## Tangram Toil

Summary
Students will build on their foundation of understanding dividing with equal shares in this activity by using more concrete models.

## Materials

Invitation to Learn

- Bike picture/cards (pdf)
- Bikes (pdf)

Instructional Procedures
Tangram manipulatives Milky Way miniature candy bars

- Milky Way Fraction Hunt (pdf) Journal


## Background for Teachers

Students should be comfortable with "sharing equally." This activity provides students experience with more physical models. The more rich area, set, and length models provided, the more meaning for the students. Tangram Toil makes the transition to algorithms more successful. This will give them an opportunity to apply and practice what they understand about equivalence, fractional relationship to the unit whole, use fraction vocabulary, and create the concrete representation.

## Instructional Procedures

## Invitation to Learn

As students enter the room they will find various bike picture cards on their desks. Invite students to look over the bike cards, and complete the BIKE worksheet provided for them at their desks. Follow with a class discussion of results and ask other probing questions to assess understanding. Pose the opportunity for students to offer questions of fractional relationships with the bikes.
Instructional Procedures
Provide a group of students, pairs of students, or individual students with a tangram manipulative. This will depend on the amount of tangram sets you have.
Challenge the students to put the tangram pieces together to form a square. This may take awhile.
Once assembled they are to find the fractional value of each of the tangram pieces. Assume that the original square is the whole or one.
An additional challenge depending on the students' prior knowledge of decimals would be to refer to the whole as 1.00 or $\$ 1.00$. Then challenge them to find the decimal value of each tangram piece. This provides an opportunity to practice fraction to decimal relationships. Another challenge would be to change the unit whole. The large right triangle could become the area whole.

## Extensions

Brain storm and/or provide a list of suggestions of real world fraction opportunities.
The list might resemble: class members, physical classroom, one student's outfit, teachers in building, shoes on students, vowels/ consonants in names, M\&M candies in a bag, Skittles in a bag, handful of Fruit Loops cereal, Valentines candies, cars in parking lot, lunch items on plate (carbs/proteins), assignment scores, opinions, and so forth.

As a writing extension have students write their own fraction problem about one of the suggestions in the list. Write the problem on a sheet of paper. Sign your name and add to a class set of problems in book form, exchange with a classmate for them to solve, or use in a center. Family Connections
Challenge students to write a fraction hunt (like Milky Way Fraction Hunt) of their own to share with the class.

## Assessment Plan

- Milky Way Fraction Hunt
has a built in self-assessment.
Provide the Milky Way Fraction Hunt worksheet on each students' desk.
Place a basket or box of miniature Milky Way bars under the South Pole of a globe in the room prior to students arriving. Hopefully not too obvious to students' sight as students will decode the clues and follow directions to the candy bars.


## Bibliography

Solomon, M., \& Hendren, R. (2003). A critical look at brain-based education. NAESP Middle Matters. 12(1).
This article addresses new brain research in respect to how children learn. Quantitative thinking requires many different component skills, including decoding of symbols, understanding quantities, counting ability, representing abstract objects, and understanding part-whole relationships. Math teaching strategies need to help students develop representations of number-related concepts, transfer lower-level rote math skills to higher-level problem solving, and generate multiple solutions to problems. This article discusses the importance of simulations, role-play, hands-on activities, collaborative decisionmaking, group problem solving, and movement for the formation of complex neural connections in the brain.
Green, F.E. (2006). Brain and learning research: Implications for meeting the needs of diverse learners. Education. 119(4).
This extensive research article provides implications of meeting the needs of the diverse learners in the classroom. It shares dramatic developments related to brain structure, multiple intelligences, learning styles, emotions and learning, music and cognitive development, and brain-based learning.

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