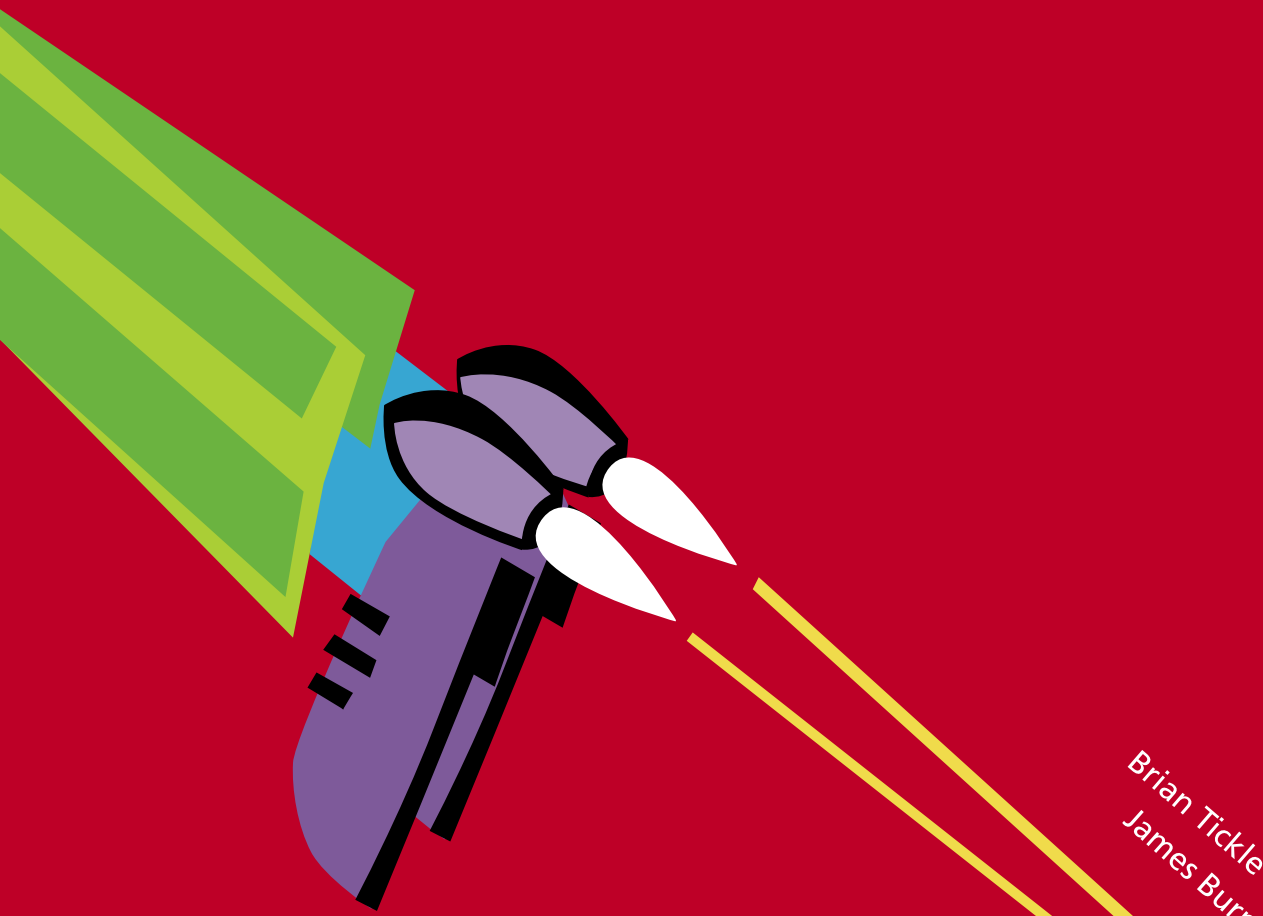
Fundamentals

Games to develop and reinforce mental computation strategies

Sample Game Red



Brian Tickle
James Burnett

ORIGO EDUCATION

Nice and Easy

2 or 3 players

Using doubling and halving to multiply

Purpose

In this game, the students are required to double and halve two factors to make a number sentence that is easier to calculate. In doing this, the students discover that the product remains unchanged. This is an efficient multiplication strategy when at least one factor in the equation is even.

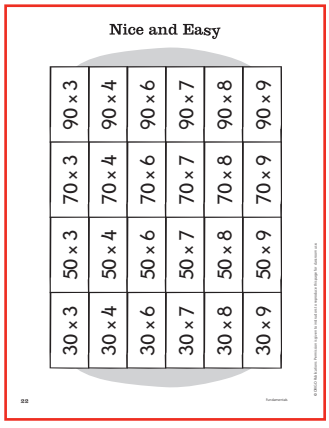
Materials

Each group of players will need

- A 'Nice and Easy' game board (page 22) as shown below.
- Two (2) number cubes made from blank wooden cubes. One cube should show the numerals 15, 15, 25, 35, 45, and 45. The other cube should show 6, 8, 12, 14, 16, and 18.

Each player will need

- Fifteen (15) counters (a different color for each player).


Nice and Easy

90 × 3	90 × 4	90 × 6	90 × 7	90 × 8	90 × 9
70 × 3	70 × 4	70 × 6	70 × 7	70 × 8	70 × 9
50 × 3	50 × 4	50 × 6	50 × 7	50 × 8	50 × 9
30 × 3	30 × 4	30 × 6	30 × 7	30 × 8	30 × 9

How to Play

The aim is to arrange three counters adjacently in a horizontal, vertical, or diagonal line.

- The first player rolls the number cubes.
- The player says the multiplication sentence represented by the cubes, then doubles one factor and halves the other to figure out an equivalent sentence.

  Example: Lincoln rolls 35 and 16. He says, 35 times 16 is the same as 70 times 8.

- The player states the product before claiming a corresponding space on the game board by covering it with a counter. If the space is unavailable, the player misses a turn.

  Example: Lincoln says, The answer is 560, and claims 70 x 8 on the game board.

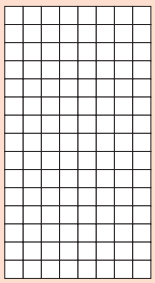
- The other player(s) has a turn.
- The first player to make a line of three adjacent counters is the winner.

Reading the Research

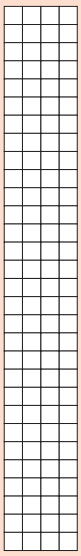
There are different ways that students can be encouraged to move from inefficient to efficient thinking strategies. One technique is to talk about slightly more advanced procedures and why they work (Fuson & Kwon, 1992).

Before the Game

Draw an array for 15 x 8 on an overhead transparency as shown (right). Show the transparency and ask the students to write a number sentence to match what they see (15 x 8). Call upon a student to share his or her number sentence as you run your finger along the length and one side of the array to check. Ask the students if they can easily calculate the total number of squares in the array. If not, cut the array in half and rearrange the two pieces to make a new array as shown (right). Ask, ***Have I changed the total number of squares in the array?*** (No.) ***What is the new number sentence you see now?*** (30 x 4.) ***Is it easier to calculate the total number of squares now?*** (Yes.) Make sure the students see that by cutting and rearranging the original array, one dimension (factor) is doubled and the other is halved.



15 x 8



30 x 4

During the Game

Encourage the students to explain the strategy they use to find the answers. Different players will use different strategies. For example, after figuring out that 35 x 16 is the same as 70 x 8, the following players gave these explanations:

Lincoln: *I knew 7 times 8 is 56 so 7 tens times 8 must be 56 tens or 560.*

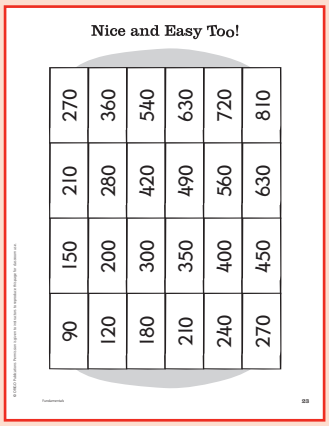
Letitia: *I just doubled 70 then doubled and doubled again.*

Lindsay: *I knew 70 times 10 is 700, so 70 times 8 must be 140 less.*

After the Game

Lead a discussion about the strategy introduced in the game. Ask, ***Did you find this strategy easy (or difficult) to use? Why was it easy (or difficult)?***

Challenge the students to write some number sentences they think they can solve using a doubling and halving strategy. Do the students see that it does not work easily when both numbers are odd?



Nice and Easy Too!

270	360	540	630	720	810
210	280	420	490	560	630
150	200	300	350	400	450
90	120	180	210	240	270

Beyond the Game

The students can play the same game using a different game board. Give them a copy of 'Nice and Easy Too!' on page 23 (illustrated). This time, the students say the equivalent multiplication sentence and cover the answer.

Nice and Easy

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