

MATH AROUND



Grades 5–8

THE WORLD



TEACHER'S GUIDE

Game 1

What You Need

For the four session class activities:

For the entire class

- 1 overhead transparency of the NIM Gameboard (master on page 28)
- overhead projector
- 1 blank overhead transparency and an overhead pen (or butcher paper) for recording winning strategies
- plenty of butcher paper and markers

For each pair of students

- 1 8 ½" x 11" piece of card stock for making a NIM Gameboard (master on page 28)
- 15 playing pieces (such as dried beans, buttons, pennies, small tiles or stones)
- 1 small plastic bag or container in which to place the playing pieces
- writing paper or math journals
- (*optional*) 1 clear plastic sleeve or access to a laminator

For one learning station

(enough materials for 12 students to be working at the station at once):

- 6 NIM Gameboards (copied onto card stock—master on page 28)
- 15 playing pieces for each gameboard
- small plastic bags or containers in which to place the playing pieces
- 1 station sign and map for NIM (masters on pages 29–30)
- (*optional*) 8 clear plastic sleeves or access to a laminator

Game 2

What You Need

For the three session class activities:

For the entire class

- 1 overhead transparency of the Kalah Gameboard
- several blank overhead transparencies and an overhead pen (or butcher paper) for recording successful strategies
- overhead projector
- (*optional*) 1 overhead transparency of the Kalah Instruction sheet

For each pair of students

- 1 Kalah Gameboard. These boards can be purchased (see "Sources" section on page 162) or made. If you are making the boards, you will need:

For simple boards

- ✓ 1 8 ½" x 11" piece of card stock to make one Kalah Gameboard (master on page 46)

For "fancier" boards

- ✓ 1 egg carton
- ✓ 1 pair of scissors
- ✓ (*optional*) 2 half sheets of paper or 2 cups

- a large handful of dry lima beans (several bags contain enough lima beans for most classes)
- 1 small container or plastic bag for the beans
- 1 Kalah Instruction sheet (master on page 47)

For one learning station

(enough materials for 12 students to be working at the station at once):

- 6 Kalah Gameboards (see page 34)
- several bags of dry lima beans
- 6 small containers or plastic bags to hold the beans
- 6 copies of Kalah Instruction sheet (master on page 47)
- 1 station sign and map for Kalah (masters on pages 48–49)
- (*optional*) 8 clear plastic sleeves or access to a laminator

Game 3

What You Need

For the three session class activities:

For the entire class

- 1 blank overhead transparency and an overhead pen (or butcher paper) for recording strategies
- overhead projector
- 1 transparency of the T-table (master on page 67)
- 1 transparency of the graph paper (master on page 68)

For each pair of students

- 1 Tower of Hanoi puzzle. These puzzles can be purchased (see the "Sources" section on page 162) or made. If you are making the puzzles, you will need:
 - ✓ 1 8 ½" x 11" piece of card stock to make one Tower of Hanoi puzzle (master on page 65)
 - ✓ 3 large paper clips
 - ✓ masking tape
 - ✓ 1 stack of eight graduated washers *or*
 - 1 sheet of card stock, scissors, and a single-hole paper punch to make paper disks (master on page 65)
 - ✓ (*optional*) access to a laminator
- 1 copy of the T-table (master on page 67)
- 1 sheet of graph paper (master on page 68)
- 1 scientific calculator. Students need a calculator, with variable exponents, in order to solve the 64-disk problem in Session 3. It's also helpful if the calculators are all the same model, so the representation of exponents is consistent.

For one learning station

(enough materials for 12 students to be working at the station at once):

- 6 Tower of Hanoi puzzles (see page 52)
- 1 station sign and map for Tower of Hanoi (masters on pages 69–70)
- (*optional*) access to a laminator

Game 4

What You Need

For the three session class activities:

For the entire class

- overhead projector
- transparencies of each of the seven student sheets
- blank overhead transparencies and an overhead pen

For each student

- 1 copy of each of the three Shongo Networks student sheets (masters on pages 91–93)
- 1 copy of each of the two Additional Networks student sheets (masters on pages 94–95)
- 1 copy of the Network Analysis student sheet (master on page 96)
- 1 copy of the Königsberg Bridge student sheet (master on page 97)
- plenty of blank paper

For one learning station

(enough materials for 12 students to be working at the station at once):

- 12 copies of the Shongo Networks A student sheet (master on page 91)
- 6 copies of each of the Shongo Networks B and C student sheets (masters on pages 92–93)
- pencils
- plenty of blank paper
- 1 station sign and map for Shongo Networks (masters on pages 98–99)
- 20 clear plastic sleeves or access to a laminator

Game 5

What You Need

For the three session class activities:

For the entire class

- blank overhead transparencies and an overhead pen (or butcher paper) for recording effective strategies
- an overhead transparency of the original *lo-shu* puzzle (master on page 115)
- overhead projector

For each pair of students

- 1 8 ½" x 11" piece of card stock to make one *lo-shu* Magic Square Gameboard (master on page 116)
- 1 8 ½" x 5 ½" piece of card stock to make one set of tiles numbered 1 to 9 for each pair of students (master on page 117). Alternatively, you can purchase more permanent tiles. See "Sources" on page 162 for more information.
- small plastic bags or containers to hold tiles
- 1 or more sheets of blank paper on which to record solutions
- (*optional*) 1 clear plastic sleeve or access to a laminator

For one learning station

(enough materials for 12 students to be working at the station at once):

- 6 *lo-shu* Magic Square Gameboards (master on page 116)
- 6 sets of tiles numbered 1 to 9, one set for each board (master on page 117; see also above)
- 6 small plastic bags or containers to hold each set of tiles
- 1 station sign and map for Magic Squares (masters on pages 118–119)
- (*optional*) 8 clear plastic sleeves or access to a laminator

Game 6

What You Need

For one learning station

(enough materials for 12 students to be working at the station at once):

- 72 tongue depressors to make six sets of 12 game sticks
- 60 colored toothpicks to make six sets of counters (one set has 10 toothpicks of one color—it works well to have sets of six different colors so there is some variety)
- 6 small boxes (old checkbook boxes are recommended) or other containers to hold game sticks and counters
- 6 Scoring Sheets (master on page 126)
- 6 Game Sticks Instructions (master on page 125)
- 1 station sign and map for Game Sticks (masters on pages 128–129)
- (*optional*) 14 clear plastic sleeves or access to a laminator

Game 7

What You Need

For one learning station

(enough materials for 12 students to be working at the station at once):

- 6 gameboards for each of the games: Pong Hau k'i and Three Men's Morris. To make gameboards you will need:
 - ✓ 1 8 ½" x 11" piece of card stock to make Pong Hau k'i Gameboard (master on page 134)
 - ✓ 1 8 ½" x 11" piece of card stock to make Three Men's Morris Gameboard (master on page 135)
- 6 sets of playing pieces (such as dried beans, chips, tiles, checkers, buttons, etc.): 10 pieces of one color and 10 pieces of another color comprise a set. This one set contains enough pieces for one pair of students to play both games.
- 12 small containers with lids to hold playing pieces (one container for each color)
- (optional) 14 clear plastic sleeves or access to a laminator
- 1 station sign and map for Games of Alignment (masters on pages 139–140)

Game 8

What You Need

For one learning station

(enough materials for 12 students to be working at the station at once):

- 6 Hex Gameboards (master on page 191). To make each gameboard you will need:
 - ✓ 1 11" x 17" (extra large) piece of card stock
- 6 sets of playing pieces. Each set should have about 30 playing pieces each of two colors (red beans and black beans work well; you may also use chips, checkers, tiles, buttons, etc.).
- 12 containers with lids to hold playing pieces
- 6 Hex Instruction sheets (master on page 147)
- 1 station sign and map for Hex (masters on pages 148–149)
- (optional) access to a laminator