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# AWESOME ALGEBRA: LOOKING FOR PATTERNS AND GENERALIZATIONS

## Family Activities Project M³: Mentoring Mathematical Minds

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CIRCUMFERENCE OF THE  
SPHERE FOR YOU

# Arrows Fly in Third Grade MATH NEWS DAILY

WE COVER  
THE WORLD'S  
SURFACE AREA

Project M³ Third Grade Classrooms (Math News Network) – Visitors to Project M³ classrooms were surprised to hear the students talking about arrow math. In the lesson *Arrow Patterns*, students examined a number array to find patterns among the rows and columns. Then the arrows arrived and the students were challenged to find the algebraic rule behind each one. Using the number array they were asked to discover the meaning behind in each in the problems  $8 \Rightarrow 9$ ,  $30 \Uparrow 23$ ,  $11 \swarrow 17$ , and  $1 \Downarrow \Rightarrow 9$ . As students discovered the meaning of the different arrows, new questions arose. Did the arrows always mean the same thing? Did they have a value? How do you do math on this chart? What happens if an arrow points off the chart? Project M³ mathematicians embraced the challenge and worked hard to discover the answers.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

### THINK DEEPLY - THINK BEYOND

In many traditional approaches to teaching mathematics, students are taught how to solve a type of problem and then given the opportunity to practice the technique many times. Often these students associate being good at math with being able to copy what teacher does correctly and never really get a chance to develop a deep understanding of why the mathematics works. Using student mathematician journals, Project M³ encourages students to think deeply about the mathematics they are learning. Now that the students have discovered the rules for the different arrows they are being asked to explore further and look for ways to undo the arrows. In doing this they are exploring the mathematical idea of inverse operations. *Think Deeply* questions are an important part of every Project M³ lesson. The questions reflect the essence of the lesson and provide your child with the opportunity to make sense of the mathematics.

These questions are designed to challenge the students and increase their understanding as they move beyond the obvious to delve into more sophisticated mathematics.

For those students who quickly grasp the concepts in the *Think Deeply* activities, Project M³ offers additional challenges via *Think Beyond* cards. These cards promote high-level thinking and mathematical discussion. In the example card to the left the student is challenged extend the his or her thinking to look for relationships and use the arrow math concepts in an unfamiliar array of numbers. *Think Deeply* cards are part of the rich, meaningful mathematical experience provided to your child by Project M³.



