



Lifting a “Giant Peach”

National Standards: Mathematics > Number and Operations

NM-NUM.3.-5.3, NM-NUM.6-8.3 Compute fluently and make reasonable estimates (Grades 4-5) (Grades 6)

- Develop and use strategies to estimate the results of whole-number computations and to judge the reasonableness of such results.
- Select appropriate methods and tools for computing with whole numbers from among mental computation, estimation, calculators, and paper and pencil according to the context and nature of the computation and use the selected method or tools.
- Select appropriate methods and tools for computing with fractions and decimals from among mental computation, estimation, calculators or computers, and paper and pencil, depending on the situation, and apply the selected methods.
- Develop and use strategies to estimate the results of rational-number computations and judge the reasonableness of the results.

National Standards: Mathematics > Problem Solving

NM-Prob.PK-12.1, (Grades 4, 5 & 6)

- Build new mathematical knowledge through problem solving.

NM-PROB.PK-12.2 (Grades 4, 5 & 6)

- Solve problems that arise in mathematics and in other contexts.

NM-Prob.PK-12.3 (Grades 4, 5 & 6)

- Apply and adapt a variety of appropriate strategies to solve problems.

NM-Prob.PK-12.4 (Grades 4, 5 & 6)

- Monitor and reflect on the process of mathematical problem solving.

Kentucky: Mathematics Standards

- Develop and apply strategies to problems from everyday and mathematical situations and evaluating the solutions relative to the original problem situation.
- Develop multiple strategies for modeling, interpreting, and formulating problems based in real-world situations, within and outside mathematics, and aids in investigating and understanding mathematical content.
- Recognizing patterns and relationships and using models, known facts, and mathematical properties to explain and justify thinking.
- Relate concepts to other concepts and procedures.
- Relate mathematical ideas within mathematics and to other disciplines using graphic, numerical, physical, algebraic, and verbal models.
- Relate concepts of a mathematical topic to other disciplines.

Number and Computation

M-4-NC-12, M-6-NC-7

- Add, subtract, multiply and divide whole numbers.

M-5-NC-12

- Explore appropriate estimation procedures.

M-6-NC-11

- Use prime numbers, composite numbers, factors, multiples and divisibility to solve problems.

Probability and Statistics

M-4-PS-2, M-5-PS-2, M-6-PS-3

- Choose appropriate means to collect and represent data.

M-4-PS-5, M-6-PS-2

- Draw conclusions based on data.

Ohio: Mathematics > Number, Number Sense and Operations Standards

- Demonstrate number sense, including an understanding of number systems and operations and how they relate to one another.
- Compute fluently and make reasonable estimates using paper and pencil, technology-supported and mental methods.

Benchmark(s)**Grade 4**

- J. Estimate the results of whole number computations using a variety of strategies, and judge the reasonableness.
- K. Analyze and solve multi-step problems involving addition, subtraction, multiplication and division of whole numbers.
- L. Use a variety of methods and appropriate tools (mental math, paper and pencil, calculators) for computing with whole numbers.

Grades 5 & 6

- I. Use a variety of strategies, including proportional reasoning, to estimate, compute, solve and explain solutions to problems involving integers, fractions, decimals and percents.

Ohio: Mathematics > Mathematical Processes Standard

- Use mathematical processes and knowledge to solve problems.
- Apply problem-solving and decision-making techniques, and communicate mathematical ideas.

Benchmark(s)**Grades 4, 5, & 6****A-K****Up, Up and Away**

It's a bird, it's a plane. No, it's a peach whose mass and weight has been calculated for lift and carry.

Objective

Students will demonstrate an understanding of estimation and its use in mathematical problem solving.

Students will use estimation to predict the requirements for paper clips to "lift and carry" objects of varying weights.

Materials

- Several helium balloons with string (or ribbon) (Alternative—mylar balloons)
- Several boxes of paper clips
- Dixie cups
- Paper
- Pencil
- A peach

Vocabulary

- Mass
- Weight
- Equivalent fraction

Activity

Task 1

Teacher will:

- Facilitate student discussion on how James used seagulls to lift and carry the peach into the air.
- Ask the students to predict how many seagulls it would take to carry a peach of average size. *James states in the story that 522 seagulls were necessary to lift the giant peach.*
- Explain to the students that it is not feasible to bring seagulls into the classroom to test their predictions, but an alternative method may be used.
- Introduce the helium balloons, Dixie cups and paper clips to the students.
- Have students predict how these tools will be used to solve the problem of lifting a peach.
- Ask students if they believe a helium balloon is capable of lifting a Dixie cup and/or a paper clip.
- Place a paper clip in a cup and tie the cup to the end of the string attached to a balloon.
- Have students observe the action (if any) of the balloon and cup.
- Ask students to predict the maximum number of paper clips that a balloon could lift and carry.
- Share and record student predictions.
- Have students, in small groups, test their predictions and record their results. *Students will start with the minimum number of paperclips the balloon can lift and add one paper clip at a time until the balloon can no longer lift the cup of paper clips. Students will record this number.*
- Have students continue to test various objects and record their findings.
- Facilitate student discussion of the findings.

Task 2

Students will:

- Continue exploration, experimentation and documentation using two balloons and the maximum number of paper clips, then three balloons, four balloons, etc.
- Record the data in the form of a table and identify resulting patterns.
- Proceed to predict and experiment with the actual lifting of a peach, placed in a small container and tied to a balloon.

Extension (Optional)

Teacher will:

- Ask students to predict or estimate how many balloons are needed to lift a person of their size. *Since it is not feasible to bring a large number of balloons into the classroom, students will have to perform mathematical calculations.*

Example:

Take the weight of the amount of paper clips lifted by one balloon and convert into a fraction. The number of balloons is the numerator, and the weight (number of paper clips) is the denominator. A student's weight becomes the denominator of the second fraction.

Students calculate an answer by discovering the numerator to make an equivalent fraction. (e.g., one balloon lifts 1.5 pounds; the first fraction is then $1/1.5$. A student weighs 45 pounds, the second fraction is $1/45$. The equivalent fraction results in a numerator of 30. It therefore takes approximately 30 balloons to lift a 45 pound person.

Performance Assessment:

Teacher will evaluate students' abilities to:

- Demonstrate the purpose of estimation and prediction in mathematical problem solving.
- Follow directions, work collaboratively to experiment and find a solution to the problem of lifting a peach.
- Collect and record data for appropriate means.