CAPACITY CONVERTERS

A Thematic Unit Introducing and Reinforcing the Relationship Between Cups, Pints, Quarts and Gallons

PAUL SCHROEDER earned his bachelor's degree in elementary education at Mayville State University in Mayville, North Dakota. He currently teaches third grade in Nevis, Minnesota and previously taught Chapter I and sixth grade students. CAPACITY CONVERTERS is Paul's third Interact publication; his first was HOPSCOTCH MATH and the second, MONEY MASTERS. Implementing audio, visual, and kinesthetic learning modes during classroom instruction has always been his primary focus when teaching. CAPACITY CONVERTERS does this again!

Copyright ©2002 Interact
10200 Jefferson Boulevard
P.O. Box 802
Culver City, CA 90232-0802
(800) 421-4246 • www.teachinteract.com
ISBN# 978-1-57336-371-6

Project Editor: Sharon Keenan
Graphics Editor: Steve Roberts
Managing Editor: Stacy Yount

INT966 v1.0

The nationwide movement for high standards has not only determined what students should learn, but also has mandated that students demonstrate what they know. CAPACITY CONVERTERS is a standards-based program addressing many National Mathematics Standards. CAPACITY CONVERTERS provides opportunities for both written and observational performance assessment. Students, working in measurement teams, demonstrate their understanding of cups, pints, quarts, and gallons as they make conversions from one unit to another. They use writing to explain and clarify their thinking on making conversions. The peer-teaching and cooperative problem solving required in CAPACITY CONVERTERS also addresses Applied Learning standards.

National Standards for School Mathematics

Number and Operations Standard

- Compute fluently and make reasonable estimates
  - — Develop fluency in adding, subtracting, multiplying and dividing whole numbers.
  - — Develop and use strategies to estimate the results of whole-number computations and to judge the reasonableness of such results.

Measurement Standard

- Understand measurable attributes of objects and the units, systems, and processes of measurement
  - — Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems.
  - — Carry out simple unit conversions within a system of measurement.
- Apply appropriate techniques, tools, and formulas to determine measurements
  - — Develop strategies for estimating perimeters, areas, and volumes of irregular shapes.
  - — Select and apply appropriate standard units and tools to measure.
  - — Select and use benchmarks to estimate measurements.

Problem Solving Standard

- Build new mathematical knowledge through problem solving
- Solve problems that arise in mathematics and other contexts
- Apply and adapt a variety of appropriate strategies to solve problems

Communication Standard

- Organize and consolidate their mathematical thinking through communication
- Communicate their mathematical thinking coherently and clearly to peers, teachers, and others
- Analyze and evaluate the mathematical thinking and strategies of others

STANDARDS

STANDARDS

Connections Standard

- Understand how mathematical ideas interconnect and build on one another to produce a coherent whole

Representation Standard

- Create and use representations to organize, record, and communicate mathematical ideas
- Select, apply, and translate among mathematical representations to solve problems

California Applied Learning Standards

Standard 2: Students will understand how to solve problems through planning and organization.

Standard 3: Students will understand how to solve problems through teaching and learning. Students will develop and implement a teaching-learning program.

Standard 6: Students will understand how to apply communication skills and techniques. Students will demonstrate ability to communicate orally and in writing.

Standard 8: Students will understand the importance of teamwork. Students will work in teams to achieve project objectives.

TABLE OF CONTENTS

CONTENTS

Teaching students how to convert cups, pints, quarts, and gallons can often be a frustrating experience. The process of how to convert from one unit to another seems to be difficult for young students to grasp and remember. CAPACITY CONVERTERS is a new approach that assists in alleviating some of these barriers.

CAPACITY CONVERTERS employs auditory, visual, and kinesthetic learning styles. Cooperative groups of students engage in peer tutoring. Students learn a specific approach that enables them to remember how to convert from one unit to another easily. CAPACITY CONVERTERS successfully stimulates student interest and enjoyment while teaching this skill. Specifically, in CAPACITY CONVERTERS your students experience the following:

Knowledge

- Different units used to measure capacity—specifically cups, pints, quarts, gallons
- Strategy for making conversions from one unit to another
- Awareness of products that are packaged in units of cups, pints, quarts, or gallons

Skills

- Identifying basic units for measuring capacity—cups, pints, quarts, gallons
- Learning the different abbreviations for cups, pints, quarts, and gallons
- Working cooperatively in groups
- Writing a summary describing how your body can help you make conversions easily
- Identifying products that are packaged in units of cups, pints, quarts, or gallons
- Estimating capacity in cups, pints, quarts, and gallons

Attitudes

- Developing a positive attitude toward working with units of capacity
- Sensing the satisfaction gained when mastering a difficult concept
- Feeling confident because of ability to make conversions from one unit to another
- Understanding the importance of teamwork

PURPOSE

OVERVIEW

OVERVIEW

In CAPACITY CONVERTERS, each Measurement Team (made up of four students) is responsible for helping team members achieve success. Measurement Teams initially jigsaw into Expert Groups formed to investigate a given capacity (cups, pints, quarts, or gallons). Expert Groups work together to complete specified tasks. Upon completing the tasks, students return to their Measurement Teams and demonstrate what they have learned.

The following day the teacher demonstrates to the class a very unique and effective way of remembering how to convert cups, pints, quarts, and gallons.

CAPACITY CONVERTERS begins with a pretest and ends with a posttest. The pretest indicates the knowledge base of students. The posttest will verify student learning to students and parents. Teams that earn 90% or more on the posttest will be named *Champion Capacity Converters Teams*.

CAPACITY CONVERTERS includes the following instructional steps:

- Pretest
- Introduce cups, pints, quarts, and gallon containers and abbreviations
- Team formation
- Expert groups meet
- Experts return to their teams and share knowledge
- Teacher instruction
- Conversion practice
- Application of learning
- Posttest
- Extension activities (optional)
- Conversion to and from fluid ounces (Grade 5)

Like all Interact units, CAPACITY CONVERTERS provides differentiated instruction through its various learning opportunities. Students learn and experience the knowledge, skills, and attitudes through all domains of language (reading, writing, speaking, and listening). Adjust the level of difficulty as best fits your students. Assist special needs students in selecting activities that utilize their strengths and allow them to succeed. Work together with the Resource Specialist teacher, Gifted and Talented teacher, or other specialist to coordinate instruction.

SETUP DIRECTIONS

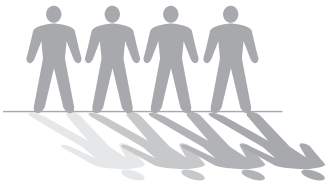
1. **Before you Begin**
   Carefully read through the entire Teacher Guide so that you understand the objectives and sequence of CAPACITY CONVERTERS. Decide how you will use the unit in your classroom. Throughout the Teacher Guide, Interact employs certain editorial conventions to identify materials.
   a. In preparing materials, *Class set* means *one per student*.
   b. One *Day* on the **Unit Time Chart** is the length of a normal *class period*—45 minutes to one hour.
   c. All masters and student handouts are listed by name using ALL CAPITAL LETTERS.
   d. Teacher reference pages are named in **Bold**.
   e. Special events are named using *Italics* (e.g., *Popcorn Party*).

2. **Timing Options**
   This unit as presented will take four days for grades 2, 3, and 4 and five days for grade 5. Study the **Unit Time Chart**. Shorten or extend the time depending on student skills, classroom time considerations, or extension activities selected.

3. **Grouping Students**
   Based upon students' pretest responses and/or teacher judgment, establish Measurement Teams of four.
   a. Your primary goal in developing Measurement Teams is to make them as academically even as possible.
   b. Keep in mind that Measurement Teams that earn 90% or more on their posttests will be crowned *Champion Capacity Converters Teams*.
   c. Encourage students to ensure that all of their Measurement Team members understand the unit concepts.
   d. If you have one or more extra students you can have five on a team.

4. **Assigning Roles for Jigsaw Groups**
   Students participate in two different groups. In the second group—a Jigsaw Expert Group—students work to master one unit of capacity measurement (cups, pints, quarts, or gallons.) "Expert" students return to their primary group (their Measurement Team) and share their expertise with other team members who have mastered different units of capacity.
   a. Assign one of the four students on a Measurement Team to be responsible to learn about the cup, one to learn about the pint, one the quart, and one the gallon.

Four–five days



Cooperative groups of four

If you do have five students on a team, average the individual test scores to determine aggregate team scores.

b. Expert Groups that include students of varying abilities will maximize the opportunity for peer teaching and learning.
c. Encourage students to use free time during the day to practice and reinforce capacity conversions with their team members.
d. Pints may be the most challenging Expert Group topic.

The *Jigsaw Model*, developed in the early 1970s by Dr. Elliot Aronson, sets up a peer-teaching opportunity. The Jigsaw model closely mirrors the authentic workplace where small and diverse groups of people must pull together in order to be successful.

5. **Materials**

Prior to Day 1 assemble all necessary materials in the quantities indicated in *Italics*.

- Blue marker or blue crayon — *class set*
- Bucket (2–gallon) — *one (It cannot have markings or lines on it indicating capacity.)*
- Clasp envelope — *one per team*
- Containers (cup, pint, quart, gallon) — *one set per team*
- Funnels (4"–5" diameter at top) — *one per team (optional)*
- Pencils — *class set*
- * Plastic washtub with water (approx. 4.5 gallons) — *one per team*
- Rulers — *one per team (to level dry contents, optional)*

*Use a rectangular dishpan-size tub.

Popcorn Party

- Napkins — *class set + extras*
- Pitchers or containers for drink mix — *several*
- Plastic cups (8–oz) — *enough for students*
- Popcorn — *enough for students*
- Powdered drink mix — *several envelopes (assorted flavors)*
- Scratch paper — *one piece per team*
- Spoon — *one or more (for mixing drink mix)*
- Sugar — *several cups*

6. **Preparing Materials**

Following are suggestions for how to prepare the materials you will need for this unit.

a. **Capacity Containers**
Be sure to have a complete set of containers (cup, pint, quart, gallon) for each Measurement Team.

b. **Water Tub**
Each team will need one tub to pour water into and take water out of while making conversions using their set of capacity containers.

UNIT TIME CHART

DAY 1

- **Introduce and identify a cup, pint, quart, and gallon**
- **Give brief overview of the CAPACITY CONVERTERS unit**
- **Measurement Teams meet / Expert Groups meet**
- **Teams investigate and solve problems**
- COOPERATIVE GROUP WORK RUBRIC
- CAPACITY CONVERTER FLASH CARDS
- CONVERSION KID
- PRETEST (optional)
- CUPS EXPERT
- PINTS EXPERT
- QUARTS EXPERT
- GALLONS EXPERT
- TEAM INVESTIGATIONS

DAY 2

- **Review basics from Day 1**
- **Teach "trick" to remember basic facts**
- **Conversion Kid Wall Chart**
- CAPACITY CONVERTER FLASH CARDS
- COLOR THE KID

DAY 3

- **Teams practice making conversions**
- CAPACITY CONVERTERS FLASH CARDS
- WRITING ASSIGNMENT and RUBRIC (Grades 2, 3, and 4)
- CUP ICON

DAY 4 (Grade 5)

- **Converting to and from fluid ounces**
- CONVERTING TO AND FROM FLUID OUNCES
- WRITING ASSIGNMENT and RUBRIC (Grade 5)

DAY 4 (Grades 2,3,4)

- **Culmination**
- *Popcorn Party*
- POSTTEST
- CERTIFICATES

DAY 5 (Grade 5)

- **Culmination**
- *Popcorn Party*
- POSTTEST
- CERTIFICATES

EXTENSIONS

- Capacity Bee
- Capacity War
- Study Trip
- MERCHANT LETTER
- PARENT PERMISSION LETTER
- STUDY TRIP WORKSHEET

Day 1

Objectives

- Introduce unit
- Form Teams and Expert Groups
- Teams practice capacity conversions
- Students apply estimation skills

Materials

- PRETEST — *class set (optional)*
- COOPERATIVE GROUP WORK RUBRIC — *display copy + as needed*
- CUPS EXPERT — *one per team*
- PINTS EXPERT — *one per team*
- QUARTS EXPERT — *one per team*
- GALLONS EXPERT — *one per team*
- TEAM INVESTIGATIONS — *class set*
- CAPACITY CONVERTERS FLASH CARDS — *two sets per team*
- CONVERSION KID — *class set*
- Clasp envelope — *one per team*
- Containers (cup, pint, quart, gallon) — *one set per team*
- *Plastic washtub with water (approx 4.5 gallons) — *one per team*

Capacity Estimation Application Materials

- Bucket (2–gallon) — *one (It cannot have markings or lines on it indicating amounts of capacity.)*

*Use a rectangular dishpan-size tub.

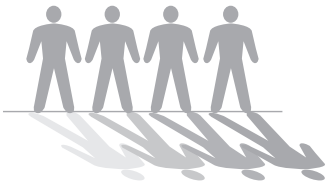
Setup

1. Prior to class, set up four Expert Group stations in separate corners of the room.
   a. Provide one tub with water for each station.
   b. Provide one set of containers for each station.

2. Four of the Measurement Teams will use these Expert Group stations. Provide one set of capacity measures for each of the remaining Measurement Teams.
   a. Provide one tub with water for each station.
   b. Provide one set of containers for each station.

Procedure

1. Distribute the PRETEST or give the question orally and have students write their responses on their own paper. Allow about five minutes for students to complete.



Cooperative groups of four

If your classroom does not have a sink, or if tubs of water are a potential management problem, consider using clean sand or jumbo packages of popped corn or puffed cereal. Each team needs slightly more than one gallon of some substance to measure.