
 + 6 ✓
 3
 \$15

30 oranges cost \$3 less because
 5 minus 12 equals \$3

2. (C)

oranges

10
 20
 40



10
 20
 30

15
 + 15
 \$30
 \$12

20 oranges at \$3.00 less



Apples

Pears

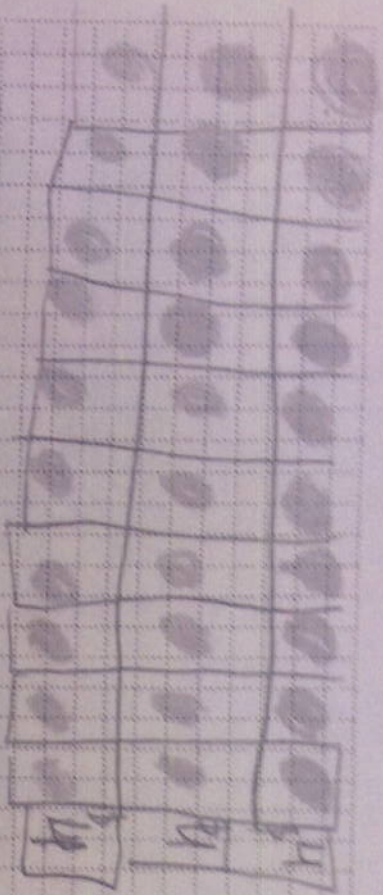
I DON know 20 oranges cost \$3.00 less than 30 Apples.

\$3.00
\$3.00
\$3.00
\$3.00
\$3.00

6
15

30

Mary



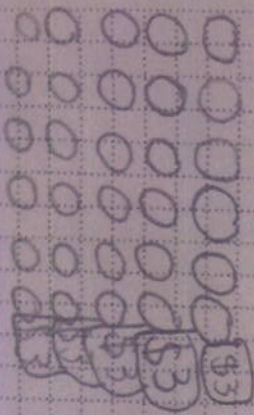
$$3 \times 10 = 30$$

$$\begin{array}{r} 15 \\ -12 \\ \hline 03 \end{array}$$

= orange

\$12 for 30 oranges

The oranges are less, there \$12
There \$3 less than \$15



$$5 \times 6 = 30$$

\$15 for 30 apple