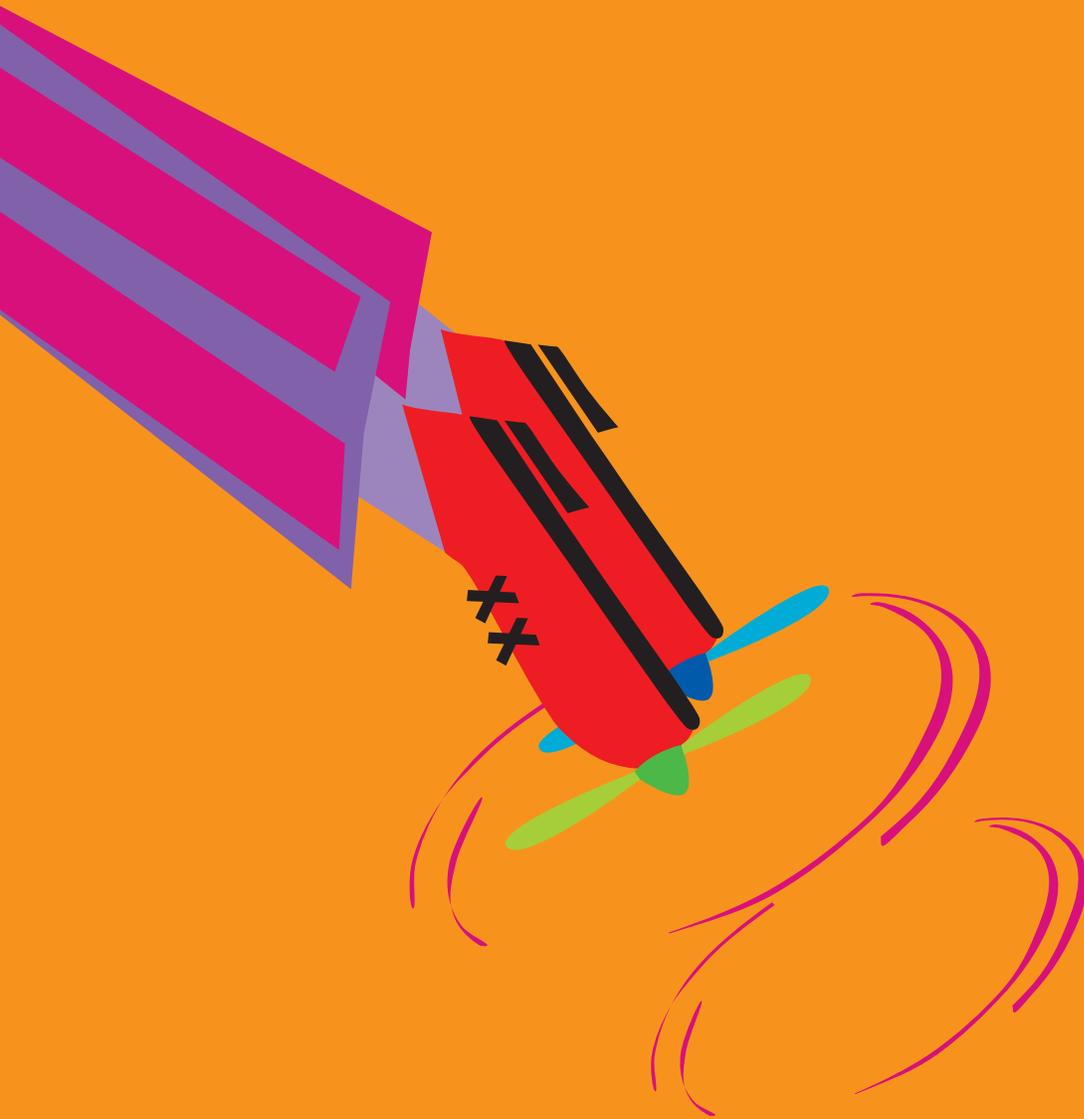


Fundamentals

Games to develop and reinforce mental computation strategies

Sample Game Orange



Brian Tickle
James Burnett

ORIGO
EDUCATION



Three Sum

Adding three single-digit numbers

2 players

Purpose

This game uses dot arrangements to help students progress from simple count-all strategies to more efficient strategies such as using doubles or making a ten. The students are encouraged to discuss various mental strategies for adding three single-digit numbers.

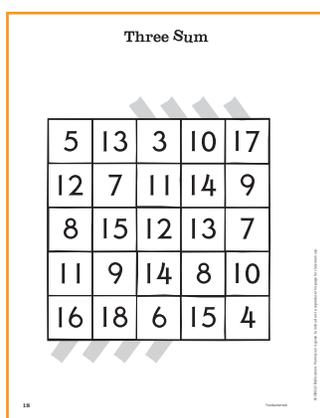
Materials

Each pair of players will need

- A 'Three Sum' game board (page 18) as shown below.
- Three (3) standard number cubes showing dot patterns 1-6.

Each player will need

- Twelve (12) counters (a different color for each player).



How to Play

The aim is to arrange four counters in a 2 x 2 square or adjacently in a horizontal, vertical, or diagonal line.

- The first player rolls the number cubes and mentally calculates the total of the three numbers.
- The player then claims the answer on the game board by covering it with a counter. If the answer is unavailable, the player misses a turn. A calculator can be used if an answer is disputed. Several numbers appear more than once on the game board so players must decide which moves may be more advantageous for building winning patterns or for blocking opponents.
- The other player has a turn.
- The first player to make a 2 x 2 square or a line of four adjacent counters is the winner.

Reading the Research

The teacher should not be disappointed if a student does not adopt more efficient strategies right away – development may be advancing below the surface at the rate best suited to the student (Isaacs & Carroll, 1999).

Before the Game

Introduce the game by inviting two students to play on the overhead projector using transparent counters. Each student could play for one half of the class. Members of each team can offer strategies for calculating the total and suggest where to place the counters on the game board.

During the Game

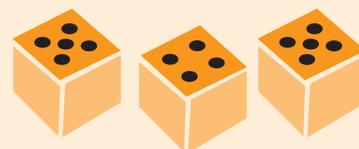
Identify those students who calculate the total by counting all of the dots or consistently use count-all strategies. Pair these students with others who use more efficient strategies. This will encourage them to explore the possibilities.

When a student needs only one number to form a line or square, stop the game and ask 'open' questions such as, *You need 11 to make a square. How could you get it? Is there another way?*

After the Game

Challenge the students to figure out all the possible totals if one of the cubes is showing the numeral one. Investigations such as this often generate further questions, for example, *Which numbers are rolled the least often? ... most often? What are the possible combinations?*

Make an overhead transparency of page 19. Reveal three number cubes at a time. Encourage the students to share and explain strategies for calculating the total. For example, the first picture may generate a discussion such as this:



Jessica: *I know that $5 + 4 = 9$, so I count on 5 more. 9 ...10, 11, 12, 13, 14.*

Jack: *You don't have to do that. There are 2 fives, so that's 10, and 4 more makes 14.*

Jacinta: *Yes, and if there was a dot in the middle of the 4 it would be 3 fives, or fifteen, so the answer must be 14.*

Beyond the Game

- The students can play the game using cubes that show numerals 1-6.
- Have the students make their own number cubes that show the other one-digit numbers, for example, numerals 4-9. They will also need to generate all possible combinations for their number cubes to make a matching game board.

Three Sum

5	13	3	10	17
12	7	11	14	9
8	15	12	13	7
11	9	14	8	10
16	18	6	15	4

Three Sum

