8 PAGE INSERT ELEMENTARY MATH

ONTARIO ASSOCIATION FOR MATHEMATICS EDUCATION

# Abacus

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# WHOLE AND DECIMAL NUMBER RELATIONSHIPS FOR ADDITION

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Past Abacus issues included lesson problems and bansho plans for whole and decimal number representations, relationships and operations. Those issues focused on developing conceptual understanding using models and different calculation methods within problem solving contexts. The next four issues include practice tasks (quick images, puzzles and games), which complement those past issues. These tasks provide practice for decomposing and composing numbers to see part-whole number relationships and equivalent number expressions within the context of each number operation (addition, subtraction, multiplication, division). Number representations include set (bar model), linear (number line), area (rectangle), graphical, numeric and/or algebraic models. Solve this puzzle using two different methods.

**Age Puzzle**

- Jan asked her mom, "How old are you?"
- Her mom answered, "There is you and your 5 siblings who are each 3 years apart. Your eldest sibling was born when I was 25 years old."
- Jan commented, "I am 9 years older than my youngest sibling who is 23 years old. Hmm…"

***Age Puzzle Solution 1:***

1st sibling born → mom is 25
2nd sibling born → mom is 28 = 25 + 3
3rd sibling born → mom is 31 = 28 + 3
4th sibling born → mom is 34 = 31 + 3
5th sibling born → mom is 37 = 34 + 3
6th sibling born → mom is 40 = 37 + 3
If 6th sibling is 23 years old, then mom is 65 years old because 63 = 40 + 23.

**Thinking Mathematically and Pedagogically**

- What mathematics are you using to solve the Age Puzzle?
- What could Puzzle Solution 2 and Solution 3 be? How are they similar and different to Puzzle Solution 1? Which puzzle solution should be discussed 1st, 2nd and 3rd?
- How might the puzzle solutions be modelled using: (a) square tiles; (b) a number line; (c) table of values; (d) a line graph; and/or (e) an algebraic equation?

This September 2019 issue includes a variety of practice tasks, which can be integrated into your classroom mathematics program as: (a) five-minute quick practice; (b) fifteen-minute mini lesson; (c) lesson problem for practice lessons; (d) at home practice; and/or (e) family math activities. These practice tasks require students to decompose and compose whole and decimal numbers in relation to the number operation, addition.

# DESIGNING PRACTICE TASKS – CRITERIA FOR TASK DESIGN

The design of mathematics practice tasks, such as quick images, math puzzles (e.g., brain teasers, logic puzzles, math riddles) and math games follow the same criteria, used to characterize meaningful and worthwhile lesson problems. Mathematics practice tasks should include:

- important and useful mathematics, which is connected to other important mathematical ideas, previously learned and to be learned
- the development of students' understanding of mathematical concepts and skills
- the application of mathematics within problem solving situations
- multiple solutions using different methods and models
- the use of higher-level thinking, reasoning and problem solving
- cognitive engagement for all students who have varying mathematics learning readiness
- teacher access for assessment (e.g., observation, interview) of the mathematics students are learning and analysis of their difficulties.

The notion of important and useful mathematics is often related to the strands of mathematical proficiencies, reported in the National Research publication, "Adding It Up" in 2000. Five interwoven strands are:

- *conceptual understanding* – comprehension of mathematical concepts, operations and relations
- *procedural fluency* – skill in carrying out procedures flexibly, accurately, efficiently and appropriately
- *strategic competence* – formulate, represent and solve mathematical problems
- *adaptive reasoning* – capacity for logical thought, reflection, explanation and justification
- *productive disposition* – habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy. (p. 116)

As an example, let's think about what a student needs to know and do specifically in order to be mathematically proficient with whole number addition. Consider these mathematics details:

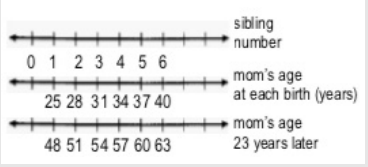
**Age Puzzle Analysis**

***Mathematics Content:***

- addition of 1- and 2-digit whole numbers
- represent a linear growing pattern as a table of values, recursive pattern rule, explicit pattern rule, concrete model and algebraic equation and expression

***Multiple Solutions:***

- *Solution 1* – Related Time Lines




- *Solution 2* – Cumulative Addition

  1st sibling born →mom's age 25

  2nd sibling born →mom's age 28 = 25 + 3

  3rd sibling born →mom's age 31 = 28 + 3

  4th sibling born →mom's age 34 = 31 + 3

  5th sibling born -→mom's age 37 = 34 + 3

  6th sibling born →mom's age 40 = 37 + 3

  If 6th sibling is now 23 years old, then mom is 63 years old because 63 = 40 + 23

- *Solution 3* – Table of Values

| sibling number | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| mom's age at births (years) | 25 | 28 | 31 | 34 | 37 | 40 |
| mom's age 23 years later | 48 | 51 | 54 | 57 | 60 | 63 |

- *Solution 4* – Numeric Equation 25 years + (5 siblings x 3 years difference) + 23 years = 63 years old

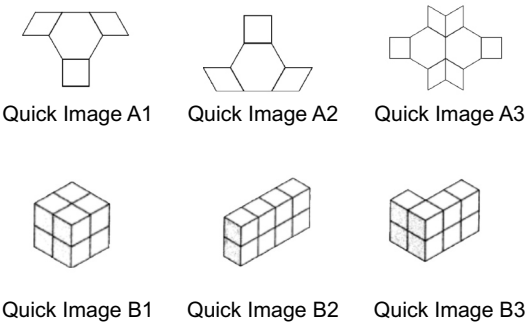
- *conceptual understanding* – addition is joining or combining of 2 or more numbers (addends), which result in a total (sum) and shown as a single number; models of an addition expressions includes a bar model, number line, number expression; explains the relationship with decomposition and composition of whole numbers to adding whole numbers using different addition methods
- *procedural fluency* – adds 2 to 6 whole number addends (1 to 7 digits) using different methods (i.e., adding quantities of same number units; grouping to make 10s; adding on 10s then 1s, decomposing to make 10s, compensation)
- *strategic competence* – selects addition methods that are most suitable for the number and size of the addends
- *adaptive reasoning* – considers methods of others and adapts thinking; explains the selection of the most appropriate addition method
- *productive disposition* – perseveres to solve the puzzle using more than one method and model.

# QUICK IMAGES DOTS, SQUARES, PATTERN BLOCKS AND CUBES

Quick Images are brief viewings of an image or sequence of images that the student reproduces as a sketch, concrete model or number of shapes in the image. The short period of time compels students to generate efficient methods to identify the shapes that compose the image or determine the quantity without counting. When viewing quick images, students:

- mentally organize and analyze aspects of the visual image for a specific purpose (based on the given prompt or question)
- develop and use geometric and number concepts and language to explain spatial relationships used to reproduce the image or to determine quantity of specific units (e.g., number of hexagon units, number of units of 5 dots)
- build connections between visual-spatial representations of number, number relationships (i.e., composition, decomposition, equivalence) and number operations, such as addition.

What mathematics is being developed with this sequence of Quick Images?



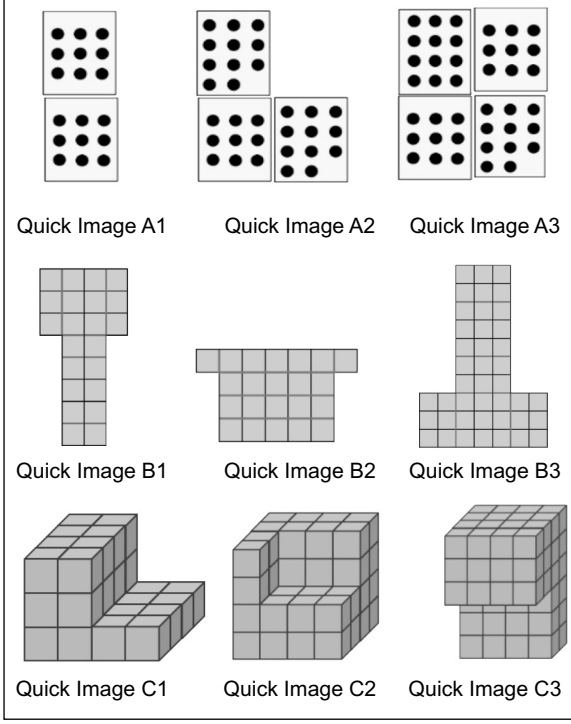
Quick Image A1 Quick Image A2 Quick Image A3

Quick Image B1 Quick Image B2 Quick Image B3

### *Quick Image Routine - 2D and 3D Geometric Figures*

- Show quick image A1 for 3 seconds.
- Students build with materials or sketch what they see.
- Show quick image A1 for 3 seconds again.
- Students make revisions to their sketch or structure.
- Show quick image A1 for 3 seconds for the last time.
- *Class Discussion* – Describe and compare the images students built or sketched and the methods they used in comparison to the quick image presented.
- Repeat for quick images A2 and A3.
- *Class Discussion* – Describe the similarities/differences between the 3 quick images in each sequence.

What mathematics is being developed with this sequence of Quick Images?



Quick Image A1 Quick Image A2 Quick Image A3

Quick Image B1 Quick Image B2 Quick Image B3

Quick Image C1 Quick Image C2 Quick Image C3

### *Quick Image Routine – Quantity of Units*

Number quick images could be composed of dot units (same size or different sizes), square units (composite rectangles) and cube units (composite rectangular prisms).

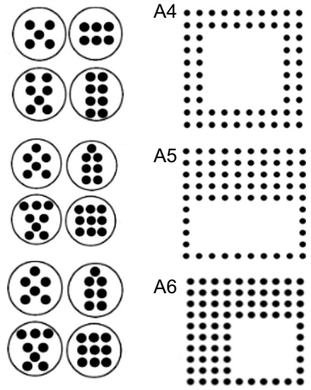
- Show quick image A1 for 3 seconds.
- Tell students to record the total number of units.
- Show quick image A1 for 3 seconds again.
- Tell students to record the unit sizes used (e.g., " I used units of 1, units of 5 and units of 10.")
- Show quick image A1 for 3 seconds for the last time.
- Tell students to record the addition equation and the calculations used (addition method).
- *Class Discussion* - Describe and compare the addition equations by their addends (size and number) and addition methods used (e.g., decompose and compose addends to make 10s and 1s; adding 10s then 1s; compensation; adding quantities of same units)
- Repeat for quick image A2 and image A3.
- *Class Discussion* – Describe the similarities and differences between quick images in each sequence. (i.e., A1-3; B1-3, C1-3)

# QUICK IMAGES, MATH PUZZLES AND GAMES MAT – WHOLE NUMBER ADDITION

## QUICK IMAGE Dots

How many black dots? Show as an addition equation.

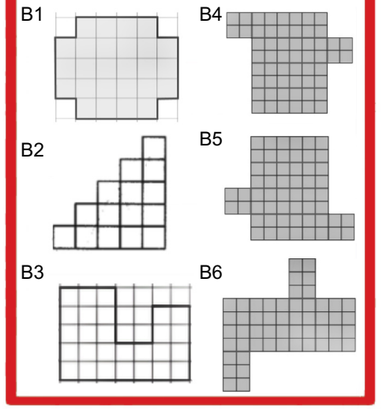
A1 A2 A3 A4 A5 A6



## QUICK IMAGE Squares

How many squares? Show as an addition equation.

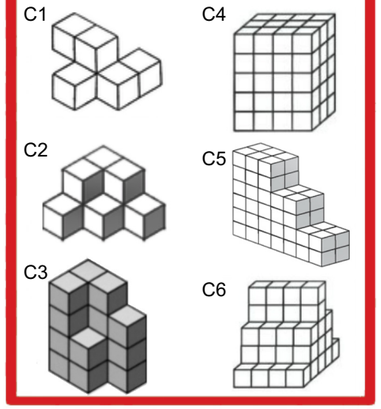
B1 B2 B3 B4 B5 B6



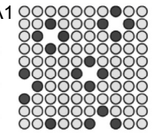
## QUICK IMAGE Cubes

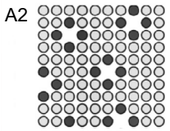
How many cubes? Show as an addition equation.

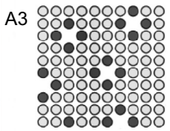
C1 C2 C3 C4 C5 C6



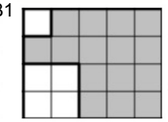
## QUICK IMAGE Dots

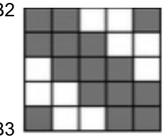
A1 
100 dots = 1 ones
How many black dots, in the unit, hundredths?

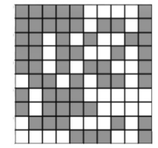
A2 
100 dots = 1 ones
How many blank dot spaces, in the unit, tenths?

A3 
100 dots = 1 ones
How many grey dots, in the unit, tenths and hundredths?

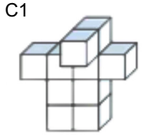
## QUICK IMAGE Squares

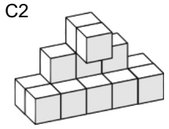
B1 
10 squares = 1 ones
How many grey squares, in the unit, hundredths?

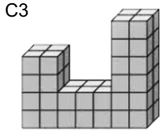
B2 
10 squares = 1 ones
How many blank squares, in the unit, tenths?

B3 
100 squares = 1 ones
How many grey squares, in the units, tenths and hundredths?

## QUICK IMAGE Cubes

C1 
100 cubes = 1 ones
How many black cubes, in the unit, hundredths?

C2 
10 cubes = 1 ones
How many cubes, in the unit, tenths?

C3 
100 cubes = 1 ones
How many cubes in the units, tenths and hundredths?

## Marble Guess

### PUZZLE

The nearest guesses for the number of marbles in a jar were 161, 172, 176 and 182. Two numbers were 3 out, one was 7 out and the other was 18 out. How many marbles are in the jar?

## Magic Squares

### PUZZLE

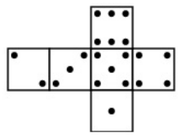
Magic sum for every row, column and diagonal is 48.

| | | |
|---|---|---|
| 19 | | |
| | 16 | 18 |
| | | |

## Stacked Dice

### PUZZLE

What is the greatest sum of all the numbers showing from 4 stacked dice?



## Magic Squares

### PUZZLE

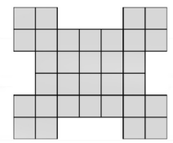
Complete the magic square, using whole numbers.

| | | |
|---|---|---|
| 35 | | |
| | 32 | |
| | | 29 |

## How Many Squares?

### PUZZLE

Twenty squares are 2 ones. How many tenths of a square unit are there?



## Magic Square

### PUZZLE

Use numbers 0.1 - 1.6 once, so diagonals, columns and rows have the same sum.

| | | | |
|---|---|---|---|
| | 1.1 | | 0.5 |
| 0.6 | 1.3 | 1.2 | |
| | | 0.7 | |
| 1.5 | | | 1.0 |

## Magic Square

### PUZZLE

Magic sum is 3.4 for every row, column and diagonal.

| | | | |
|---|---|---|---|
| 0.1 | | 1.6 | 1.5 |
| | 1.4 | | 0.3 |
| | | 0.9 | 0.6 |
| 0.8 | 1.1 | | |

## Addition Path to 53

### PUZZLE

Add numbers from Reds 0.5 to 0.4, to sum to exactly 5.3.

| | | | | |
|---|---|---|---|---|
| 0.4 | 0.9 | 0.7 | 0.7 | 0.4 |
| 0.8 | 0.9 | 0.4 | 0.5 | 0.7 |
| 0.6 | 0.6 | 0.4 | 0.9 | 0.9 |
| 0.7 | 0.8 | 0.8 | 0.8 | 0.6 |
| 0.5 | 0.5 | 0.6 | 0.5 | 0.5 |

## "Make 25" MATH GAME

**Materials:** 1 set of playing cards (remove jacks, queens and kings; aces are worth 1)



**Game Goal:**

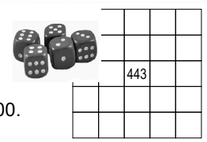
- Collet 5 cards totaling 25 ones

**How to Play:**

- Deal each player 5 cards, faced down. The remaining cards are placed in the centre of the players with the top card turned up.
- Players take turns picking up and discarding one card until their five cards sum to 25 ones.
- Player who has a hand summing to 25, calls out "25."
- Once a player calls out 25, the other players may take one more turn to make a "25" hand.
- Variations – number of cards, target sum is 35

## "Make 10 000" MATH GAME

**Materials:** 5x5 blank square grid, colour markers, 5 dice




**Game Goal:**

- To accumulate points to 10 000.

**How to Play:**

- Players take turns rolling 5 dice, to make a 1-digit, 2-digit and/or 3-digit whole numbers.
- Players record the dice rolled as an addition equation with 1, 2, or 3 addends. (6 + 5 + 432 = 443)
- Record the sum on any blank square on the square grid. Players are assigned different colours to record.
- Players collect points from the addition sum (sum is 443, so points are 443).
- Players who complete 5 squares in a row (horizontal, diagonal, vertical) get an additional turn.

## "Connect 4" MATH GAME

**Materials:** 6x6 circle array, plastic page protector, colour dry erase markers

| | | | | | |
|---|---|---|---|---|---|
| 12.3 | 90.82 | 1230 | 1.23 | 0.123 | 0.98 |
| 36.82 | 8.37 | 3.68 | 86.32 | 26.83 | 6.52 |
| 50.09 | 950 | 59.4 | 42.90 | 500.9 | 9.42 |
| 1.6 | 63.01 | 1.64 | 3.00 | 16.0 | 1.06 |
| 23.19 | 123.9 | 43.17 | 3.91 | 63.15 | 0.75 |
| 163.1 | 1.36 | 274 | 72.04 | 309.5 | 7.53 |

**Game Goal:**

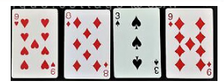
- To accumulate lowest (or highest) points.

**How to Play:**

- Join 4 numbers, vertically and horizontally, but not diagonally and calculate their sum.
- Each number may be used once and connecting lines may not intersect.
- Keep track of the points by recording the addition equation for each set of 4 numbers connected.
- Game ends when 4 numbers cannot be joined.

## "Race to 40 Ones" MATH GAME

**Materials:** 2 sets of playing cards (no jacks, queens, kings), aces are 1, paper, pencil



**Game Goal:**

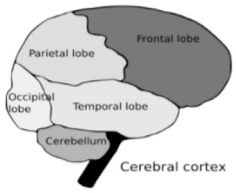
- To accumulate points that sum to 40 ones.

**How to Play:**

- Black cards are tenths units; red cards are hundredths units. Face down all cards in a 10x8 array.
- Players take turns flipping over 4 cards at a time and calculate their sum. Set aside the cards revealed.
- Record points as a 4-addend addition equation.
- Game ends when there are no more cards to flip over.
- Here is a points example.
  (9 + 8 + 9) hundredths + 3 tenths
  = (26 x 0.01) + (3 x 0.1)
  = (26 x 0.01) + (30 x 0.01)
  = (26 + 30) x 0.01 = 0.56 points

# MATH PUZZLES - RIDDLES AND MAGIC SQUARES

Math puzzles include brain teasers, logic puzzles and math riddles, which have specific rules and conditions and requires mathematical thinking to solve them. Because math puzzles often do not involve competition between two or more players, students can take as many opportunities as possible to try different ways to solve the puzzle.




As students exercise their brain by thinking, learning, experiencing and remembering, new neurons are grown and tied together to form neural pathways. When students solve math puzzles, the brain rewires itself in these areas:

- front lobes - pattern recognition, hypothesis testing and logic
- left parietal lobe - number relationships retrieval and processing numerical quantity
- occipital lobe - visual recognition of shapes and colours.

Think about the mathematics that is used to solve these different math puzzles.

### *Puzzle 1 – What is the Unknown Number?*

- 1st digit - prime number
- 2nd digit - difference between 5th and 1st digit
- 3rd digit - triple 1st digit
- 4th digit - 2nd digit plus 1
- 5th digit - 3 more than 3rd digit

The unknown number is double the 5-digit number

*Solution 1:*

| Digit | Choice 1 | Choice 2 |
|---|---|---|
| 1st | 2 | 3 |
| 2nd | 9-2=7 | 12-3=9 |
| 3rd | 2+2+2=6 | 3+3+3=9 |
| 4th | 7+1=8 | 9+1 |
| 5th | 6+3=9 | 9+3=12 |

Unknown Number
= 27 689 + 27 689
= 54 000 + 1200 + 178
= 54 1378

**Mathematics Content:**

- numeral is composed of digits;
- digits represent the quantity of a specific number unit (for the 5th digit, 5 x 10 000)
- ordinal numbers, 1st to 5th to show sequence of operations
- 1 digit to 5-digit whole number addition using different addition methods

### *Puzzle 2 – Over 10 000 Movie Passes were Sold at the Start of Summer! True or False?*

| Type of Movie | # Students |
|---|---|
| action | 3915 |
| comedy | 4002 |
| drama | 3967 |
| action and comedy | 1497 |
| comedy and drama | 1388 |
| action and drama | 1521 |
| action, comedy, action | 873 |

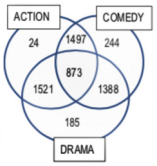
***Solution 1*** *- Double Counted*

Action, comedy and drama movies viewed is more than
10 000 movies.
4000 + 4000 + 3900 ~ 11900 movies, but:

- some movie passes are used for 2 or 3 movies
- too much because 1497, 1521 and 1388 added twice and added 873 three times
- 1 497 + 1 521+ 1 388 + 873 + 873 = 4200 + 349 = 4549
- 4549 less than 10 000 movie passes, so False.

***Solution 2*** *- Sort Numbers*

- Use a Venn Diagram to show the number of movie passes used.




- Count movie passes for 2 or 3 types of movies only once.
- 24 + 1497 + 244 + 1388 + 185 + 1521 + 873 = 21 + 1500 + 32 + 1600 + 6 + 2500 + 73 = 5600 + 132 = 5732

**Mathematics Content:**

- addition of 4-digit whole numbers
- comparison of 4-digit whole numbers using different addition methods
- distinguish meaning and related quantity of objects (e.g., movie passes, movies watched by genre)

### *Puzzle 3 –How Many People*

Have More Than 10 Vouchers?

Students lined up to receive free movie vouchers. Only 100 vouchers

were given out.

- 1st person got 1 voucher
- 2nd person got 2 vouchers
- 3rd person got 3 vouchers … and so on.

***Solution 1*** *– Group Addends to Make 10s and 1s*

- for 9 people, 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 = (1 + 9) + (2 + 8) + (3 + 7) + (4 + 6) +5 = 45 tickets
- for 5 more people 10 + 11 + 12 + 13 + 14 = 10 + (14 + 11) + (13 + 12)
  Total = 45 + 10 + 25 + 25 = 105
- 3 students have more than 10 vouchers not 4 because student 14 only got 9 tickets

***Solution 2*** *– Sum of Consecutive Numbers*

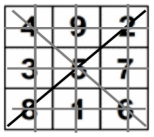
1 + 2 + 3 = 6
Sum of n consecutive numbers = $(n(n + 1)) \div 2 = ((n + 1) \times n) \div 2$
$3(3 + 1) \div 2 = 3 \times 4 \div 2 = 6$

- $n(n + 1) \div 2 = 14(14 + 1) \div 2$ $(14 \div 2) \times 15 = 105$ tickets, only 100 tickets given out.
- 11th, 12th and 13th student have 11, 12 and 13 tickets, 14th has 14 – 5 = 9 tickets

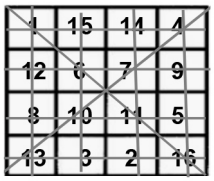
**Mathematics Content:**

- addition methods - grouping addends to make 10s
- consecutive numbers sum

## Magic Squares

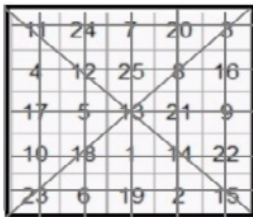



A Magic Square is commonly defined as an arrangement of different numbers, appearing only once. The numbers or elements are placed in a square grid by following a certain pattern that has the same sum for any row, column or main diagonal. This sum is called the **magic constant** of this magic square. The number of rows and the number of columns is represented as n (natural numbers). A magic square has $n \times n = n^2$ magic square.




A ***normal magic square*** is composed of integers from 1 to n, in an arithmetic progression with a common difference of 1. For 3 rows x 3 columns, there are 9 numbers ($n \times n = n^2 = 3 \times 3 = 3^2 = 9$). The sum of consecutive numbers, from 1 to 9 can be calculated as 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 = 45 = 9 (9 + 1) ÷ 2. The sum for each row or column is 15. (i.e., 45 ÷ 3 rows = 15 for each row or column). The magic sum of an $n$th order magic square is generalized as $[n\ (n^2 + 1)] \div 2$.

| Order of Magic Square | # Elements Rows x Columns | Magic Constant Consecutive Numbers $n^2\ (n^2+1) \div 2$ | Magic Sum $[n^2\ (n^2 + 1) \div 2] \div n$ |
|---|---|---|---|
| 3rd<br>4th | 3 x 3 = 9<br>4 x 4 = 16 | 9 (9 + 1) ÷ 2 = 45<br>16 (16 + 1) ÷ 2 = 136 | [9 (9 + 1) ÷ 2] ÷ 3 = 45 ÷ 3 = 15<br>[16 (16 + 1) ÷ 2] ÷ 4 = 34 |
| 5th | 5 x 5 = 25 | 25 (25+1) ÷ 2 = 325 | [25 (25 + 1) ÷ 2] ÷ 5 = 65 |




Think of these magic squares as quantities of $n^2$ with the unit of ones.

To solve the decimal magic square puzzles provided, consider that the quantities are still $n^2$, but with the unit of tenths.

## Constructing 'Normal" Magic Squares

Let's think through a process for constructing 3 x 3 normal magic square, which has 8 equations with 9 unknowns.







- 3 rows → A + B + C = 15 D + E + F = 15 G + H + I = 15
- 3 columns → A + D + G = 15 B + E + H = 15 C + F + I = 15
- 2 diagonals → A + E + I = 15 C + E + G = 15

Reduce number of unknowns to 2, using elimination. By testing sets of values for A and B, it turns out that these conditions are necessary: A ≤ 14 and B ≥ 6 So, solutions for (A, B) and B include (4,3), (2,9), (6,7) and (8,1), which produce 4 magic squares that are the same with successive 900 rotations.



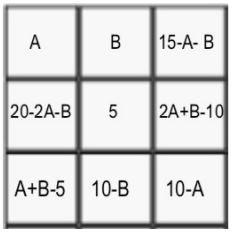













Also, by adding the same constant to every element of a normal magic square, all of the rows and columns sum to the same number. (Note: These magic squares are no longer considered normal magic squares, as they do not include integers, starting at 1.









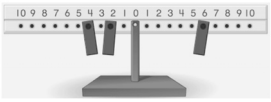

There are other types of magic squares, such as Semimagic squares, Associative magic squares, Multimagic squares, Diabolic magic squares and Heterosquares. Famous magic squares include Benjamin Franklin's magic square and Albrecht Durer's magic square.

# MATH GAMES - CARDS, DICE, INTERLOCKING CUBES, NUMBER LINE BALANCE AND SQUARE TILES

There is resonance between engaging in mathematical activity and game-playing. Both are rule-governed, as well as goal and solution oriented. Learning mathematics and game-playing have multiple entry points. Not only do students use and refine their current knowledge to operate within the game rules, constraints, goals and challenges, but also to invent and test multiple strategies.

Constance Kamii reminds us that game-based, mathematics practice consolidates students' understanding of mathematics concepts and methods within a problem-solving context. In the game, "Even and Odd Numbers," students practice addition using mental methods, but also think spatially about area that the square tiles will take up on the game board. (e.g., 1x8 or 2x4 square units' rectangle)

Keep track of points on a number balance scale. This example shows the players are tied with 6 points each.



Also, mathematics games compel students' active construction and practice of mathematical concepts and skills in a social context. In a social context, students receive immediate feedback about their use of mathematics throughout the game.

Students learn from ongoing observation of other students' use of mathematics by enabling the students to reflect, clarify and apply their mathematical understanding throughout the game.

### *"Addition Concentration" Math Game*

**Materials:** 1 set of playing cards (aces worth 1; jacks, queens, kings worth 10)

**Game Goal:** To accumulate the greatest points from pairs of cards.

**How to Play:**

- Players take turns flipping over 4 cards at a time.
- Keep and make points for the value of matching pairs of cards. Turn back cards that don't match.
- Game ends when there are no more cards left to turn over.
- Point example - 20 points (keep 2 tens and turn back over the Jack and King cards).



### *"Building Towers" Math Game*

| | | | | | |
|---|---|---|---|---|---|
| 12 | 3 | 4 | 10 | 12 | 6 |
| 2 | 15 | 3 | 25 | 9 | 4 |
| 20 | 5 | 1 | 20 | 15 | 24 |
| 36 | 6 | 30 | 8 | 10 | 18 |
| 6 | 18 | 5 | 30 | 12 | 8 |
| 24 | 9 | 18 | 2 | 30 | 24 |
| 4 | 12 | 25 | 6 | 16 | 15 |

**Materials:** 2 colours of interlocking cubes, number gameboard, 2 dice

**Game Goal:**

Make a 2-digit number from your roll. Cover numbers on the gameboard to represent your numbers. e.g., Roll 1 and 4 can cover 41 or 14 – they do not appear BUT 10 and 4 are adjacent → 14

**How to Play:**

- Players take turns rolling 2 dice to determine a 2-digit whole number.
- Cover numbers adjacent on the gameboard that sum to the 2-digit whole number. Stack cubes if numbers used more than once.
- When all numbers are covered, the game ends and players add points.

### *"Even and Odd Numbers" Game*

**Materials**

- 10x10 square grid gameboard
- 4 number dice
- 2 colours of square tiles or markers assigned to player

**Goal** - Cover the greatest number of squares on the square grid gameboard

**Rules**

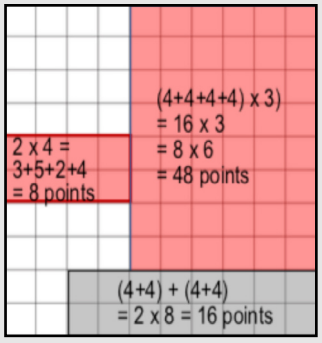
- Take turns rolling 4 dice.
- Points for sum of odd numbers. No points for even numbers. (e.g., Roll 3, 5, 2, 4 is 3 + 5 + 0 + 0 = 8 points)
- Represent the points on the square grid as a rectangle (e.g., 8 points could be a 1x8 or 2x4 rectangle)
- Game ends when there is no space on the square grid to record points, as a rectangle.

**Bonus Points**

Roll 4 same numbers (odd or even numbers), get double points
→ 4, 4 is (4 + 4) + (4 + 4) = 16 points

For each set of bonus points, alternate even or odd numbers for:

- 3 same numbers (triple points)
- 4 same numbers (quadruple points) → (4 + 4 + 4 + 4) x 3 = 16 x 3 = 48 points
- 5 same numbers (5X even numbers, 10X odd numbers)




## CLOSING

Our next issue (Vol 58 Issue 2) will focus on practice tasks (quick images, math puzzles and games) for decomposing and comparing whole and decimal numbers in relation to the subtraction of whole and decimal numbers. These practice tasks can be used for mini lessons and practice lessons.

**CALL FOR *ABACUS* SUBMISSIONS**

Send your teaching strategy ideas, problems and student solutions to the *Abacus* Co-Editors via email

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