Core within the Core: Algebra Readiness for All

Jan Scott, Ph.D., Scholastic
Director of Math Partnerships, South Region
jscott@scholastic.com

The Importance of Algebra

How important is algebra to a student's chance of attending college

Students who take a year of algebra and follow with a year of geometry nearly DOUBLE their chances of going to college -- by doing that alone! Students who complete Algebra II are more than twice as likely to GRADUATE from college.

Connecting Multiplication, Squares, and Square Roots

3RD Grade: Squares up to 20
4TH Grade: Area of squares and rectangles
5TH Grade: Area of squares and rectangles
7th Grade: Represent squares and square roots using geometric models.
8TH Grade: Square roots of perfect squares
9TH Grade: Positive and negative square roots
Relationship between squares and square roots
Represent squares and square roots using geometric models

1 x 5 =

2 x 5 =

3 x 5 =

4 x 5 =

5 x 5 =

$\sqrt{58} \approx$

You mean I really have to re-teach fractions??!!

New Expectations:

3RD Grade: Fractions as representations of numbers — Fractional quantities
4th Grade: Operations on fractions — Decimal concepts
5th Grade: Fraction equivalence — Operations on fractions

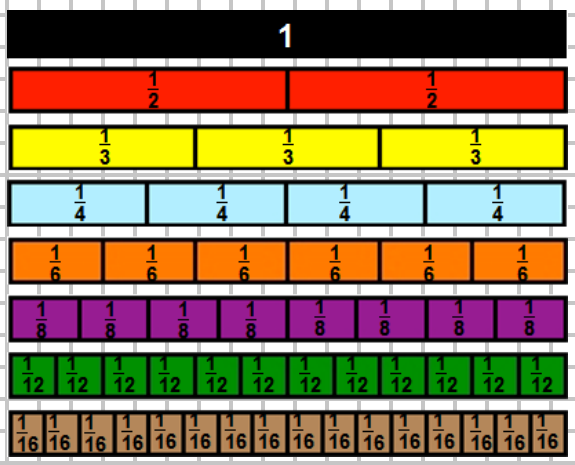
Where did the words come from:

Latin *frangere* (to break), often called “broken numbers
Fibonacci (1202) *Liber abaci* generally used *fractio and* first used the fraction bar
Robert Recorde in *Ground of Artes* (1575) "A Fraction in deede is a broken number"
IMPROPER: Robert Recorde (1542) *The ground of artes, teachyng the worke and practise of arithmetike* “An Improper Fraction...that is to saye, a fraction in forme, which in dede is greater than a Unit.”
PROPER: Samuel Jeake *Arithmetic* (1701) "Proper Fractions always have the Numerator less than the Denominator, for then the parts signified are less than a Unit . . .”
MIXED NUMBER by Robert Recorde (1542) "mixt numbers (that is whole numbers with fractions)"

Fraction Riddle:

I'm a fraction with a value less than ½ .
Both my numerator and denominator are one-digit primes.
What three fractions could I be?

Fraction Strips: Brief description of how to create your fraction strips.



Start with $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}$.

1. Label the black strip as your whole with the number 1.
2. Compare your orange strip to your whole; now fold it into two equal pieces (hamburger style); label each piece ½ and cut .
3. Compare your blue strip to your whole; now fold it into two equal pieces; fold again, now creating how many equal pieces? [4] Label each of these pieces ¼ and cut.
4. Compare your purple strip to your whole; now fold it into two equal pieces; fold again and again, now creating how many equal pieces? [8] Label each piece $\frac{1}{8}$ and cut
5. Repeat for 16ths

Now create $\frac{1}{3}, \frac{1}{6}, \frac{1}{12}$..

1. Compare your yellow strip to your whole; now Z-fold it to where each piece is equal or measure out 3 equal pieces with a ruler. Label each piece 1/3 and cut.
2. Create your $\frac{1}{3}$ pieces, then fold each in half, creating your $\frac{1}{6}$s; fold in half again to create your $\frac{1}{12}$s.

Comparing Fractions: Foundations for Computing

Strategy 1: compare unit fractions

$\frac{1}{8}$ $\frac{1}{3}$

Strategy 2: compare fractions with common numerators

$\frac{3}{12}$ $\frac{3}{8}$

Strategy 3: compare fractions with common denominators

$\frac{7}{16}$ $\frac{11}{16}$

Strategy 4: compare fractions one unit fraction from 1 whole

$\frac{7}{8}$ $\frac{5}{6}$

Strategy 5: compare fractions to ½

$\frac{3}{8}$ $\frac{5}{16}$

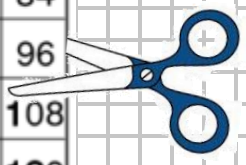
Strategy 6: change fractions to equivalent fractions

$\frac{3}{4}$ $\frac{5}{6}$

Fraction Families on a Multiplication Chart

After filling out the multiplication chart, cut each row into strips.

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



	1	2	3	4	5	6	7	8	9	10	11	12
2												
5												

Why does this work?

Operations of Fractions

Foundations for Computing: Applying Big Ideas to Fractions

- 1 is the organizer of fractions
- Fractions can be composed and decomposed

Ready to Compute

$$8 + 4 =$$

$$\frac{4}{5} + \frac{3}{5} =$$

Addition:

$$1\frac{5}{8} + \frac{1}{2} =$$

Subtraction:

$$1\frac{2}{3} - \frac{5}{12} =$$

Multiplication:

1x5 =

2x5 =

3x5 =

4x5 =

5x5 =

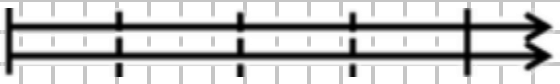
What is ½ x 5?

Division:

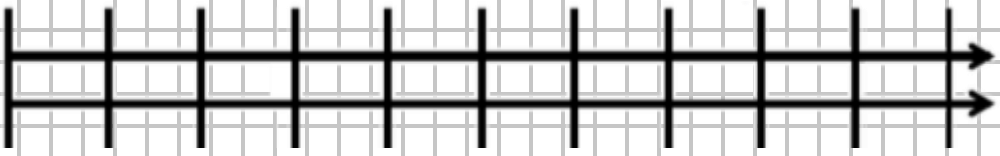
What we should be saying is “dividing by a number is equivalent to multiplying by its reciprocal.”

Solving Problems with a Double Number Line

On a bicycle you can travel 20 miles in 4 hours. What are the unit rates in this situation?



When the entire 6th grade of 240 students was polled, results showed that 96 students were dissatisfied with the music at a dance. What percentage of the 6th grade does this represent?



Andrew was given an allowance of $20. He used 75% of his allowance to go to the movies. How much money was spent at the movies?

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Fabulous Fours

Can you make all the prime numbers less than 100 with 6 fours and these symbols?

4 4 4 4 4 4
+ − × ÷ ( ) ! √

2 =	17 =	41 =	67 =
3 =	19 =	43 =	71 =
5 =	23 =	47 =	73 =
7 =	29 =	53 =	79 =
11 =	31 =	59 =	83 =
13 =	37 =	61 =	89 =
			97 =

Use these six 4s

4	4	4	4	4	4

and any of these symbols

+	−	×	÷	(	)	!	√
+	−	×	÷	(	)	!	√
+	−	×	÷	(	)	!	√