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Indiana Department of Education

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K-2 Mathematics Resources to Extend and Enrich the Core Curriculum Appropriate for High Ability Students
Strand:
Reasoning, Logic, Problem Solving, Visual Spatial, and Strategic Thinking

Resource	Annotation	Differentiation Tip(s)	Correlating Indiana Academic Strand Standards	Correlating Indiana Academic Process Standards
Benjamin, E. (2003) ***Logic Links: Level A.*** Mindware Holdings, Inc. www.mindware.com (ISBN: 1-892069-50-4)	This reproducible resource, along with a set of colored chips (also available from Mindware), develops logical thinking skills by presenting a series of clues for students to use in figuring out the one and only possible arrangement of chips based on the clues given. The logic puzzles are progressively more difficult. This resource is ideal for independent task time or partner problem solving.	***Tiered Delivery:*** Students needing less of a challenge can be assigned lower-numbered puzzles to solve, and students needing more of a challenge can be assigned higher-numbered puzzles to solve. ***Self-Pacing:*** All 100 puzzles can be stapled into a book and students can progress through the puzzles at their own pace working through as many as	N/A	PS.1; PS.2; PS.3; PS.6; PS.7; PS.8

		they are able.		
Cook, M. (1999) ***Crayon Logic***. Balboa Island, CA: Marcy Cook Math. www.marcycookmath.com	This resource provides students with multi-level logical thinking experiences. There are 20 each of 3-crayon, 4-crayon, 5-crayon, and 6-crayon activities during which students read or listen to clues and place their crayons on a template in the order that suits the clues. This resource is appropriate for a whole-class, small group, partner, and/or independent task time logical thinking exercise.	***Tiered Delivery:*** Students needing less of a challenge can be assigned 3- and/or 4-crayon activities, and students needing more of a challenge can be assigned 5- and/or 6-crayon activities.	N/A	PS.1; PS.2; PS.3; PS.6; PS.7; PS.8
Cook, M. (2008) ***Count & Place: Sides and Shapes.*** Balboa Island, CA: Marcy Cook Math. www.marcycookmath.com *Also found in:* • *Number Sense*	In the first section of this resource, there are 36 activities in which students use a circle, a square, and a triangle (pattern blocks work well), a placement board, and clues to determine the proper ordinal placement of the blocks. The first section of this resource is appropriate for a whole-class, small group, partner, and/or independent task time	N/A	N/A	PS.1; PS.2; PS.3; PS.6; PS.7; PS.8

	logical thinking exercise. Since there are only three shapes to order, the first section of this resource is especially appropriate for kindergarten.			
Cook, M. (1994) ***Shapes & Logic: Young Geometry.*** Balboa Island, CA: Marcy Cook Math. www.marcycookmath.com *Also found in:* • *Computation and Algebraic Thinking* • *Geometry*	In the first section of this resource, there are 30 activities in which students use five pattern blocks, a placement board, and clues to determine the proper ordinal placement of the blocks. The first section of this resource is appropriate for a whole-class, small group, partner, and/or independent task time logical thinking exercise.	N/A	N/A	PS.1; PS.2; PS.3; PS.6; PS.7; PS.8
del Regato, Dr. J.C., Gilfeather, Dr. M.E., LeBlanc, R.J. (1980, 1986, 1991, 203, 2012) ***Mathematics Pentathlon Problem-Solving Games: Division I (Grades K-1).*** Indianapolis, IN: Pentathlon Institute. www.mathpentath.org	The Mathematics Pentathlon program includes five games and supplemental resources that are intended to support basic math concepts and skills, while strengthening strategic and problem-solving skills. The games in Division I include: • **Kings and Quadraphages**	***Flexible Grouping:*** The pentathlon games are appropriate for all ability levels, but it is recommended that students be grouped in like-ability teams when playing.	N/A	PS.1; PS.2; PS.3; PS.4; PS.6; PS.7; PS.8

	(a challenging entrapment game using horizontal, vertical, and diagonal movement) • **Shape-Up** (a game that integrates fact families with geometric shape recognition, attributes, algebraic thinking, spatial visualization, and directionality) • **Hex-A-Gone** (a game in which students apply spatial visualization, estimation, measurement, fractions, algebraic thinking, and deductive and inductive thought as they strategically cover shapes using pattern blocks with the goal of being the last player to place a block on the board) • **Calla** (a variation of ancient African and Asian counting games in which students apply number sense, deductive thinking, directionality, and one-to-one correspondence)			

	• **Star Track** (a game in which students apply number sense, inequality, addition, measurement, mapping, and decision making as they select chain links of various lengths and decide which is a better choice to apply to the number of spaces they will move on the gameboard) The Mathematics Pentathlon program can be implemented via classroom instruction, a math club, home use, and/or participation in a local National Mathematics Pentathlon Academic Tournament.			
del Regato, Dr. J.C., Gilfeather, Dr. M.E., LeBlanc, R.J. (1980, 1986, 1991, 2003, 2012) ***Mathematics Pentathlon Problem-Solving Games: Division II (Grades 2-3).*** Indianapolis, IN: Pentathlon Institute. www.mathpentath.org	The Mathematics Pentathlon program includes five games and supplemental resources that are intended to support basic math concepts and skills, while strengthening strategic and problem-solving skills. The games in Division II include: • **Par 55** (a game in which	***Flexible Grouping:*** The pentathlon games are appropriate for all ability levels, but it is recommended that students be grouped in like-ability teams when playing.	N/A	PS.1; PS.2; PS.3; PS.4; PS.6; PS.7; PS.8

	students use attribute blocks and a gameboard to score a specific number of points based on the number of attribute differences of connected blocks. There are many opportunities for critical and strategic thinking, along with opportunities for developing computational fluency) • **Fiar** (a game in which students use spatial reasoning and observation skills to move chips along the paths on a gameboard with the goal of forming a line of four chips of the same color without any chips of the opposite color intervening) • **Ramrod** (a game in which students use Cuisenaire rods, a gameboard, strategic thinking, and number family facts to construct "Ramrod" (addend) combinations of two rods that complete a			

	rectangle (sum)) • **Sum Dominoes & Dice** (a game in which students use three dice, a set of double nine dominoes, a gameboard, problem solving skills, and computational reasoning skills to build three-addend sums according to specific domino-placing rules) • **Kwatro-Sinko** (a game in which students use odd- and even-numbered chips, a gameboard, and computational and spatial reasoning to create a spatial and numerical alignment that results in an answer of four or five) The Mathematics Pentathlon program can be implemented via classroom instruction, a math club, home use, and/or participation in a local National Mathematics Pentathlon Academic Tournament.			

Findell, C.R., et al (2004) ***Navigating through Problem Solving and Reasoning in Grade 1.*** Reston, VA: The National Council of Teachers of Mathematics, Inc. www.nctm.org (ISBN: 0-87353-550-2)	This resource presents five investigations designed to develop the following reasoning methods and problem-solving strategies: • Identification of mathematical relationships • Inference • Generalization • Representation • Guess, check, and revise • Analogy • Verification Blackline Masters are included.	***Tiered Delivery:*** Match the grade level resource most appropriate to the readiness level of students. For the third through sixth grade levels of this resource, see "3-5 Mathematics Resources to Extend and Enrich the Core Curriculum Appropriate for High Ability Students." ***Extend:*** This resource is appropriate for all students. See the "Extend" section of each activity for additional challenging activities appropriate for high ability math students.	N/A	PS.1; PS.2; PS.3; PS.4; PS.5; PS.6; PS.7; PS.8
Greenes, C.E., et al (2003) ***Navigating through Problem Solving and Reasoning in Prekindergarten-Kindergarten.*** Reston, VA: The National Council of Teachers of Mathematics, Inc. www.nctm.org (ISBN: 0-87353-549-9)	This resource presents five investigations designed to develop the following reasoning methods and problem-solving strategies: • Identification of mathematical relationships • Inference • Generalization • Representation	***Tiered Delivery:*** Match the grade level resource most appropriate to the readiness level of students. For the third through sixth grade levels of this resource, see "3-5 Mathematics Resources to Extend and Enrich the Core Curriculum Appropriate for High Ability Students."	N/A	PS.1; PS.2; PS.3; PS.4; PS.5; PS.6; PS.7; PS.8

	• Guess, check, and revise • Analogy • Verification Blackline Masters are included.	***Extend:*** This resource is appropriate for all students. See the "Extend" section of each activity for additional challenging activities appropriate for high ability math students.		
Odell, M. (2004) ***Noodlers: Spatial stumpers to noodle your noggin.*** Mindware Holdings, Inc. www.mindware.com (ISBN: 1-892069-80-6)	This resource contains 80 puzzle cards intended to develop visual spatial skills and flexible thinking. All cards have a field of small symbols printed on them. Students use the indicated number of sticks to separate each small symbol into its own area. Coffee stirrers are recommended for whole-class use. Solutions are printed on the reverse side of each card. If solution access is not desirable during student use, photocopying the puzzle side of cards is recommended. The 3-stick puzzles are the least challenging, and the 6-stick puzzles are the most challenging.	***Tiered Delivery:*** Students needing less of a challenge can be assigned 3- and/or 4-stick puzzles, and students needing more of a challenge can be assigned 5- and/or 6-stick puzzles. ***Choice:*** Photocopy a 3-, 4-, 5-, and 6-stick puzzle card onto 11x17 pieces of paper, and allow students to choose which puzzles on that paper they want to solve.	N/A	PS.1; PS.2; PS.3; PS.6; PS.7; PS.8

Small, M., et al (2004) ***Navigating through Problem Solving and Reasoning in Grade 2.*** Reston, VA: The National Council of Teachers of Mathematics, Inc. www.nctm.org (ISBN: 0-87353-551-0)	This resource presents five investigations designed to develop the following reasoning methods and problem-solving strategies: • Identification of mathematical relationships • Inference • Generalization • Representation • Guess, check, and revise • Analogy • Verification Blackline Masters are included.	***Tiered Delivery:*** Match the grade level resource most appropriate to the readiness level of students. For the third through sixth grade levels of this resource, see "3-5 Mathematics Resources to Extend and Enrich the Core Curriculum Appropriate for High Ability Students." ***Extend:*** This resource is appropriate for all students. See the "Extend" section of each activity for additional challenging activities appropriate for high ability math students.	N/A	PS.1; PS.2; PS.3; PS.4; PS.5; PS.6; PS.7; PS.8