Planning for the New Grade 4 Math

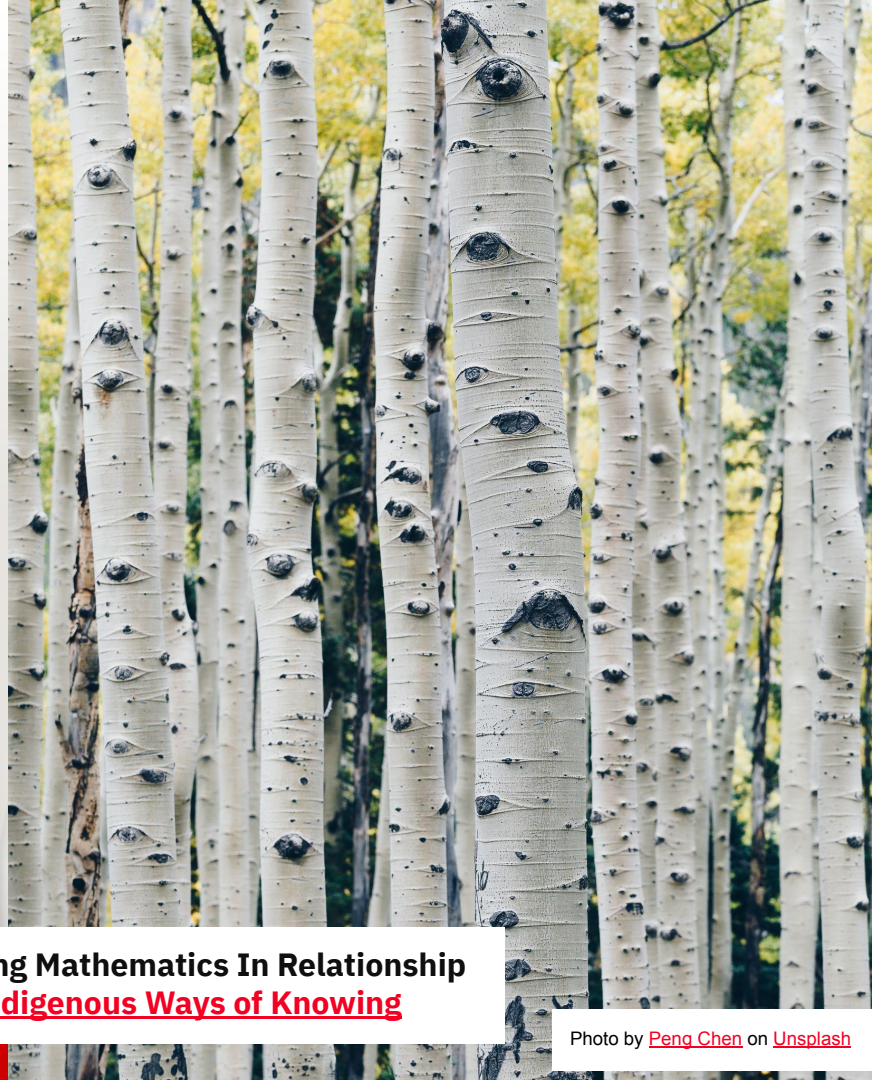
Provincial Session 4

February 13, 2024

Presenter: Chris Zarski
chris.zarski@arpdc.ab.ca

Land Acknowledgement

In the spirit of reconciliation, we want to acknowledge that this gathering is taking place on traditional lands across the province of Alberta, home to many diverse First Nations, Métis and Inuit peoples. We acknowledge that this land is a traditional meeting ground giving voice to its original peoples and the story of creation of this country in a way that history has forgotten.



Teaching Mathematics In Relationship with Indigenous Ways of Knowing

Photo by Peng Chen on Unsplash

Make It Visible...Make It Real

On our agenda today:

- Fractions - Equivalent Fractions - 4N5.1
- Decimal Numbers to hundredths - 4N5.2
- Fractions and Decimals that occupy the same place on a number line represent the same number - 4N5.2
- Percentages - fractions, decimals and percents can represent the same part-whole - 4N6
- Add and Subtract within 10 000, including decimals to hundredths (context of money) Standard Algorithms- 4N2
- Multiply and divide natural numbers to 10 000 (strategies) - 4N4
- Time - measuring time in degrees. What is that?
- Algebra - to next session

February	March	April
Number: Quantity is measured with numbers that enable counting, labelling, comparing and		
4N5.1 Students apply equivalence to the interpretation of fractions • There are infinitely many equivalent fractions that represent the same number. (limit to money with dimes and pennies initially) • Exactly one of infinitely many equivalent fractions is in simplest form. (initially limit to money with pennies and dimes) 4N5.2 Students apply equivalence to the interpretation of fractions. • Decimal numbers that terminate (do not repeat) are fractions with denominators of 10, 100, etc. • Fractions and decimal numbers that represent the same number are associated with the same point on the number line (use this part understanding as your initial conversation) 4N6 Students interpret percentages • Fractions, decimals, and percentages can represent the same part-whole relationship. 4N4 Students multiply and divide natural numbers within 10 000.(facts 12 x 12) • Multiplication and division strategies can be chosen based on the nature of the numbers *this should be ongoing throughout the year	4N2 Students add and subtract within 10 000, including decimal numbers to hundredths. • Standard algorithms for addition and subtraction may be used for any decimal numbers (Tie into Financial Literacy) • 4N4 Students multiply and divide natural numbers within 10 000.(facts 12 x 12) • Multiplication and division strategies can be chosen based on the nature of the numbers *this should be ongoing throughout the year	4N2 Students add and subtract within 10 000, including decimal numbers to hundredths. • Standard algorithms for addition and subtraction may be used for any decimal numbers (Tie into Financial Literacy) • 4N4 Students multiply and divide natural numbers within 10 000.(facts 12 x 12) • Multiplication and division strategies can be chosen based on the nature of the numbers *this should be ongoing throughout the year
Algebra: Equations express relationships between quantities.		
	4A1.2 Students represent and apply equality in multiple ways. • An equation is solved by determining an unknown value that makes the left and right sides of the equation equal.(Could revisit equality with money initially - different ways of showing the same amount)	

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
"Sharing"	In a quantity partitioned into two equal groups, each group represents one-half of the whole quantity. In a shape or object partitioned into two identical pieces, each piece represents one-half of the whole. Symmetry	"Quarters" Model a unit fraction.. (10 or fewer parts) Compare unit fractions of the same/different wholes. Make the whole from a **unit fraction.**	Fractions are numbers between natural numbers. Fractions can represent part-to-whole relationships. A **unit fraction** describes the size of the equal parts of a fraction. The size of the parts and the total number of equal parts in the whole are inversely related. (Money)	There are infinitely many equivalent fractions that represent the same number. Exactly one of infinitely many equivalent fractions is in simplest form. (GCF) Decimal numbers that terminate (do not repeat) are fractions with denominators of 10, 100, etc. Fractions, decimals, and percentages can represent the same part-whole relationship.	Fractions allow counting and measuring **between whole** quantities. Improper fractions and mixed numbers that represent the same number are associated with the same point on the number line.	Model an equal-sharing situation in more than one way. Describe an equal-sharing situation using a fraction. Express a fraction as a division statement and vice versa. Convert a quotient from fraction to decimal form using division.

Grade 4	**Grade 5**	**Grade 6**
There are infinitely many equivalent fractions that represent the same number. Exactly one of infinitely many equivalent fractions is in simplest form. (GCF) Decimal numbers that terminate (do not repeat) are fractions with denominators of 10, 100, etc. Fractions, decimals, and percentages can represent the same part-whole relationship.	Fractions with common denominators are multiples of the same **unit fraction**. Properties for addition and subtraction of natural numbers apply to fractions.	Fractions with common denominators have the same units. Any numbers with the same unit can be compared, added, or subtracted. Multiplication does not always result in a larger number. Multiplication of a natural number by a fraction can be interpreted as **repeated addition** of the fraction. Multiplication of a fraction by a natural number can be interpreted as taking part of a quantity.


"Fraction is..."
Symbolic
Numerator and Denominator in a Fraction
Numerator
Denominator
Fraction Bar
Fraction
RELATIONSHIPS

WHAT IS A FRACTION?

A fraction is a number which can tell us about the relationship between two quantities.

How do we help students to see a unit fraction?

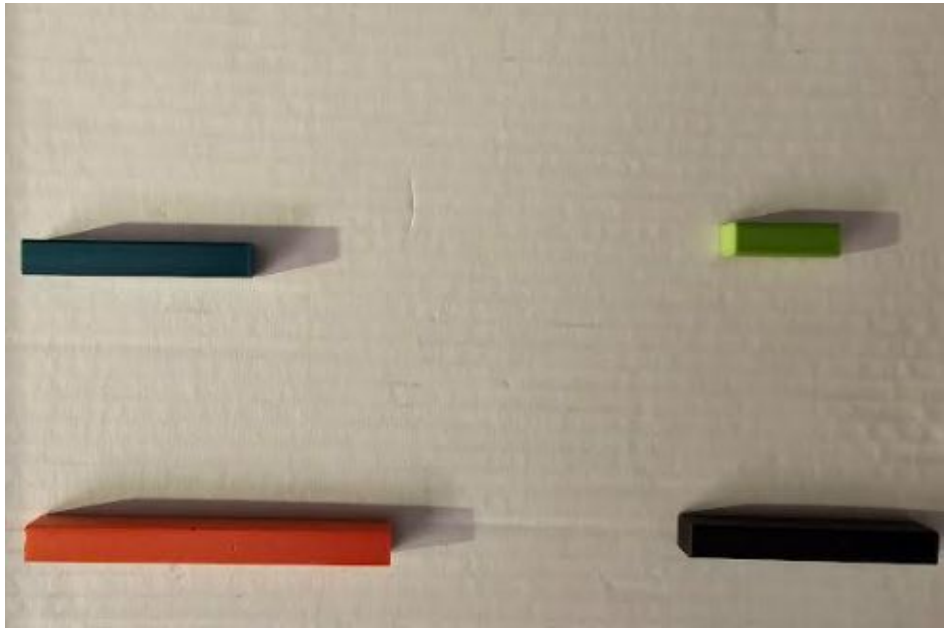

0
10¢
20¢
30¢
40¢
50¢
60¢
70¢
80¢
90¢
100¢

Create the Unit Fractions Visually

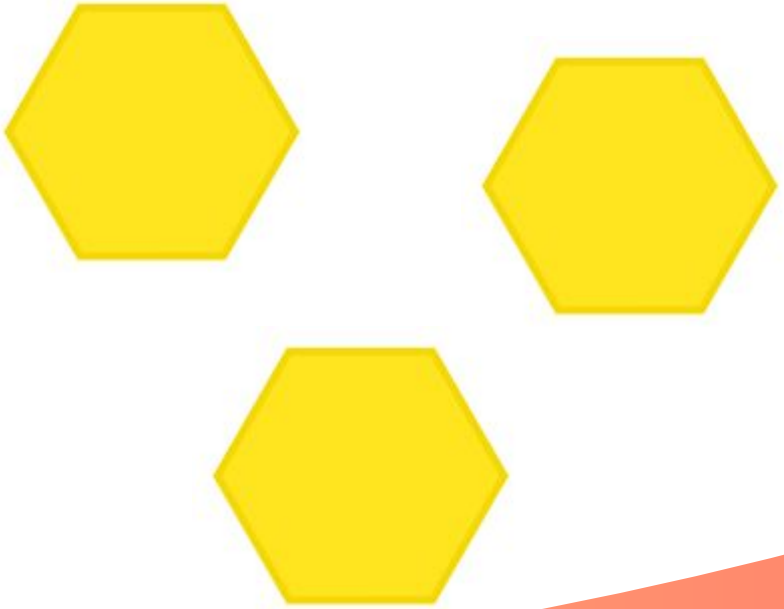
Money Link

$1000 Template

Cuisenaire Rods

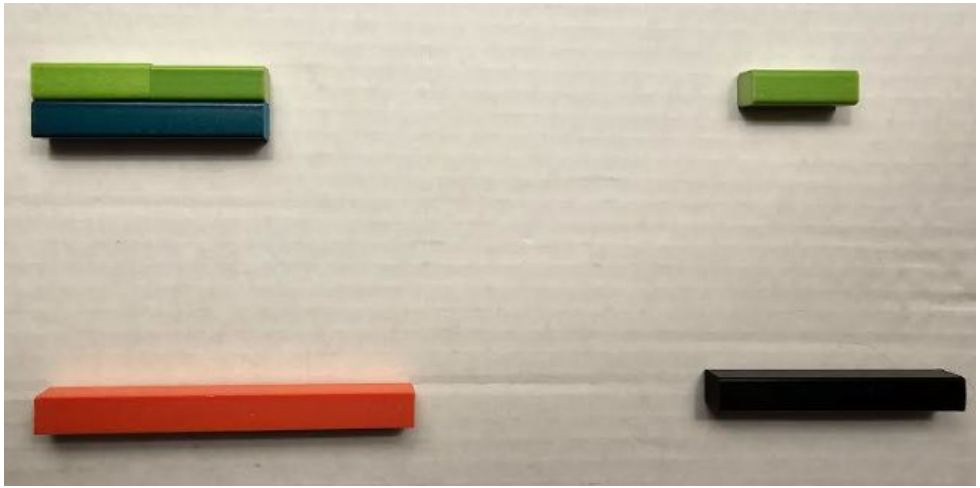


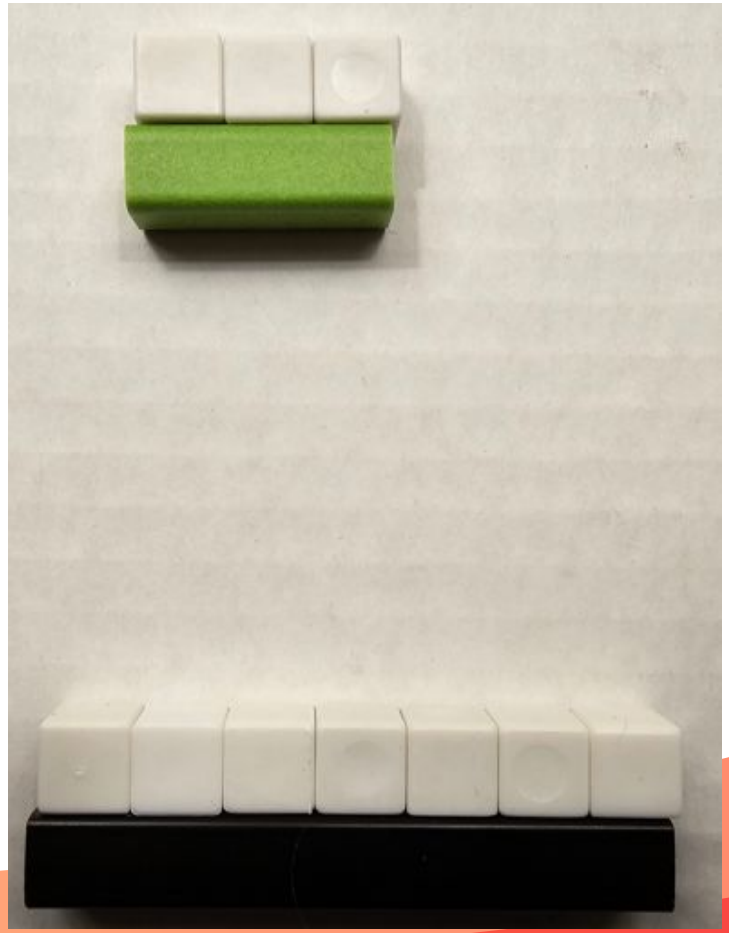
Pattern Blocks

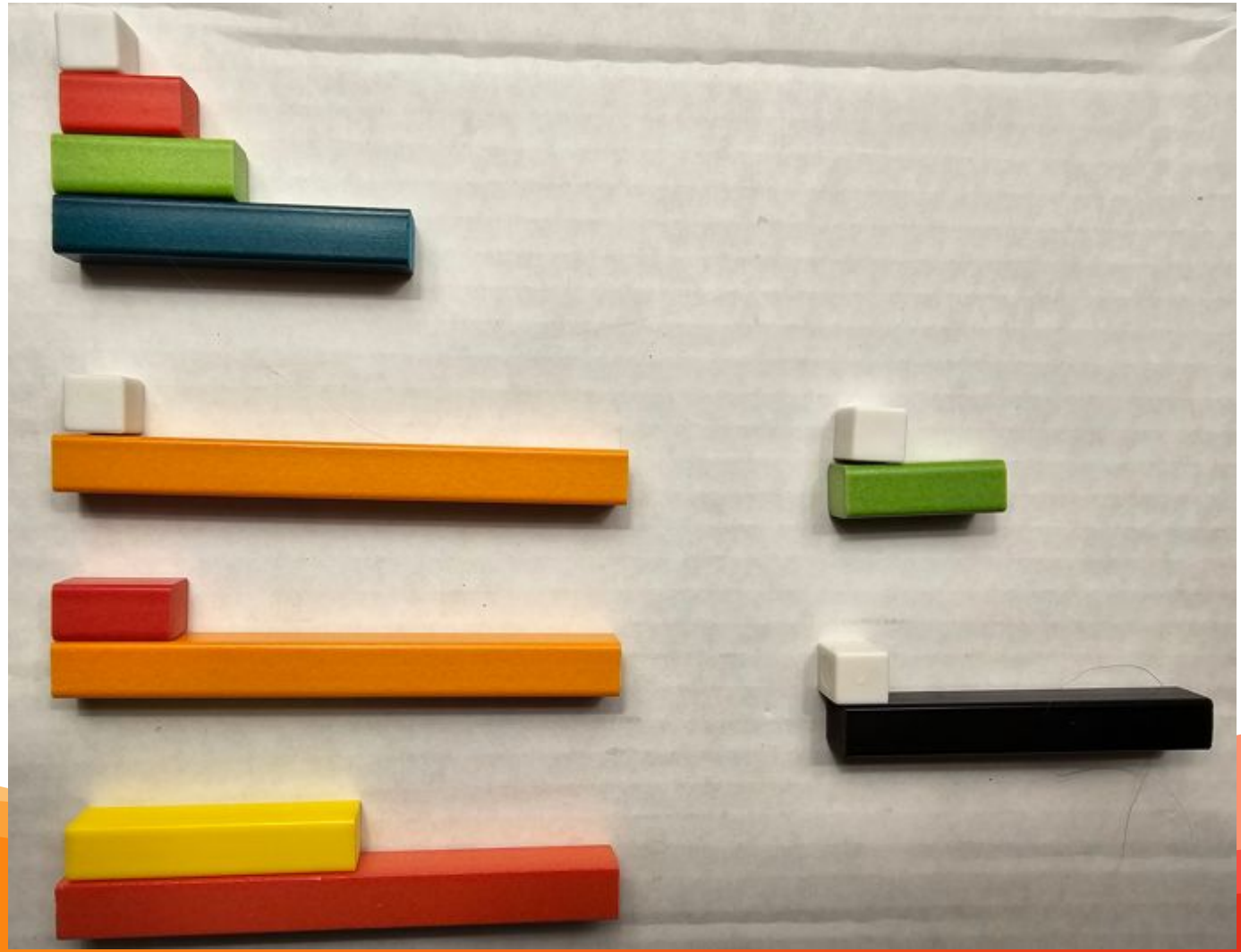


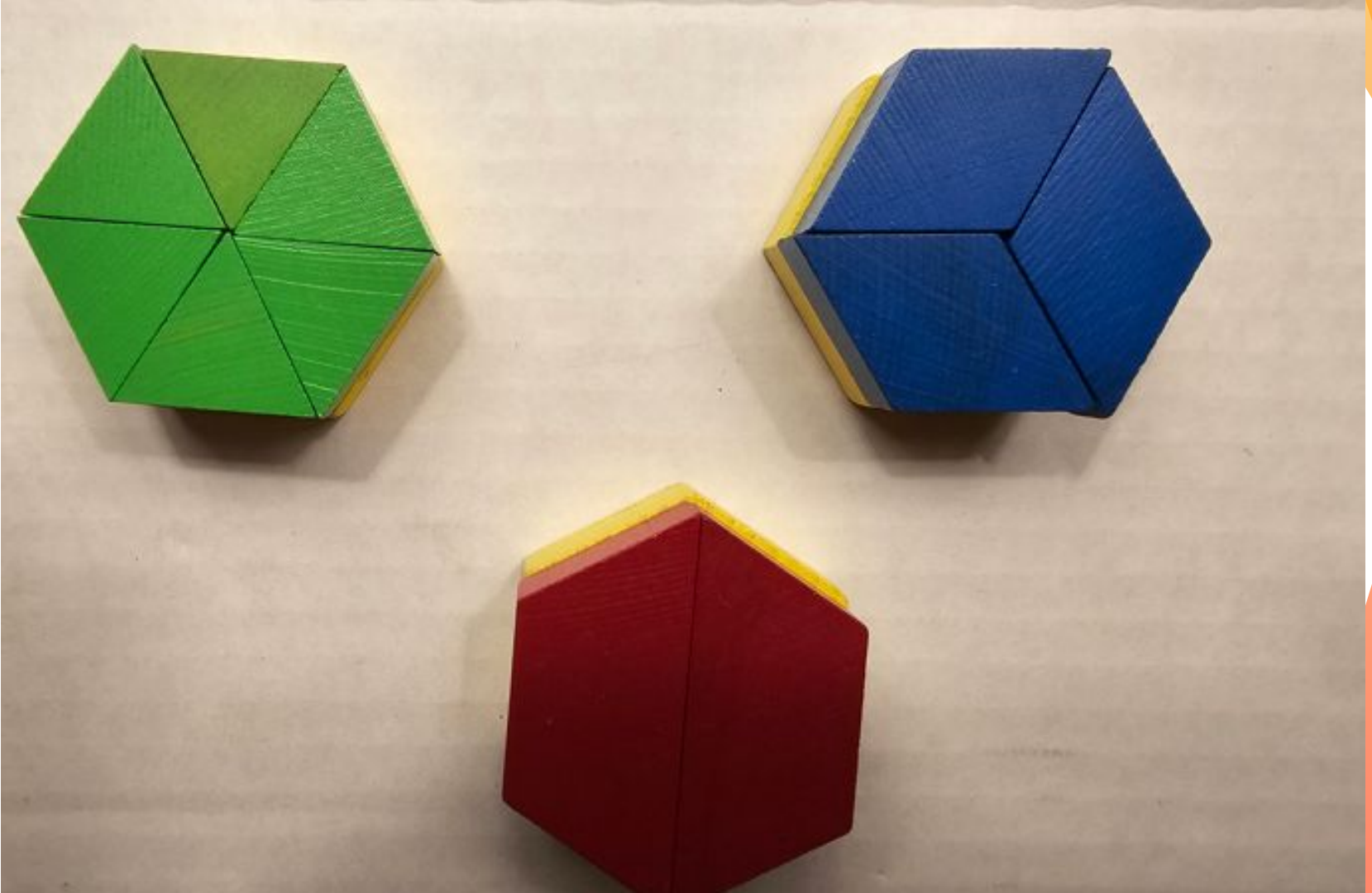
Brainingcamp

Didax

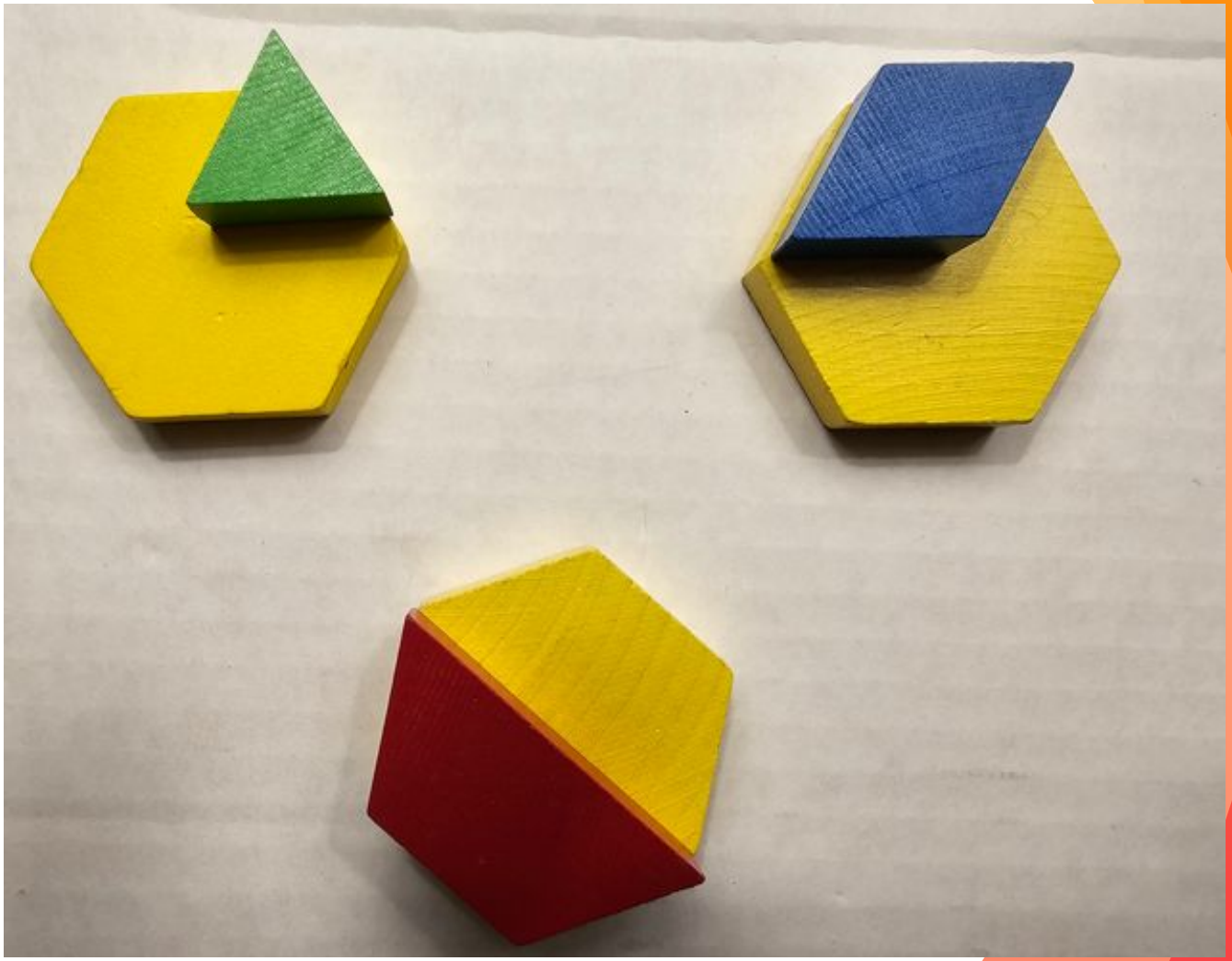




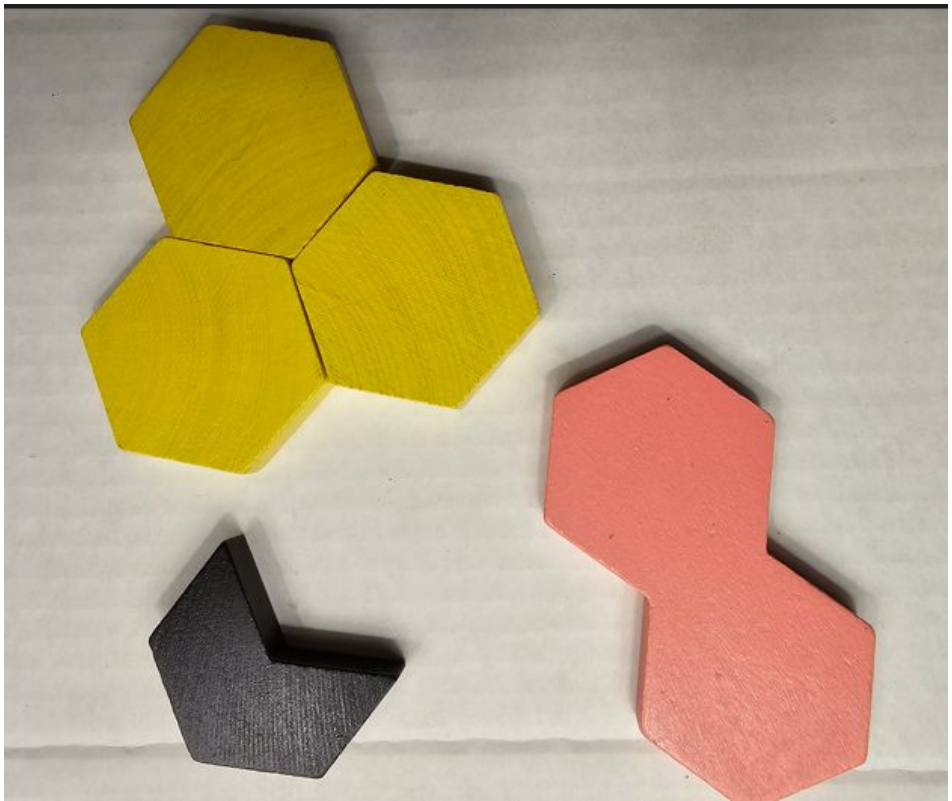




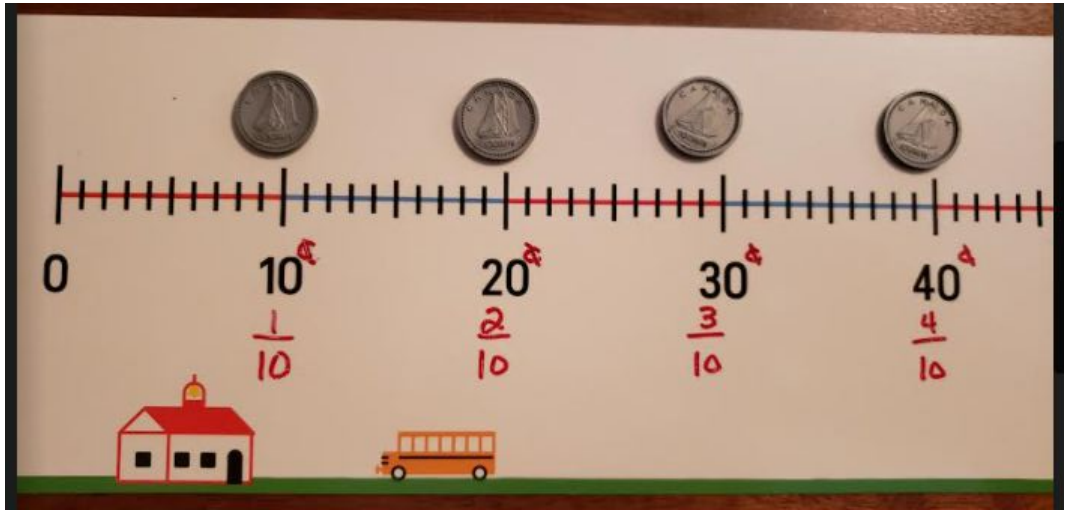
What unit fractions are evident?



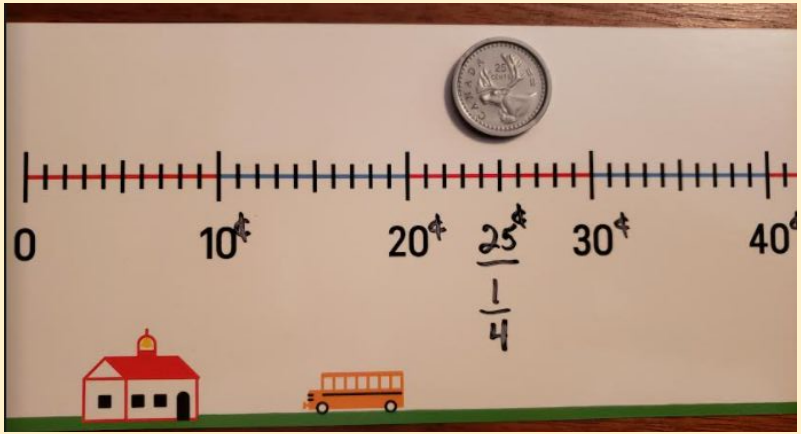
What is the relationship between the unit fraction and these wholes?

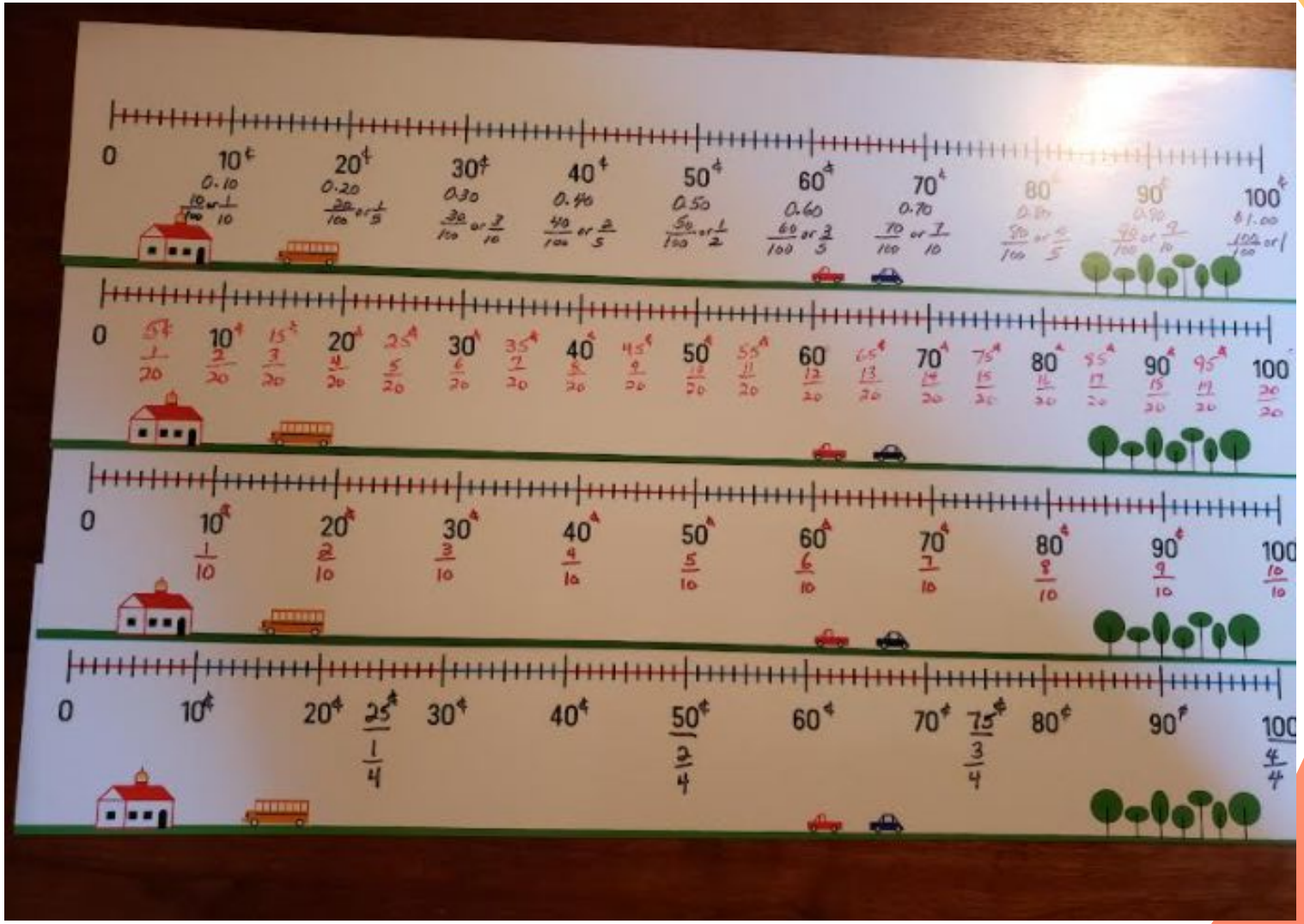


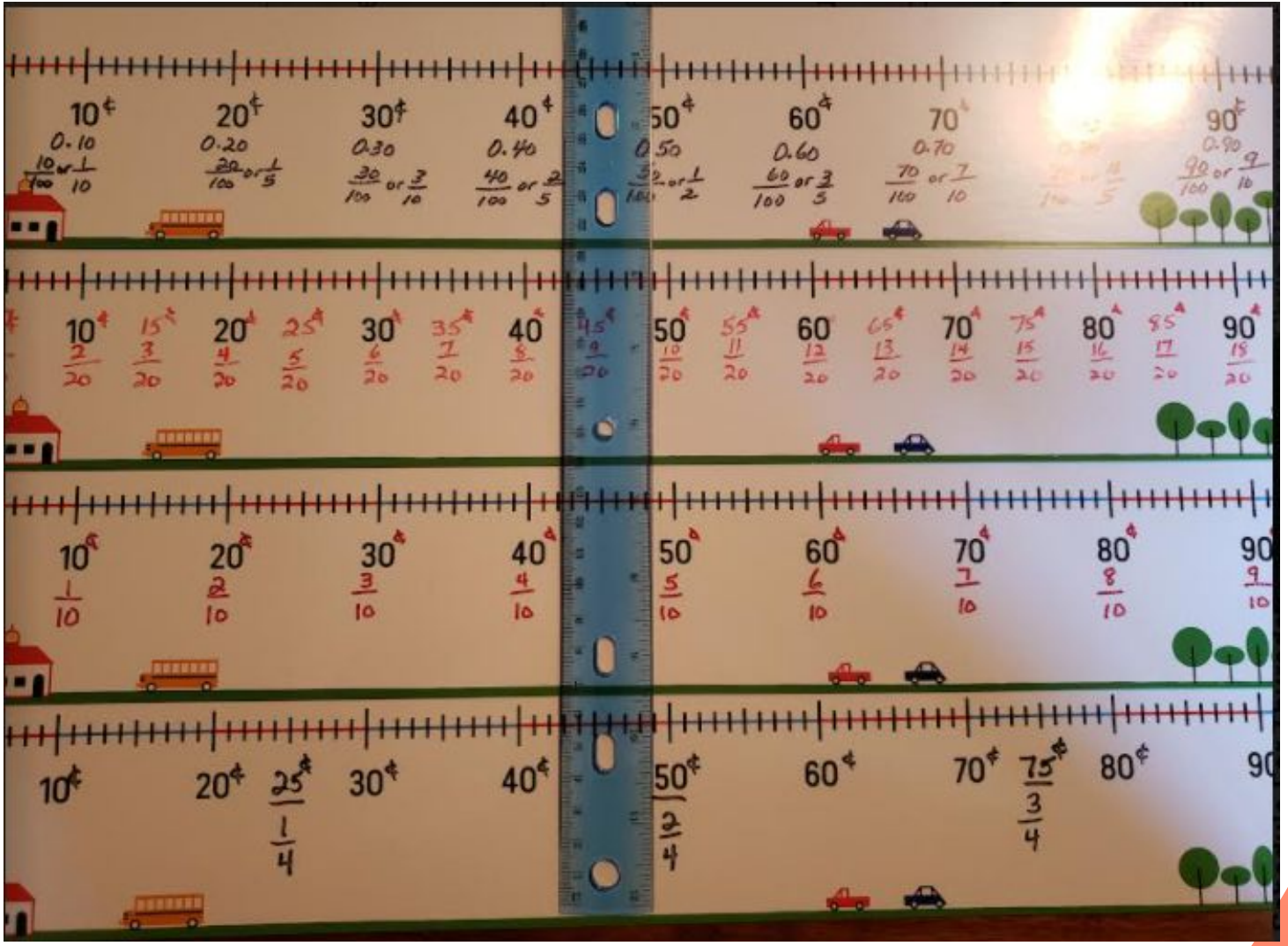

0
10¢
1/10
20¢
2/10
30¢
3/10
40¢
4/10
50¢
5/10
60¢
6/10
70¢
7/10
80¢
8/10
90¢
9/10
100¢
10/10

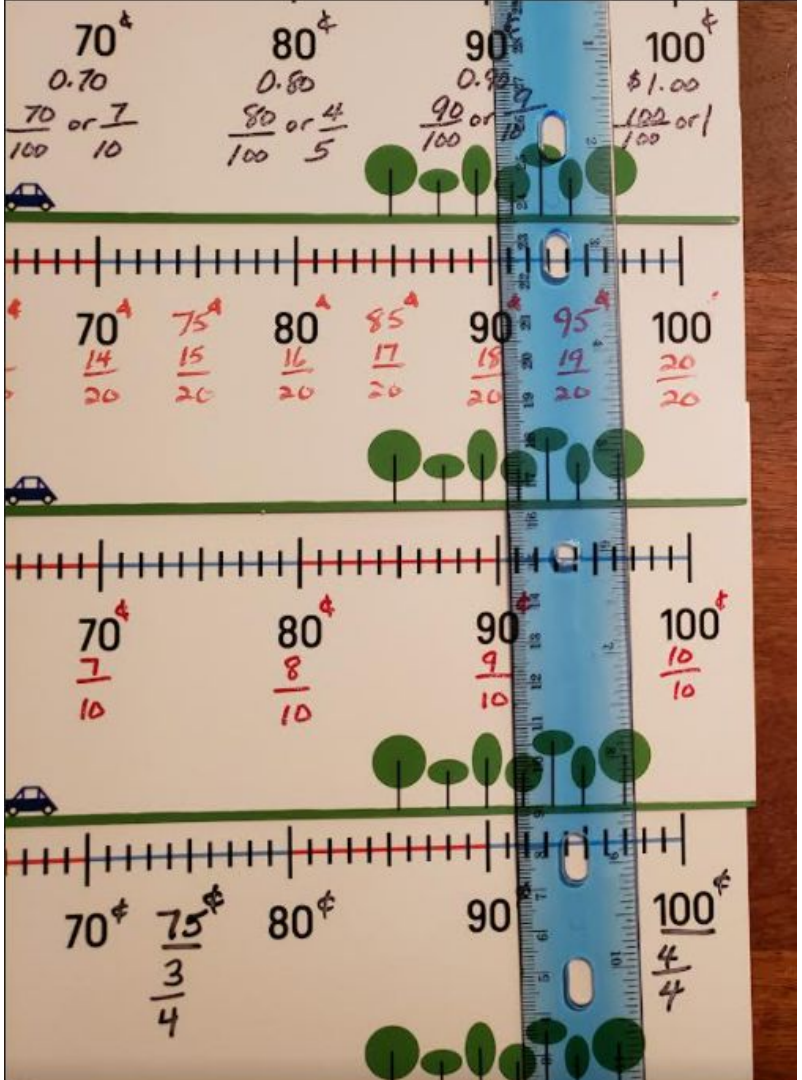

0
10¢
1/10
20¢
2/10
30¢
3/10
40¢
4/10

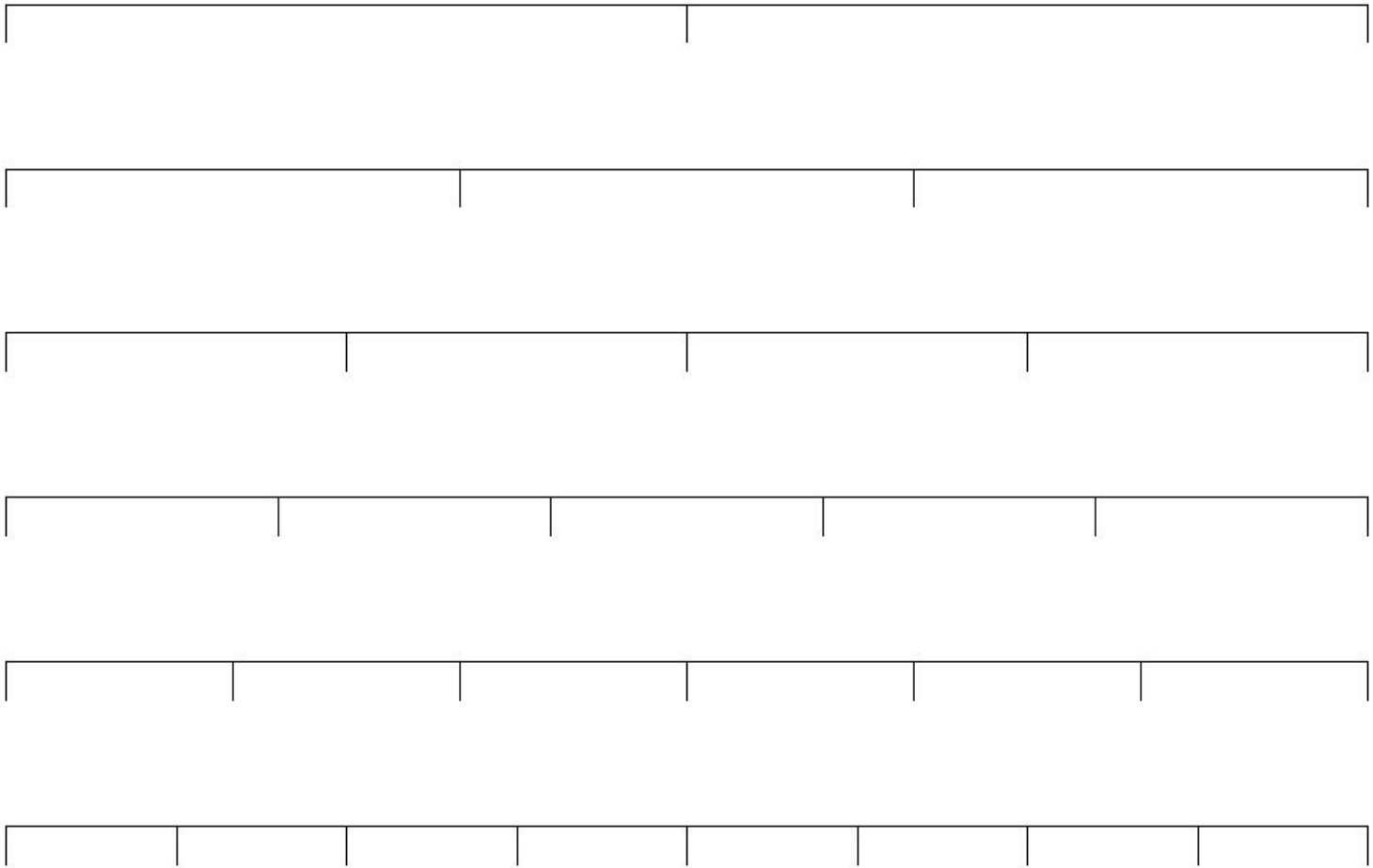

0
10¢
20¢
25¢
1/4
30¢
40¢
50¢
2/4
60¢
70¢
75¢
3/4
80¢
90¢
100¢
4/4


0
10¢
20¢
25¢
1/4
30¢
40¢

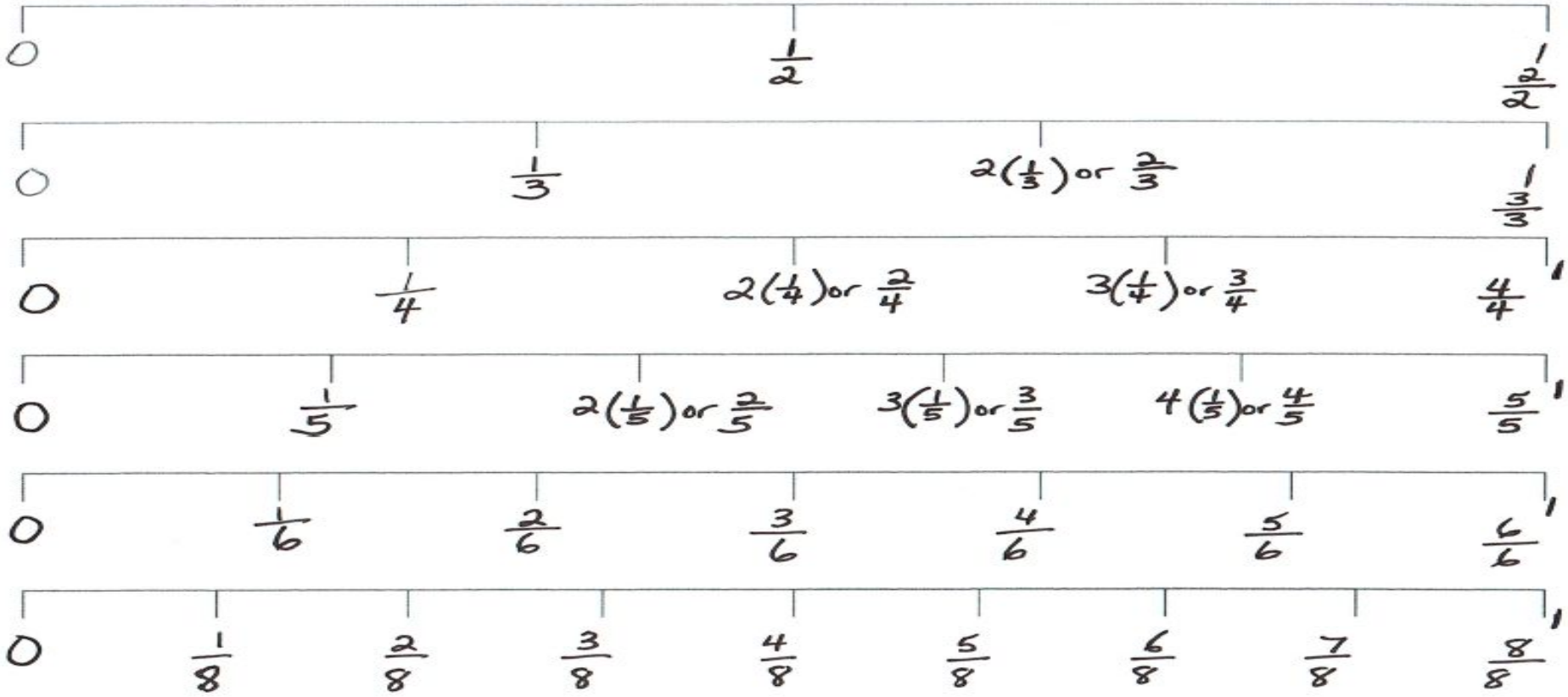

0
10¢
0.10
10/100 or 1/10
20¢
0.20
20/100 or 1/5
30¢
0.30
30/100 or 3/10
40¢
0.40
40/100 or 2/5
50¢
0.50
50/100 or 1/2
60¢
0.60
60/100 or 3/5
70¢
0.70
70/100 or 7/10
80¢
90¢
100¢
$1.00
100/100 or 1
0
5¢ 1/20
10¢ 2/20
15¢ 3/20
20¢ 4/20
25¢ 5/20
30¢ 6/20
35¢ 7/20
40¢ 8/20
45¢ 9/20
50¢ 10/20
55¢ 11/20
60 12/20
65¢ 13/20
70¢ 14/20
75¢ 15/20
80¢ 16/20
85¢ 17/20
90¢ 18/20
95¢ 19/20
100 20/20
0
10¢ 1/10
20¢ 2/10
30¢ 3/10
40¢ 4/10
50¢ 5/10
60¢ 6/10
70¢ 7/10
80¢ 8/10
90¢ 9/10
100 10/10
0
10¢
20¢
25¢ 1/4
30¢
40¢
50¢ 2/4
60¢
70¢
75¢ 3/4
80¢
90¢
100 4/4


10¢ 20¢ 30¢ 40¢ 50¢ 60¢ 70¢ 90¢
0.10 0.20 0.30 0.40 0.50 0.60 0.70 0.90
10¢ 15¢ 20¢ 25¢ 30¢ 35¢ 40¢ 45¢ 50¢ 55¢ 60¢ 65¢ 70¢ 75¢ 80¢ 85¢ 90¢
10¢ 20¢ 30¢ 40¢ 50¢ 60¢ 70¢ 80¢ 90
10¢ 20¢ 25¢ 30¢ 40¢ 50¢ 60¢ 70¢ 75¢ 80¢ 90


70¢
0.70
70/100 or 7/10
80¢
0.80
80/100 or 4/5
90
0.9
90/100 or
100¢
$1.00
100/100 or 1
70¢
14/20
75¢
15/20
80¢
16/20
85¢
17/20
90
95¢
19/20
100
20/20
70¢
7/10
80¢
8/10
90
9/10
100¢
10/10
70¢
75¢
3/4
80¢
90
100¢
4/4



Link


0
1/2
1
0
1/3
2(1/3) or 2/3
1
0
1/4
2(1/4) or 2/4
3(1/4) or 3/4
1
0
1/5
2(1/5) or 2/5
3(1/5) or 3/5
4(1/5) or 4/5
1
0
1/6
2/6
3/6
4/6
5/6
1
0
1/8
2/8
3/8
4/8
5/8
6/8
7/8
1

Compare

How does what we learned in the activity **Transfer** to the strips?

How can we use this for equivalent fractions? 4N5.1

Finding Equivalent Fractions - Teacher's Guide and support

Finding Equivalent Fractions - Powerpoint

Source: ncetm, uk.

Link

Unit Fraction

How do our multiplication tables help us see equivalent fraction patterns?

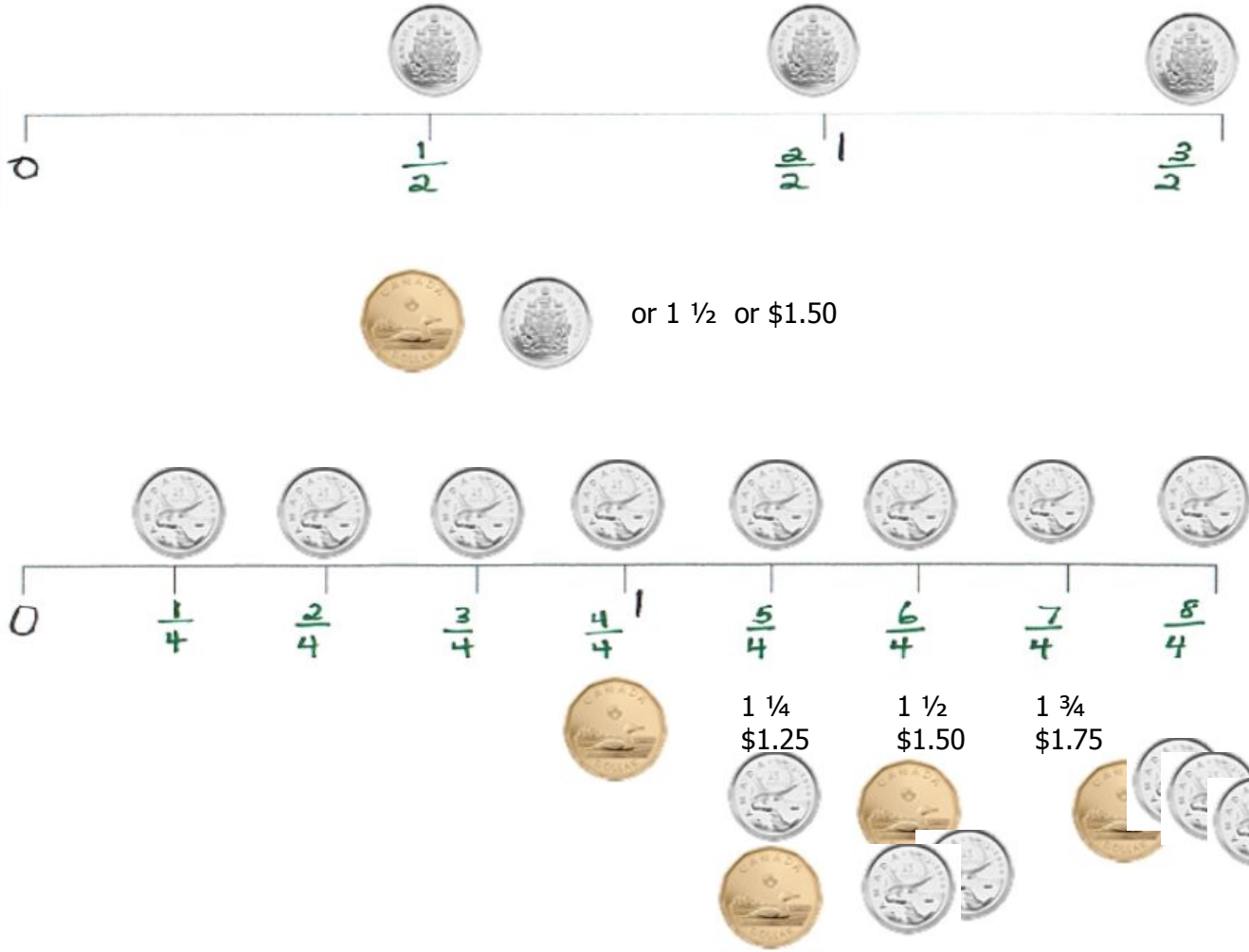
How do multiplication tables help us see ratios?

x	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

Placing Unit Fractions on a number line allows me to count by unit fractions in the same way we taught students to count by natural numbers.

Show how 5/11 can be obtained by counting by a unit fraction.

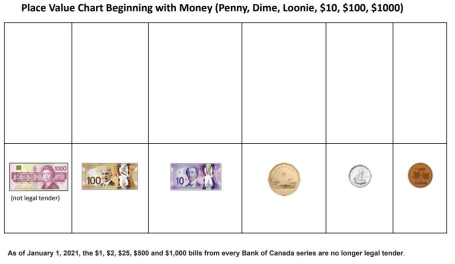
Which is greater, 3/11 or 3/4


0
1/2
2/2
1
3/2
or 1 ½ or $1.50
0
1/4
2/4
3/4
4/4
1
5/4
6/4
7/4
8/4
1 ¼
$1.25
1 ½
$1.50
1 ¾
$1.75

Money is real!

It offers our students a real world connection as a concept and as a manipulative.

How can this help us make connections for Fractions, Decimals and Percents? 4N5.2



March	April
Number: Quantity is measured with numbers that enable counting, labelling, comparing and	
4N2 Students add and subtract within 10 000, including decimal numbers to hundredths. • Standard algorithms for addition and subtraction may be used for any decimal numbers (Tie into Financial Literacy) • 4N4 Students multiply and divide natural numbers within 10 000.(facts 12 x 12) • Multiplication and division strategies can be chosen based on the nature of the numbers *this should be ongoing throughout the year	4N2 Students add and subtract within 10 000, including decimal numbers to hundredths. • Standard algorithms for addition and subtraction may be used for any decimal numbers (Tie into Financial Literacy) • 4N4 Students multiply and divide natural numbers within 10 000.(facts 12 x 12) • Multiplication and division strategies can be chosen based on the nature of the numbers *this should be ongoing throughout the year
Algebra: Equations express relationships between quantities.	
4A1.2 Students represent and apply equality in multiple ways • An equation is solved by determining an unknown value that makes the left and right sides of the equation equal.(Could revisit equality with money initially - different ways of showing the same amount)	

Should ensure that they understand dollars and cents (tenths and hundredths well) before adding and subtracting decimal numbers of varying sizes. (context and real world concept before the algorithm. It will help support the basic algorithm for addition and subtraction)



DOLLARS				CENTS	
$1000	$100	$10	$1	dimes	pennies

You need this strip and a Base 10 Money Kit

Alberta Regional Professional Development Consortia
Dedicated to the provision of professional learning opportunities at the local, regional and provincial levels

chris.zarski@arpdc.ab.ca

DOLLARS				CENTS	
$1000	$100	$10	$1	dimes	pennies

Show me $23 Below that show me $16

DOLLARS				CENTS	
$1000	$100	$10	$1	dimes	pennies

How much money all together?

DOLLARS				CENTS	
$1000	$100	$10	$1	dimes	pennies

Show me $28 Below that show me $16

DOLLARS				CENTS	
$1000	$100	$10	$1	dimes	pennies

How much money all together?

DOLLARS				CENTS	
$1000	$100	$10	$1	dimes	pennies

Do we see dollars and cents in stores written as $17 and 65 cents?

 = 10 ¢

 20 ¢ 2 dimes no cents

 = 1 ¢

 2 ¢ no dimes and 2 cents

How do we transition to a decimal?

4N6 Students interpret percentages

- Fractions, decimals, and percentages can represent the same part-whole relationship.

Tenths

Hundredths (Grids)

Money

Number Lines

Tenths - Numbers (decimals)

Hundredths - Numbers (decimals)

Tenths - Fractions

Mixed Numbers - Fractions

Percents

Tenths - Words

Hundredths - Words

How can percentages standardize part-whole relationships?

4N6 Students interpret percentages.

Knowledge	Understanding	Skills & Procedures
Percentage is represented symbolically with %. Decimals can be expressed as percentages by multiplying by 100. Percentages can be expressed as decimals by dividing by 100. One percent represents one hundredth of a whole.	Fractions, decimals, and percentages can represent the same part-whole relationship.	Investigate percentage in familiar situations. Compare percentages within 100%. Express the fraction, decimal, and percentage representations of the same part-whole relationship.

1 ¢

This is the algorithmic thinking - make sure they understand the concept of 100 and percent well

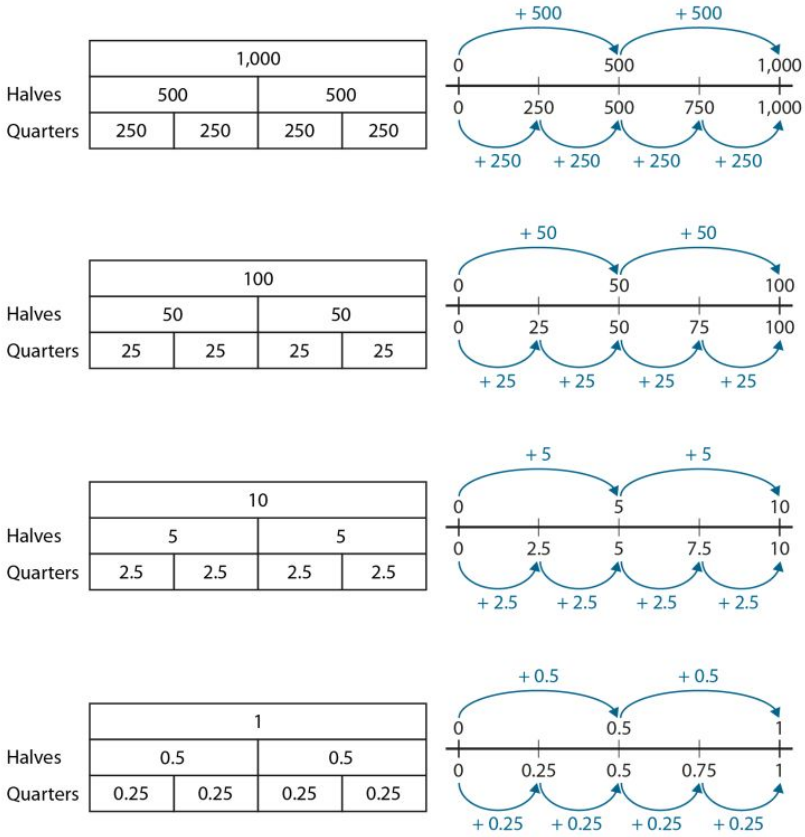
Teacher Note: The card game is for both Grades 4 & 5. Remove cards that represent values greater than 1 for Grade 4.

Source: mathies Support

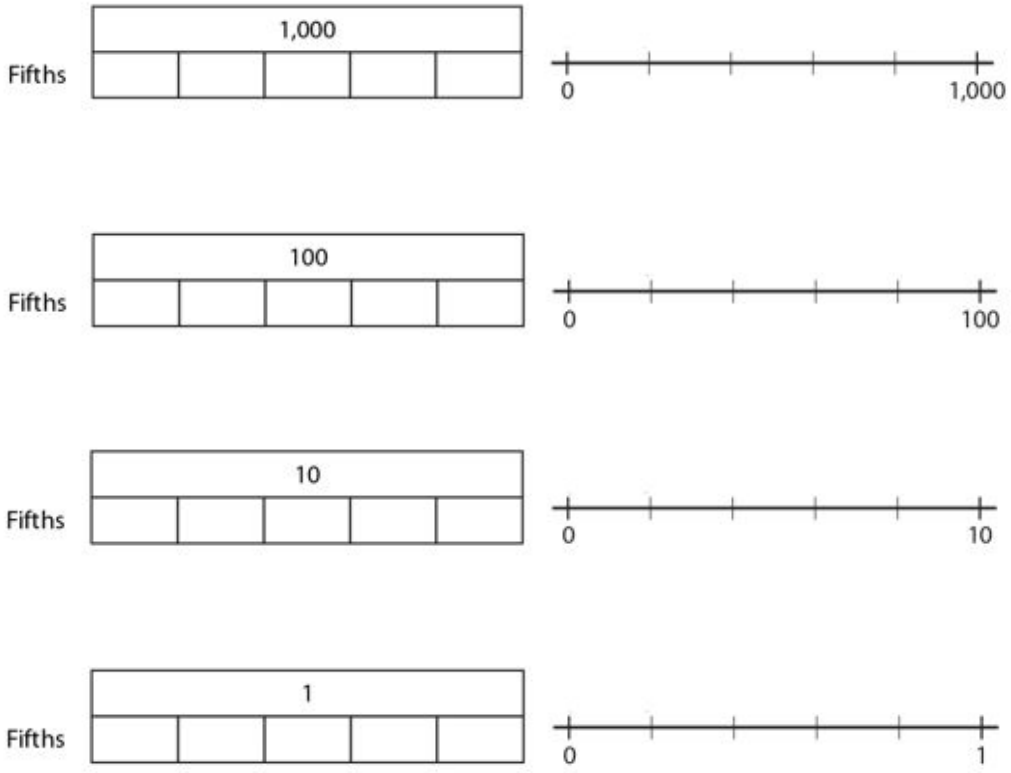
4N6

How does my knowledge of money help give this meaning?

What is the values had dollar signs?

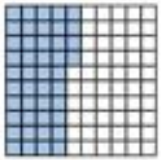
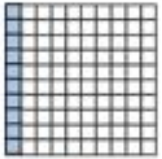
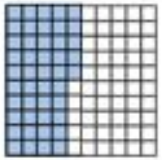
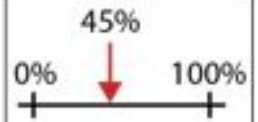
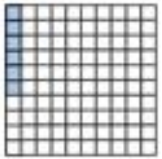


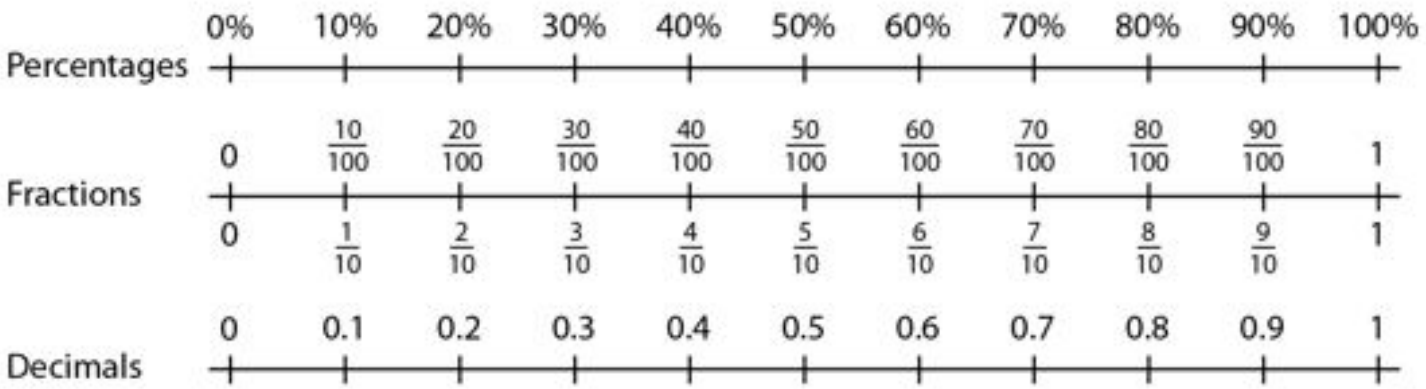
3.10 Fractions, decimals and percentages



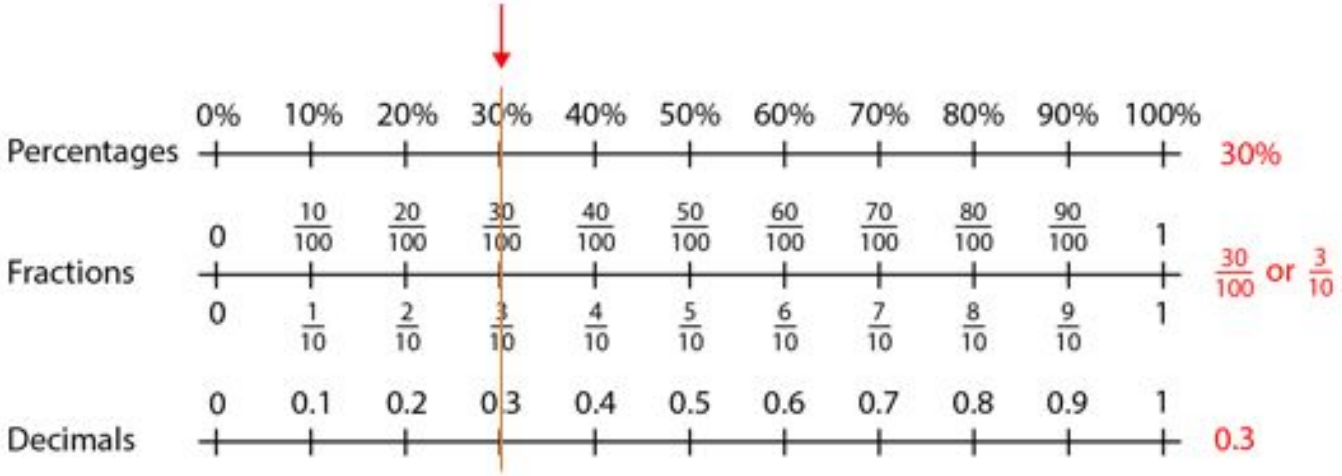
Transfer

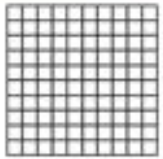
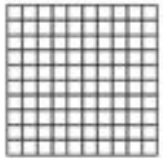
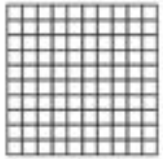
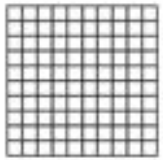
How does a money context help?

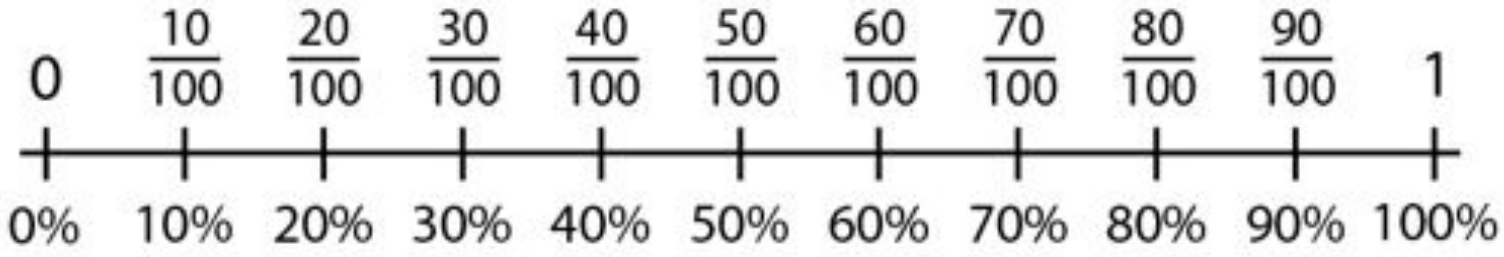
Percentage	Fraction	Hundred square	Number line
44%	$\frac{44}{100}$		
10%	$\frac{10}{100}$		
45%	$\frac{45}{100}$		
6%	$\frac{6}{100}$		



If these are dollar amounts, students make a real connection!

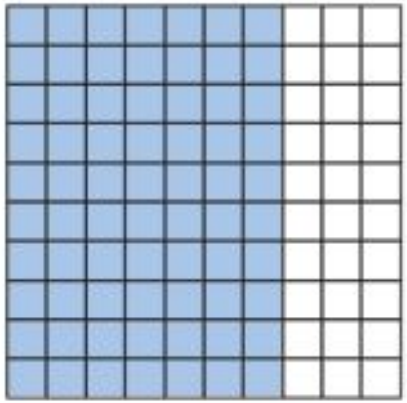


Percentage	Fraction	Hundred square	Number line	Decimal
80%	$\frac{\square}{100}$			0.80
45%	$\frac{\square}{100}$			0.45
31%	$\frac{\square}{100}$			0.31
9%	$\frac{\square}{100}$			0.09



10%	$\frac{1}{10}$	0.1	
20%	$\frac{2}{10}$	0.2	
30%	$\frac{3}{10}$	0.3	
40%	$\frac{4}{10}$	0.4	
50%	$\frac{5}{10}$	0.5	
60%	$\frac{6}{10}$	0.6	
70%	$\frac{7}{10}$	0.7	
80%	$\frac{8}{10}$	0.8	
90%	$\frac{9}{10}$	0.9	
100%	$\frac{10}{10}$	1	

70%



100 ¢ = $1.00

Part of a dime

7 ¢ out of 10 ¢

What is ~~the~~ an Algorithm?

Definition

Context is everything for students who are just learning a concept OR are LOST

Strategies for Multiplication & Division

Other forms of the “Standard Algorithm”

Resource 1

Resource 2

Measuring *time* and telling *time* are different processes. Measuring *time* is like measuring length. Time, as a measurement is about ‘duration’ (how long it takes an event from beginning to end). We can measure duration in second, minutes, hours, days, weeks years etc. so knowing a variety of tools that help us measure time is helpful. Standard clocks, stop watches and non-standard hour glass, egg timer etc. We can measure time in terms of degrees and how much of an hour/minute has elapsed.

Small, M.(2017). *Making math meaningful*. Nelson Education Ltd. p.541

Standard Units of Time

MINUTES (min)

Defining a Minute

A *minute* is equal to 60 seconds. It is also $\frac{1}{60}$ of an hour.

Minute Referents

To help students get a feel for 1 minute, a teacher might use an estimating activity. First, students watch as the teacher times 1 minute. Then they put their heads down, and they raise their hands when they think 1 minute is over.

Other activities that will help students establish personal referents include problems such as the following:

- How many times can you write your name in 1 minute?
- How many times can you clap your hands in 1 minute?
- How high can you count in 1 minute?
- How far can you go saying the letters of the alphabet in 1 minute?

HOURS (h)

Defining an Hour

An *hour* is equal to 60 minutes.

Hour Referents

To help students establish personal referents for 1 hour, a teacher might pose problems such as the following:

- What takes you about 1 hour to do?
- How far could you walk in 1 hour?

Familiar referents for 1 hour might include the amount of time students spend in math class, the length of a favourite TV show, or how long they have for lunch and recess.

SECONDS (s)

Defining a Second

A *second* is the basic SI unit of time

Second Referents

To help students establish personal referents for seconds, a teacher might pose problems such as the following:

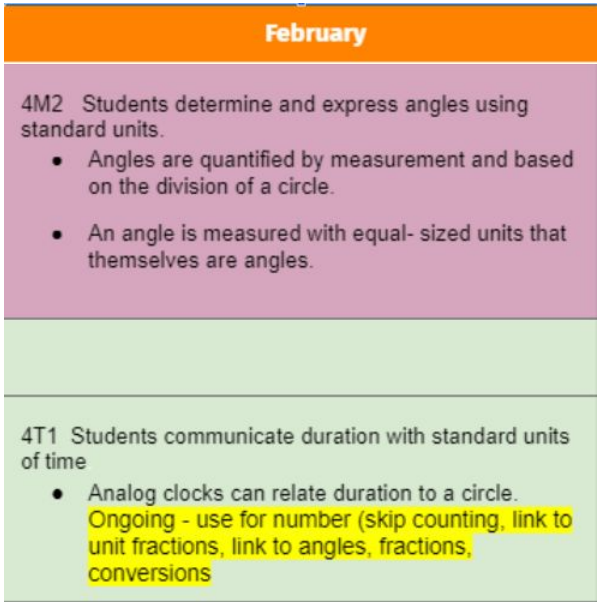
- What is something that takes about 1 second to do?
- What is something that takes about 10 seconds to do?
- How many seconds does it take you to walk 100 m? to run 100 m?

A moment of silence

"Just a minute"

"In a minute"

Small, M.(2017). *Making math meaningful.* Nelson Education Ltd. p.541



Understanding Angles

Angles - use your right angle foldable to classify the given angles.

Use clocks to start the conversation

Mathigon Clocks

Lessons - *scroll down for additional lessons*

Teaching Clock

March	April
Geometry: Shapes are defined and related by geometric attributes.	**Geometry: Shapes are defined and related by geometric attributes.**
4G1.1 Students analyze and explain geometric properties. • Geometric properties are measurable. • Geometric properties define a hierarchy for classifying shapes.	4G1.2 Students analyze and explain geometric properties. • A shape resembling a polygon that does not share the defining geometric properties of the polygon is a close approximation

Right Angle is a referent (Greater/less/equal - see Measurement Organizing Idea)

Use the regular quadrilateral (square) to show a quad has 360 degrees to also help develop the degrees in a triangle)

Mathigon

Brainingcamp

Redemption code for Brainingcamp: WINTER24

In what ways can geometric properties define space?

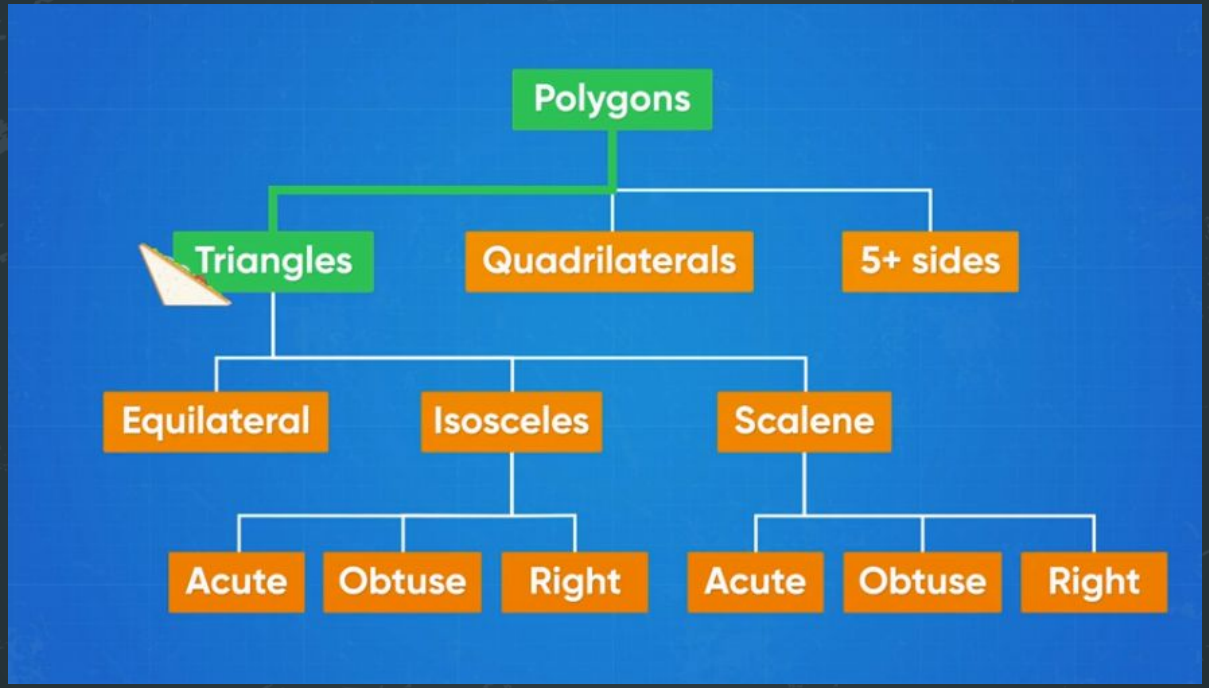
4G1.1 Students analyze and explain geometric properties.

Knowledge	Understanding	Skills & Procedures
Angle relationships, including supplementary and complementary, are geometric properties. Two angles that compose 90° are complementary angles. Two angles that compose 180° are supplementary angles. Quadrilaterals include ° squares ° rectangles ° parallelograms ° trapezoids ° rhombuses ° Side length can be used to describe triangles as ° equilateral ° isosceles ° scalene Triangles can be classified according to angle as ° right ° obtuse ° acute	Geometric properties are measurable. Geometric properties define a hierarchy for classifying shapes.	Identify relationships between the sides of a polygon, including parallel, equal length, or perpendicular, by measuring. Identify relationships between angles at vertices of a polygon, including equal, supplementary, and complementary, by measuring. Identify relationships between the faces of three-dimensional models of prisms, including parallel or perpendicular, by measuring. Describe triangles according to side length. Classify triangles as right, acute, or obtuse using geometric properties related to angles. Classify quadrilaterals in a hierarchy according to geometric properties.

What is a hierarchy?

Hierarchy of Quadrilaterals and Triangles

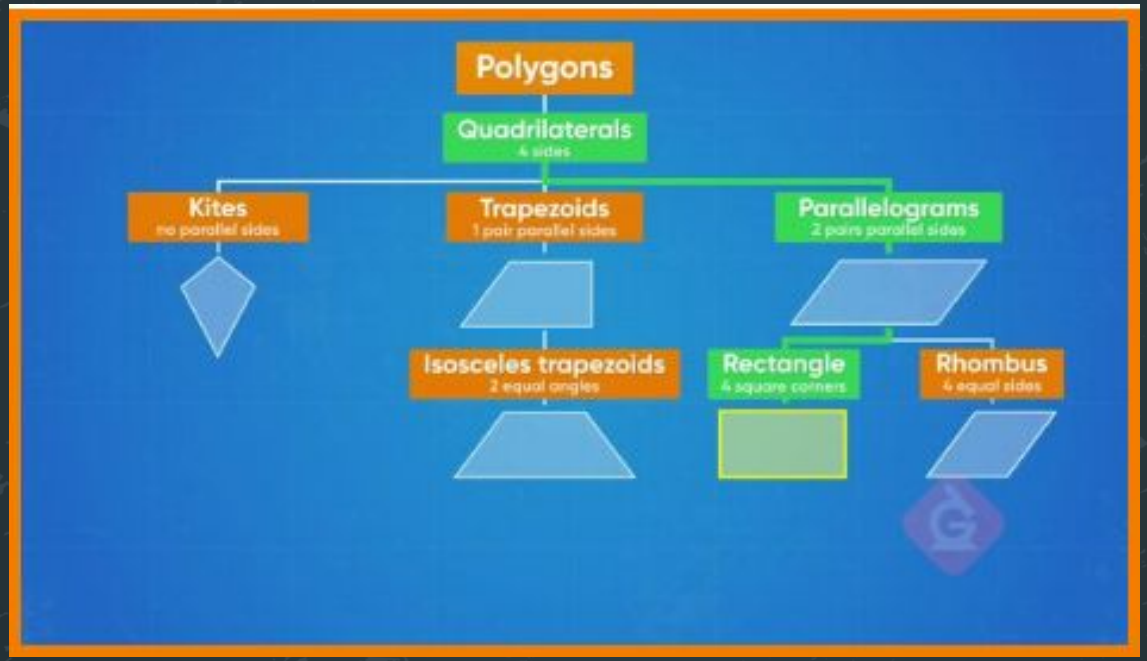
A hierarchy is a system of classification based on sets of properties that become more and more specific as you move down the hierarchy. All subgroups retain all the properties of their supergroups, so in geometry, shapes inherit the properties of the categories above them in the hierarchy.



Subscribe to https://www.generationgenius.com/videolessons/classify-shapes-in-a-hierarchy-quadrilaterals-triangles/

Hierarchy of Quadrilaterals and Triangles

A hierarchy is a system of classification based on sets of properties that become more and more specific as you move down the hierarchy. All subgroups retain all the properties of their supergroups, so in geometry, shapes inherit the properties of the categories above them in the hierarchy.



Subscribe to https://www.generationgenius.com/videolessons/classify-shapes-in-a-hierarchy-quadrilaterals-triangles/

April

Geometry: Shapes are defined and related by geometric attributes.

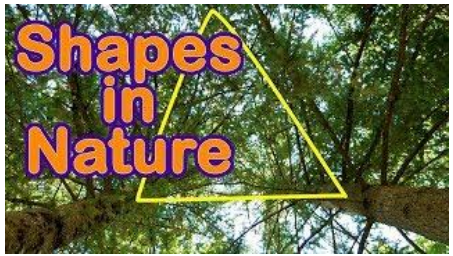
4G1.2 Students analyze and explain geometric properties.

- A shape resembling a polygon that does not share the defining geometric properties of the polygon is a close approximation

4G1.2 Students analyze and explain geometric properties.

Knowledge	Understanding	Skills & Procedures
Many shapes in the environment resemble polygons. Transformations can be used to illustrate geometric properties of a polygon.	A shape resembling a polygon that does not share the defining geometric properties of the polygon is a close approximation.	Show, using geometric properties, that a close approximation of a polygon is not the same as the polygon. Verify geometric properties of polygons by translating, rotating, or reflecting using hands-on materials or digital applications.

Pattern Blocks
Deci Blocks
Mathigon
Brainingcamp.com
Toy Theatre

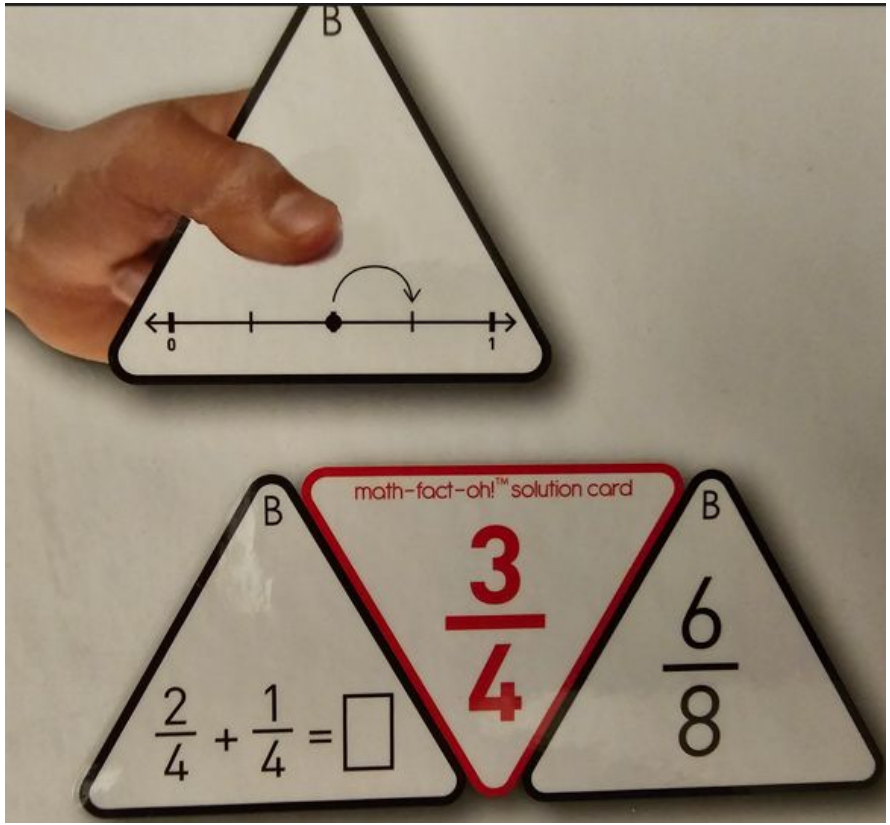


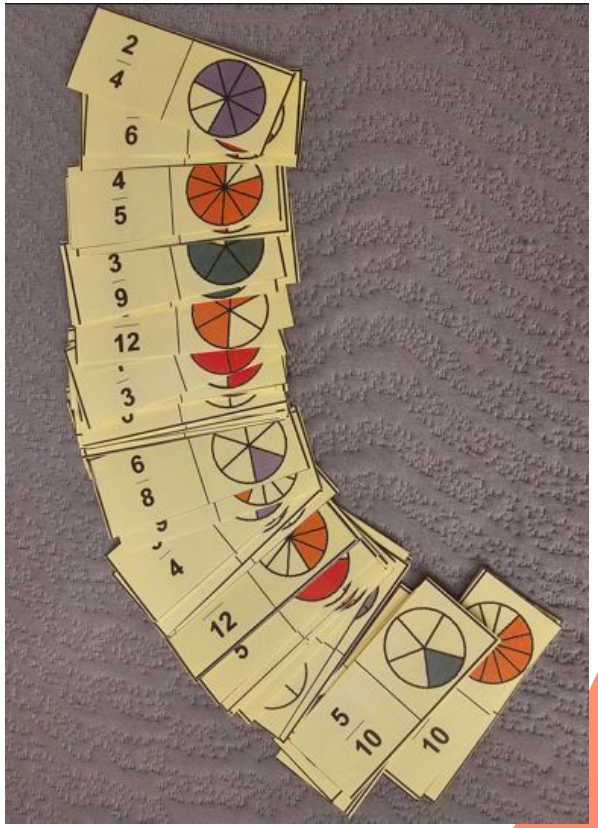
Polygons in Nature

Polygons in the Real World

Transfer question: What is the relationship between geometric properties of polygons and the Real World? Give examples and explain your thinking.

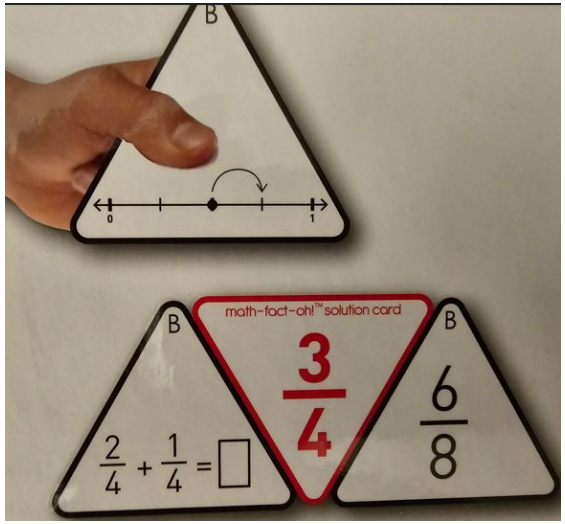
Possible Activities Available in the room



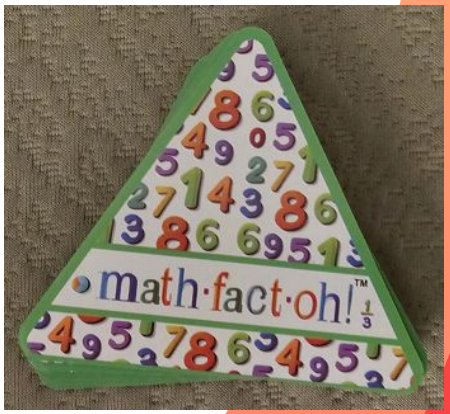


Math-Fact-O

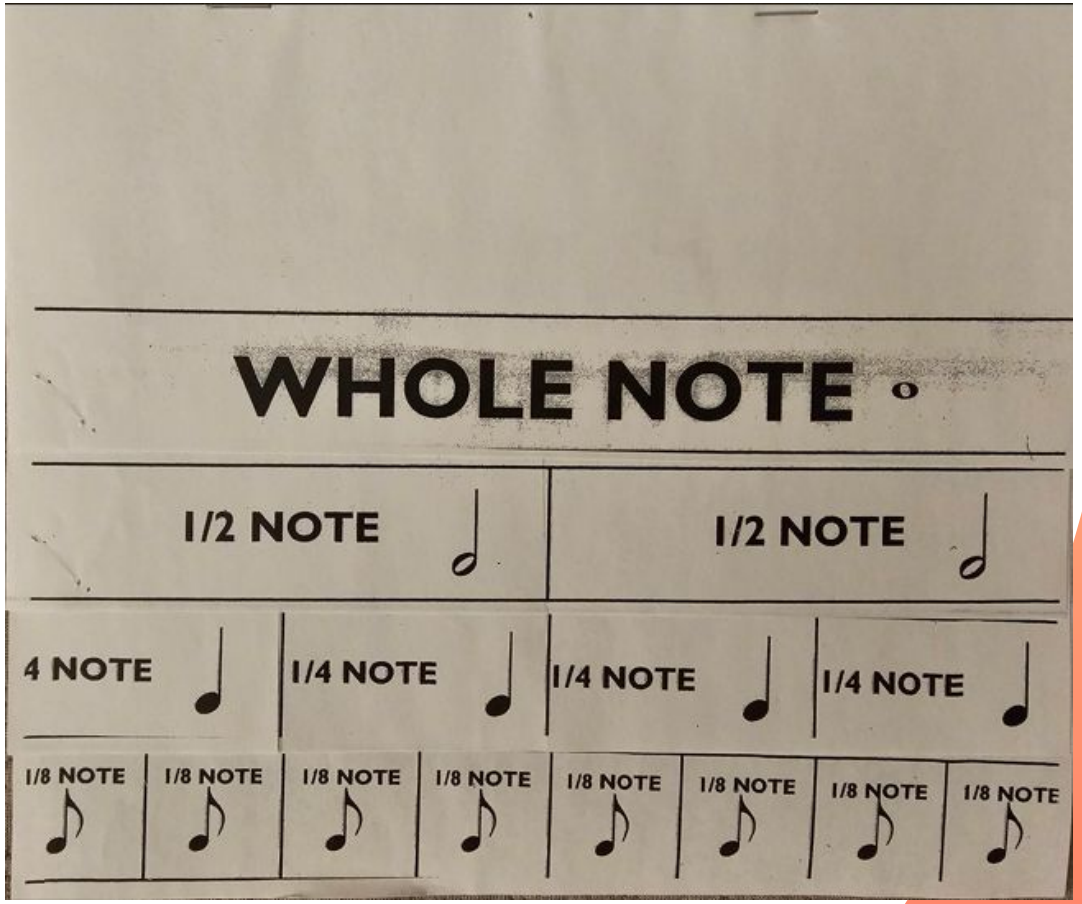

1/3
1
1/2
4/10
2/8


B
0
1
B
math-fact-oh!™ solution card
3/4
2/4 + 1/4 = □
B
6/8

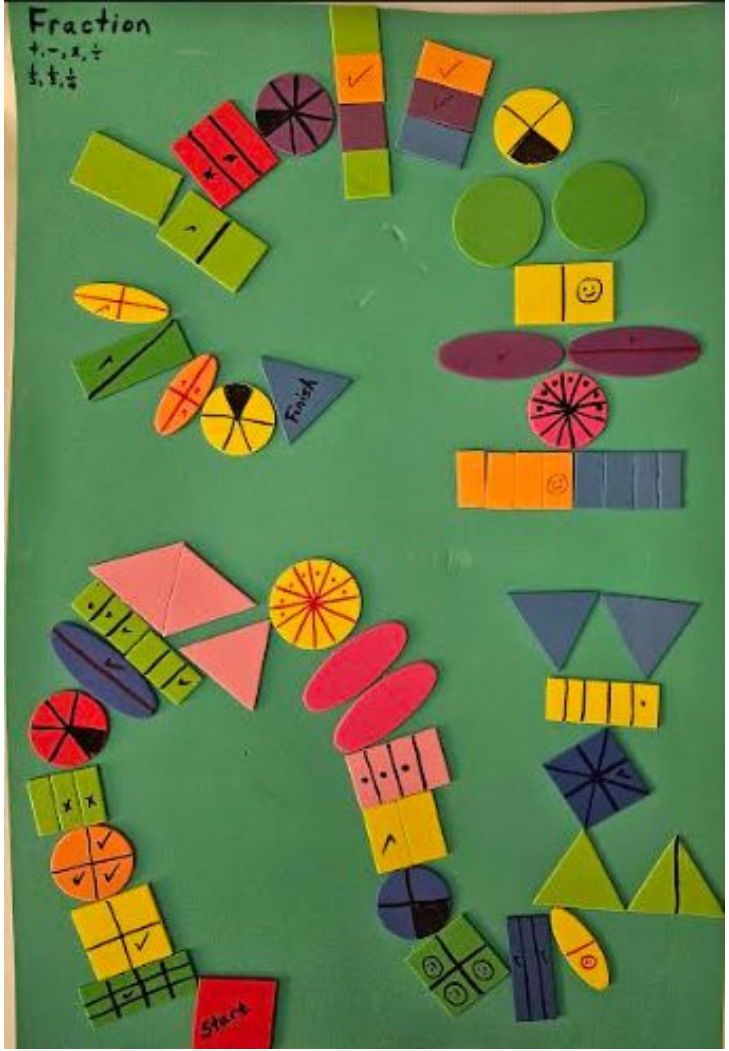

A
GAME CHANGER
pues
A
GAME CHANGER
save
A
GAME CHANGER
send

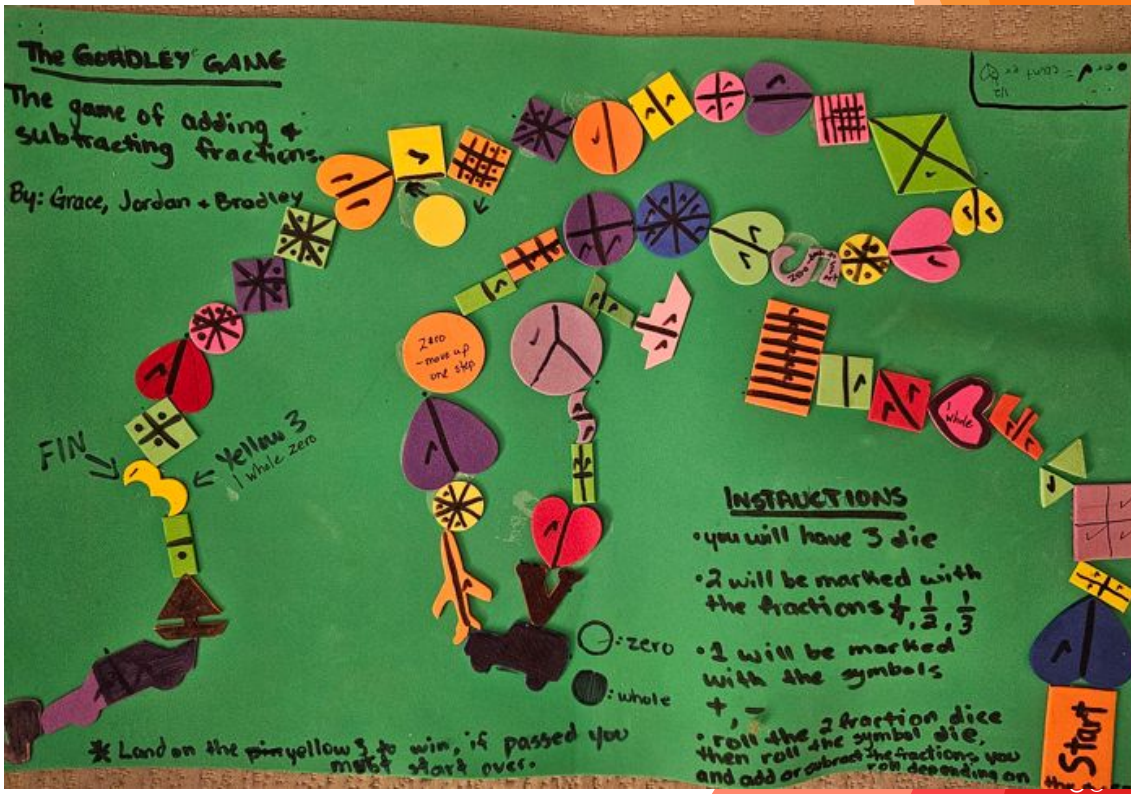

math·fact·oh!™

Foldables


WHOLE NOTE
1/2 NOTE
1/2 NOTE
4 NOTE
1/4 NOTE
1/4 NOTE
1/4 NOTE
1/8 NOTE
1/8 NOTE
1/8 NOTE
1/8 NOTE
1/8 NOTE
1/8 NOTE
1/8 NOTE
1/8 NOTE

Fraction Game Boards

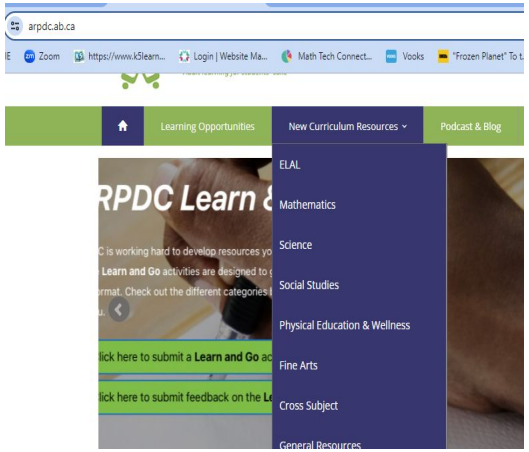




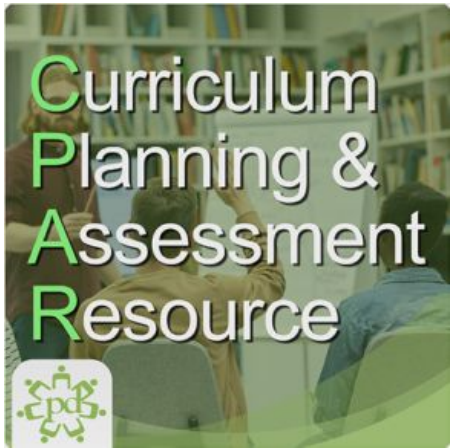
Resource Sites:

www.arpdc.ab.ca

Select Mathematics and Your Grade



CPAR Documents (in Mathematics, Science, ELAL and Computing Science)



Mathematical Verbs

K-3 Mathematics Verbs

Grades 4-6 Mathematics Verbs

Videos unpacking K-3 Mathematics

Videos Unpacking Grades 4-6 Mathematics (3 out of 5 sessions posted)

Thanks!

Any questions?

You can find Chris at:

- chris.zarski@arpdc.ab.ca
- Connect with your local consortia consultant

Presentation design

This presentation uses the following typographies:

- Titles: **Lato Bold**
- Body copy: **Lato Light**

Download for free at:

https://www.fontsquirrel.com/fonts/lato

You don't need to keep this slide in your presentation. It's only here to serve you as a design guide if you need to create new slides or download the fonts to edit the presentation in PowerPoint®

Free templates for all your presentation needs

For PowerPoint and Google Slides

100% free for personal or commercial use

Ready to use, professional and customizable

Blow your audience away with attractive visuals