

# Teacher Instructions: Chaperones

**Grade Level:** K – 2

**Task:** Chaperones

**Standard:** Number Sense and Operations

A class of 25 students is going on a field trip to a science museum.

They plan to visit the exhibits in small groups of 2, 3, or 4 students along with a chaperone.

What is the least number of chaperones they will need?

➤ **Teacher Note:** A kindergarten and first grade version of this problem is given.

**Context – From the Task Author:** The arrangements that commonly need to be made when a class goes on a field trip often involve mathematics. It is useful to share these situations with your class whenever possible, and involve them in the real-world problem solving/decision making process.

**What the task accomplishes...**

- This task readily engages the interest of this age group as field trips are special events that are much anticipated.
- How groupings are formed is always an interest of students.
- The task involves the students because they have to break down a number into a variety of groupings while keeping several variables in play.

**What students will do...**

- Some students will count out 25 manipulatives, or make drawings to represent the number of students in the class and group these.
- Others will start by making groups and adding on until they reach the number of students in the class.
- Some will, from the beginning, see the need to start with groups of 4. Others will arrive at this conclusion as they work the problem.

**Time Required:** 40 minutes

**Interdisciplinary Links:** This task is readily modified to link with different contexts in which groupings are involved. In school, students need to be grouped for different activities. This task can be adapted to fit those activities.

**Teaching Tips...**

- The numbers in this task can easily be adapted for students with different abilities. For example, in kindergarten students might work with the number 13. First graders may work with 17, 18, or 21; and second graders with 25 or 29.
- I chose the number in the task because it was a multiple of 4 plus 1, and could be broken down into 2 acceptable groupings.
- The original task may also be turned around so that the number of chaperones is known, and the possible composition and combination of groups becomes the question.

**Suggested Materials:** Provide manipulatives that can represent students, string or other manipulatives that can be used to create groups, and pencil and paper to record solutions.

**Possible Solution...**

**Grade 2 Version:** There are 2 correct solutions to the problem. In the case of a class of 25, the least number of chaperones needed will be 7: 5 groups of four, 1 group of 3, and 1 group of two, or 2 groups of four and 3 groups of three. There are a variety of calculation strategies that students can use to arrive at the solutions.

**Grade 1 Version:** There are 2 correct solutions to the problem. In the case of a class of 18, the least number of chaperones needed will be 5: 4 groups of four and 1 group of two, or 4 groups of four and 2 groups of three. There are a variety of calculation strategies that students can use to arrive at the solutions.

**Kindergarten Version:** There are 2 correct solutions to the problem. In the case of a class of 13, the least number of chaperones needed will be 4: 2 groups of four, 1 group of 3, and 1 group of two, or 3 groups of three and 1 groups of four. There are a variety of calculation strategies that students can use to arrive at the solutions.

**Benchmark Descriptors:**

- The benchmark descriptors and rubric are designed to help the teacher analyze student thinking and understanding at each of the four performance levels.
- The descriptors are generalizations of what student work could look like.
- It is not possible to anticipate every answer a student can give, so in scoring student work the teacher must use these generalizations to come to their own conclusions as to where a student is performing on the task.
- It is recommended that teachers create their own task specific rubric by listing the specific math skills that would make up each section of the four performance levels.

<b><i>Novice</i></b>	<ul style="list-style-type: none"> <li>✓ The novice will be unclear about how to begin and need help beyond the initial class introduction of the problem to get started.</li> <li>✓ The novice may begin to group manipulatives as they see other students doing, but their groupings are unrelated to those given in the problem, or made without an overall purpose.</li> </ul>
<b><i>Apprentice</i></b>	<ul style="list-style-type: none"> <li>✓ The apprentice is able to start solving the problem independently and know what s/he is trying to find out, but makes some error or ignores some piece of information.</li> <li>✓ For example, the pictured groups may not add up to 25; groupings other than 2,3, or 4 are used; or the student does not find the least number of chaperones.</li> </ul>
<b><i>Practitioner</i></b>	<ul style="list-style-type: none"> <li>✓ These students are clear about how to set about solving the problem, and find a correct solution by setting out manipulatives to represent the number of students in the class and then grouping them.</li> <li>✓ They may also draw out the 25 students and group them on paper.</li> <li>✓ The practitioner will use accurate and appropriate math language, and diagrams will be labeled.</li> </ul>

<b>Expert</b>	<ul style="list-style-type: none"> <li>✓ The expert not only finds one or more of the correct solutions, but is able to mentally solve the problem using knowledge of multiples of 4, 3, and in one case 7.</li> <li>✓ The expert may use math "drawings" and equations to prove the solution, and are able to show and tell how the solution was calculated.</li> <li>✓ The expert may also make mathematically relevant observations and connections.</li> </ul>
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**A Note About the Task Specific Rubrics:** The task specific rubrics included in the mathematics task bank states specific proficiency levels for each on the grade levels within the task. For a more comprehensive explanation of the rubrics please read the March Tip Sheet.

## APS Mathematical Standards...

❖ The math standards stated for this task are aligned to the APS Draft Standards 2000.

### Strand – Number Sense and Operations:

Students will demonstrate number sense through experiences with meaningful mathematical problems that focus on number meaning, number relationships, place value concepts, relative effects of operations, and multiple representations to communicate sound mathematical thinking.

**Benchmark (K – 5):** The student will understand place value of whole numbers, compose and decompose whole numbers, understand the operations and their effects on numbers and solve problems with fluency and a variety of methods.

### Performance Standards:

#### Kindergarten:

- **Demonstrates** 1 -to- 1 correspondence by keeping track of quantities while counting.
- **Creates** a set of a given size.
- **Connects** numerals to the quantities they represent.
- **Demonstrates** that the meaning of a number does not change no matter how objects are grouped.
- **Combines** and **separates** sets of objects with quantities and identifies the parts and the whole.
- **Describes** a quantity using the terms more, less, and same.
- **Represents** numbers in a variety of equivalent ways (e.g., dots, pictures, numerals).
- **Combines** and **separates** 2 single-digit numbers using pictures, stories, and objects to model the situation.
- **Records** numerical information using pictures, words, and/or numbers.

#### First Grade:

- **Forms** and **counts** groups of objects (e.g., 2s, 5s, 10s).
- **Represents** equivalent forms of the same number through the use of physical models, diagrams, and number expressions to 20 [part – part – whole (e.g.,  $3+5=8$ ,  $7+1=8$ ,  $2+6=8$ )].
- **Builds, estimates, and compares** combinations of numbers to 20 in different ways using pictures, stories, and objects to model the combinations.

- **Finds** the sum or difference of 2 quantities up to 20 using symbols in problem-solving situations (e.g.,  $12+5=17$ ,  $12-5=7$ ).
- **Demonstrates** that the number of objects (up to 20) does not change when the objects are moved or rearranged.
- **Constructs** a mental image of combining and separating quantities in problem situations.
- **Develops** strategies and estimation skills for solving addition and subtraction problems.
- **Records** strategies for solving, combining, and separating problems using pictures, numbers, equations, and words.
- **Identifies** equal shares in examples of models partitioned with equal and unequal parts (e.g., share 12 M&M candies among 3 friends, share 11 apples among 5 friends).
- **Uses** estimation and other methods to justify whether or not an answer is reasonable (e.g., using a small container, would 25 marbles fit?).

### Second Grade:

- **Applies** patterns in skip counting; **compares** and **defends** the relationship between skip counting, grouping, and equal sets.
- **Analyzes** relationships of quantities to 20 using part – part - whole (e.g.,  $1+7$ ,  $2+6$ ,  $3+5$ ,  $4+4$ : all equal 8.).
- **Makes** and **defends** a reasonable estimate of quantities up to 200 in problem situations.
- **Uses** and **explains** multiple strategies to solve addition and subtraction problems using 2-digit numbers with and without re-grouping.
- **Decomposes** and **recombines** numbers in logical ways to solve problems (e.g.,  $8+5=(3+5)+5=3+10=13$ ).
- **Uses** and **explains** mental math strategies to solve problems (e.g., children solve problems without pencil and paper).
- **Solves** the 2 types of situational subtraction problems: comparing 2 sets of objects and separating parts from whole.
- **Describes** the inverse relationship between addition and subtraction.

### Strand – Patterns, Functions and Algebraic Concepts:

The student demonstrates an understanding of algebraic skills and concepts through experiences with meaningful mathematical problems that focuses on discovering, describing, modeling, and generalizing patterns and functions, representing and analyzing relationships, and finding and supporting solutions.

**Benchmark (K – 5):** The student sorts and classifies objects by properties, extends, analyzes, and generalizes patterns, and models the result using appropriate tools. The student understands qualitative and quantitative change and begins to use number properties.

### Performance Standards:

#### Kindergarten:

- **Identifies**, **describes**, and **extends** patterns with familiar objects in both classroom and real-life situations.

### First Grade:

- **Identifies, describes, creates, and extends** patterns observed in familiar objects in real-life situations (e.g. 1 child = 2 eyes, 2 children = 4 eyes).

### Second Grade:

- **Describes, creates and extends** a wide variety of patterns.

## Strand - Global Mathematical Processes:

Students will understand and use mathematical process.

**Benchmark (K - 12):** The student will use problem solving, reasoning and proof, communication, connections, and representation as appropriate in all mathematical experiences.

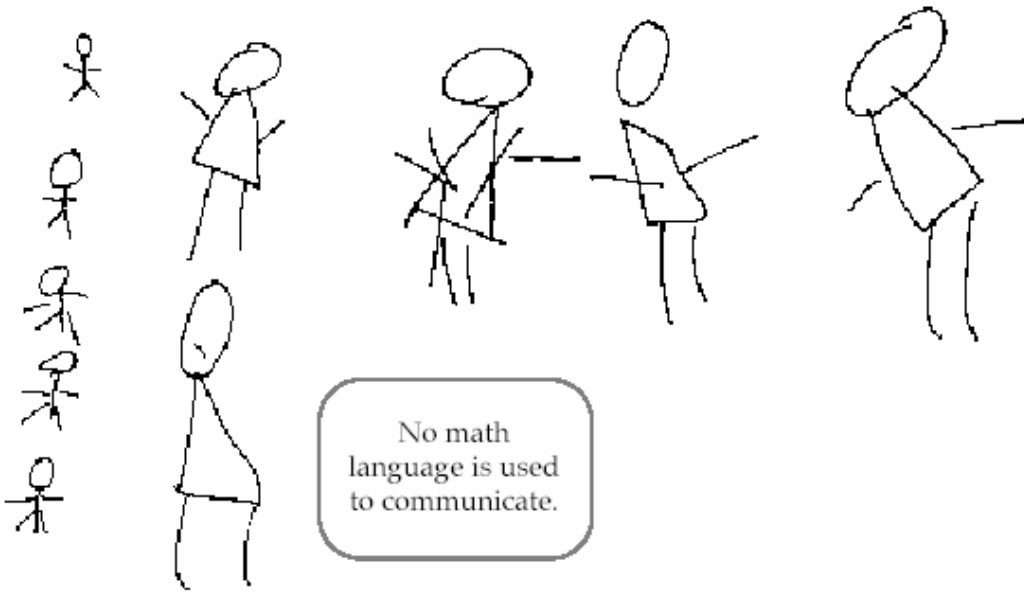
### Performance Standards:

Grades Kindergarten through twelve:

- **Develops** resourcefulness and perseverance in problem solving in mathematics and other disciplines.
- **Recognizes** when to use previously learned strategies to solve new problems.
- **Develops and uses** strategies for solving given problems.
- **Monitors and reflects** on the process of mathematical problem solving.
- **Makes and investigates** mathematical conjectures and use them successfully in developing and evaluating mathematical arguments and proofs.
- **Uses** the concept of counterexample to test the legitimacy of an argument.
- **Develops** a logical sequence of arguments leading to a valid conclusion or solution to a problem (statement/reasons, proof, informal proof, and algebraic steps).
- **Works** in teams to share ideas, to develop and coordinate group approaches to problems, and to share from each other in communicating findings.
- **Relates** applications to mathematical language in various modalities.
- **Communicates** mathematical thinking coherently and clearly to others.
- **Analyzes and evaluates** mathematical thinking and strategies of others.
- **Identifies and connects** functions with real-world applications.
- **Identifies** how seemingly different mathematical situations may be essentially the same (e.g. the intersection of two lines is the same as the solution to a system of linear equations).
- **Investigates and explains** the mathematics required for various careers.
- **Recognizes and applies** mathematics in contexts outside the mathematics course.
- **Develops** a repertoire of mathematical representation that can be used purposefully, and appropriately interchangeably (e.g. pictures, written symbols, oral language, real-world situations, and manipulative models).
- **Selects, applies, and translates** among mathematical representations to solve problems.
- **Uses** representations to model and interpret physical, social, and mathematical phenomena.

# Benchmark Papers

Novice



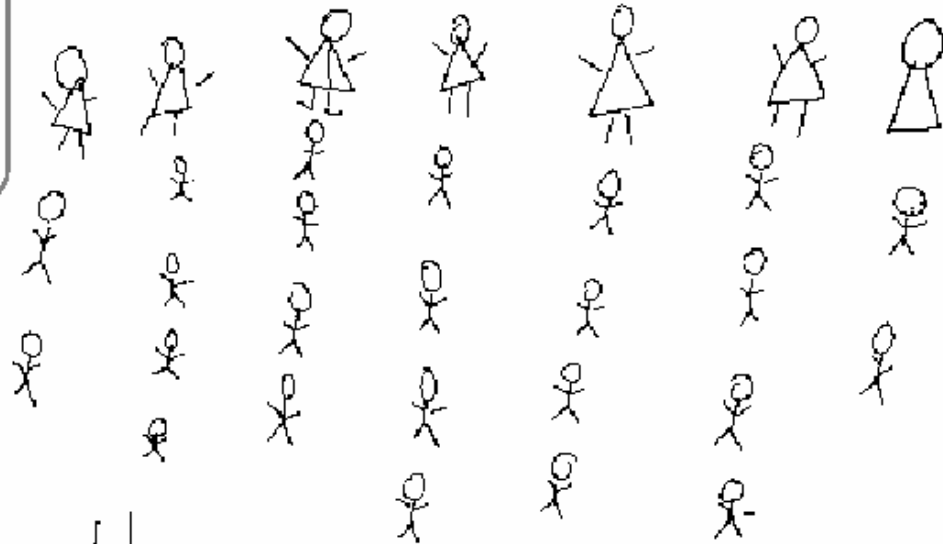
The class will need 5 chaperones.

The student arrives at a solution, but no work is provided that supports that solution.

There is little or no evidence of strategy.

# Apprentice

Some math language is used to communicate the solution.



$$\begin{array}{r}
 44 \\
 +42 \\
 +42 \\
 +42 \\
 \hline
 25
 \end{array}$$

The class will need 7 chaperones

This diagram lacks labels and its use is unclear.

The student makes a computational error that leads to an incorrect answer.

The student clearly states his/her solution.

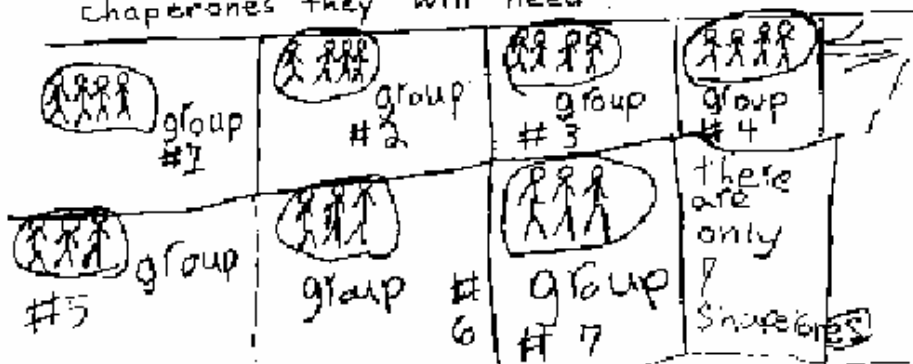
# Practitioner


Chaperones



A class of 25 is going on a field trip to a science museum. They plan to visit the exhibits in small groups of 2, 3, or 4 students with a chaperone. What is the least number of chaperones they will need?

Work is organized and well-labeled.



Math language is used to communicate the solution.

$$\begin{array}{r}
 4+ \\
 4+ \\
 4+ \\
 4+ \\
 3+ \\
 3+ \\
 3+ \\
 \hline
 25
 \end{array}$$

I think 7 is the least you would need

The student states a solution which directly relates to the objective of the task.

Expert

Hand-drawn diagram showing a rectangular area divided into two sections. The left section contains seven hand-drawn shapes: a circle with four dots, a square with four dots, a square with three dots, a square with two dots, a square with one dot, a square with one dot, and a square with one dot. The right section contains the equations  $4 \times 5 = 20$  and  $20 + 2 + 3 = 25$ .

There are 7 Shaporons  
that ~~they~~ need

Work is organized  
and labeled.

A correct answer  
is achieved.