It's All About That Base:
Creatively Connecting Fractions and Decimals

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NOTES

Base-X Positional Representations

1. Find the missing representations. **Do the movements related to each number represented**!

Base-10 number representation	Base-5 number representation	Base-**5** movement representation
78_{TEN}		3 snaps, 0 claps, 3 steps
		4 snaps
124_{TEN}		
126_{TEN}		
		1 spin, 1 snap, 1 step
	2012_{FIVE}	
	1000_{FIVE}	
		"The largest number you can create with the moves you have"

2. Complete the following for different bases (10, 3, 5, and 7).

Base-**10** number representation	Base-**3** number representation	Base-**5** number representation	Base-**7** number representation
	102_{THREE}		
		102_{FIVE}	
			102_{SEVEN}

Extension: Which is larger, 42_{FIVE} or 112_{THREE}? Can you *determine* and *justify* the answer without using base-10 numbers?

"X-imals"

Symbols	Words	Picture
23.5_{SIX}		
23.5_{EIGHT}		
222.22_{FOUR}		
	2 groups of 9, 0 groups of 3, 2 ones, 2-thirds, and 3-ninths	

Connecting Fractions and X-imals

Find ½ as an X-imal in each base

Base 6
Base 8
Base 10
Base 5

Picturing Different Fraction and Decimal Notational Forms

3 loaves of bread shared by 4 people

Connecting Symbols and Pictures

For each situation, draw a picture that shows the amount of bread for each person's fair share in a way that matches the different symbol systems.

1 loaf shared by 4 people

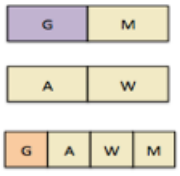
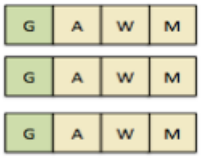
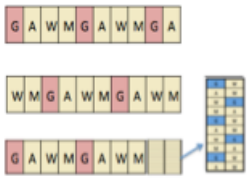
The standard fraction way	The decimal way
The base 5-imal way	Another way (your choice)

2 loaves shared by 6 people

The standard fraction way	The decimal way
The base 5-imal way	Another way (your choice)

3 loaves shared by 7 people

The standard fraction way	The decimal way
The base 5-imal way	Another way (your choice)

Egyptian Fraction		½ + ¼	• All numerators are 1 • No denominator repeated
Standard Fraction		¾	Each person gets one piece from each loaf
Decimal		0.25	Only allowed to make pieces that are powers of 10 *"You must always cut into 10 pieces"*
X-imal		0.33...FIVE	Only allowed to make pieces that are powers of X *"You must always cut into X pieces"*

More Explorations with X-imals

Exploration 1	**Exploration 2**
Find: • 1/3 in base 4 • 1/6 in base 7 • 1/5 in base 6 What do you notice? Why?	Find ½ in base 2, 3, 4, 6, 7, etc. What do you notice? Can you determine what ½ will be in base-N?
Exploration 3	**Exploration 4**
Find: • 1/3 in base-7 • 2/9 in base-10 What do you notice? Why?	In base-6, which fractions terminate? Which repeat? Can you find a way to predict if a fraction will terminate or repeat in base-6 without doing the division?