**Soccer Gear**

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| In this lesson, students compare estimation strategies in the context of buying soccer gear. |

**NC Mathematics Standards:**

**Operations and Algebraic Thinking**

**NC.4.OA.3** Solve two-step word problems involving the four operations with whole numbers.

• Use estimation strategies to assess reasonableness of answers.  
• Interpret remainders in word problems.  
• Represent problems using equations with a letter standing for the unknown quantity.

**Supporting Standards:**

**NC.4.NBT.4** Add and subtract multi-digit whole numbers up to and including 100,000 using the standard algorithm with place value understanding

**NC.4.NBT.5** Multiply a whole number of up to three digits by a one-digit whole number, and multiply up to two two-digit numbers with place value understanding using area models, partial products, and the properties of operations. Use models to make connections and develop the algorithm.

**Standards for Mathematical Practice:**

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.

**Student Outcomes:**

* I can devise a plan to solve a two-step word problem.
* I can estimate to find a reasonable answer.

**Math Language:**

* estimate
* round
* reasonable
* two-step word problem
* operations
* addition
* subtraction
* multiplication
* division

**Materials:**

* Soccer Gear student handout (1 per student)
* Sports Central sales flier (1 per student)

**Advance Preparation**:

* Copy Soccer Gear student sheets and Sports Central sales flier (1 per student)
* Pull up the website for the Launch portion of the lesson

**Launch:**

1. Introduce the problem. (5 minutes)

Visit <https://www.svsports.com/info/soccer-equipment-checklist> with students. Quickly go over the names of the various types of soccer gear. Hand out the Soccer Gear student sheet and read the problem to students. Tell students that the math goals today are for them to be able to come up with a plan to solve a two-step word problem and use estimation to find reasonable answers.

**Explore:**

1. Partner Work Time (30-40 minutes)

Assign students to partner groups and allow them to begin solving the task. As students are working, observe to see how each group has decided to solve the task. This is your opportunity to find strategies that you want shared during the discussion portion of the lesson. Since this lesson is focused mainly on estimation strategies instead of exact answers, you should look for estimation strategies to compare. For example, you may want to choose a strategy in which students estimated the total cost of soccer gear for one team member before multiplying by 11, so that you can ask students to compare it to a strategy in which students estimated the cost for the team for each piece of gear and added. Alternately, some students may round the cost of the pieces of equipment, while others round the number of team members to 10 to make calculations easier.

To move students’ thinking forward, ask questions such as:

* What do you know?
* What do you want to find out first?
* How could you get started?
* How could you estimate to make the computation easier and get close to the total cost?
* How did your estimate help you solve think about the problem?
* What does this number mean?
* Is this estimation reasonable for the number of \_\_\_\_\_? Is this answer probably less or more than the exact amount needed to buy soccer gear for the team?

**Discuss:**

1. Share Strategies (20-30 minutes)

Bring the group back together and have students share in the order you chose. As students share, encourage other students to ask questions, add on to the explanation or strategy, restate the strategy, connect the math to a model, and connect work from multiplication strategies.

Possible questions to ask:

* Why did you round to that number to estimate?
* What does this strategy show about the cost of soccer gear for the team?
* How do these strategies compare? Can they both be correct if the estimate is different?
* Which strategy most likely shows the closest estimate? Why?

Summarize the lesson by helping students see why estimation is good to use in situations like this. Discuss other situations where estimation is appropriate. Be sure students understand that estimation is not rounding, though rounding can sometimes help with estimation.

Teacher Note: Refer to the Estimation Strategies Document for Teachers under Additional Resources for more information on estimation strategies if needed.

**Evaluation of Student Understanding**

**Informal Evaluation:**

* Listen for student thinking during partner work and class discussions. Students should be able to come up with an efficient plan for solving a two-step word problem and find a close estimate.

**Formal Evaluation/Exit Ticket:**

* Exit Ticket: The team decides to also purchase a water bottle and a soccer ball for each player. Which estimation strategy would provide the closest estimate for the cost of these items?

**Meeting the Needs of the Range of Learners**

**Intervention:**

* Give students only $5 and $10 bills in pretend money. Ask the student to lay out an appropriate amount of money to represent the cost of each piece of equipment.

**Extension:**

* Tell students that Sports Central will give away a free sports towel for every $50 spent at their store. About how many free water bottles will the team receive?

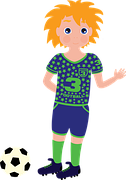
**Possible Misconceptions/Suggestions:**

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| **Possible Misconceptions** | **Suggestions** |
| The student lacks mental benchmarks that allow him or her to find a reasonable estimate. | Provide a number line for the student to use so that the magnitude of each number is more visible. |

**Possible Solutions:**

* A reasonable estimate for one team member would be close to $90. When this amount is multiplied by the 11 players on the team, the price of gear for the team would be $990.
* If students estimate the price for the team of each piece of equipment, their answers will be close to the following:
  + Shin guards $220
  + Cleats $330
  + Shorts $110
  + Socks $110
  + Jersey $220

Total: $990

**Soccer Gear**

The Green Dragons soccer team has 11 players. The team is ordering new soccer gear for each player on the team from Sports Central. Each player needs a jersey, a pair of shorts, a pair of socks, shin guards, and a pair of cleats.

***About how much will soccer gear cost for the team?***

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