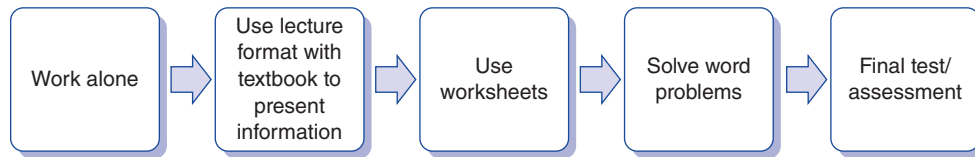
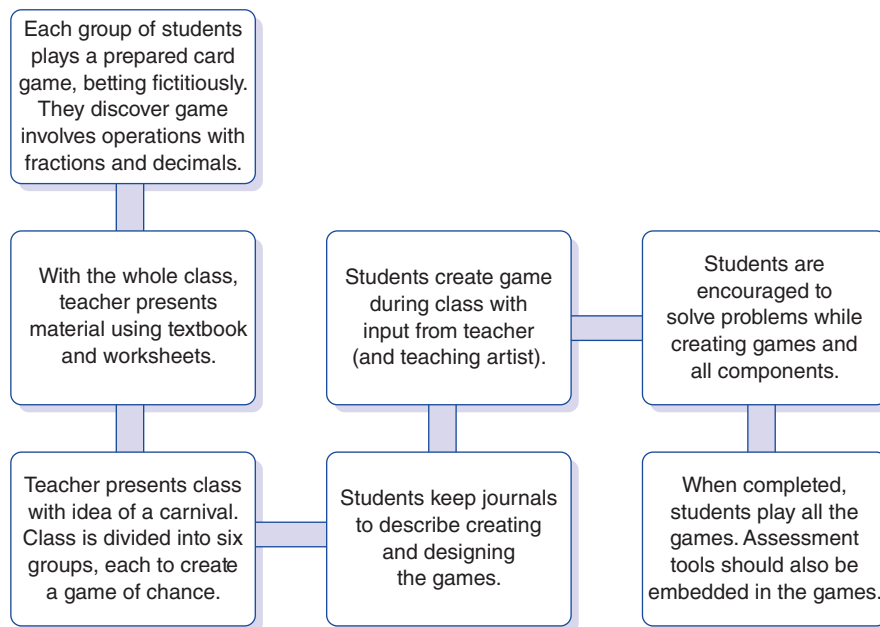


Grade 6 Mathematics: Multiplication and Division of Fractions and Decimals

Traditional approach: The students work alone, and the teacher uses the textbook to present material in a lecture format. Using worksheets, the students solve problems in multiplication and division of fractions and decimals, and then they are given a final test to evaluate their learning.



Arts-integrated approach: To add interest and engagement to this otherwise ordinary learning objective, the teacher (and teaching artist, if available) decides to use games of chance to teach multiplication and division of fractions and decimals. The students are to design and create their own games of chance. They keep written (or computer) journals describing the process. When the games are ready, the students play all of them one at a time, explaining the fractions and decimals involved. Assessment tools can be built into the games, if desired. The teacher, of course, can also use any other assessments the curriculum requires.



No doubt some teachers will feel that integrating the arts into their lessons on mathematics may be too much to take on for a variety of reasons. Teachers in the elementary grades are usually more receptive to arts integration because they recognize that they are already doing some of it, perhaps unwittingly, in many of their lessons. Secondary-level teachers, however, are more cautious. They often say there is too much content material to cover to take time for arts integration. "Remember, there are state tests coming in the spring," is a common refrain. Others believe they

Integrating the arts into mathematics instruction can enhance student engagement and motivation as well as improve student achievement.

are not creative enough themselves to provoke students to be creative. Experience has shown these concerns to be unfounded. Teachers unconsciously make creative decisions every day, from choosing what they will wear for the day to the instructional strategies they select for their classes. As for testing, both the Common Core State Standards for Mathematics and the Next Generation

Science Standards are focusing more on developing creative problem solving and analytical skills, and so will the resulting assessments.

Places Where Arts Integration in Mathematics Is at Work

Here are just a few recent examples of how educators are finding ways to integrate the arts into their mathematics classes, to get their students involved in real-world applications, and even to open schools dedicated to the STEAM concept.

- **Rockford, IL:** Sixth-grade students at Kennedy Middle School with varying success in mathematics are designing and building different types of lamps to learn about ratios, proportions, and perimeters. Teachers report improved test scores in mathematics since this project started (Kravets, 2014).
- **Buffalo, WY:** Students at Clear Creek Middle School built sleds of cardboard and duct tape, and entered them in a tournament. The students used graph paper to design their sleds and calculate the surface area of various box designs. In science class, they learned about weight and friction on various types of snow, as well as the aerodynamics of the box designs (Stepenoff, 2014).
- **Daytona Beach, FL:** A teaching artist is working with teachers and fifth-grade students at Turie T. Small Elementary School, using song and dance to help the students remember important mathematics facts. Test scores in mathematics for these students have gone up dramatically since this program began (Trimble, 2014).
- **Jersey City, NJ:** Jersey City Public Schools will open a small high school in the fall of 2014 that will have a focus on STEAM. Its first class of 100 ninth graders will work with faculty from New Jersey City University in the STEAM subject areas (Jersey City Board of Education, 2014).

For more examples of mathematics/arts-integrated lessons, see the websites provided in the [Resources](#) section.

■ SIMPLIFIED INSTRUCTIONAL MODEL

Based on all I can gather from cognitive neuroscience, a reasonable model for teaching mathematics to children and adolescents proceeds through four major steps (Figure 8.2). Step 1 is to build on young children's intuitions about numbers, subitizing, quantitative manipulations, and counting.