Math Night

Fourth Grade and Fifth Grade

Fluency brochures

- Provided by Howard County Public School System
- Provides parents an insight of what strategies their children will learn during the school year

Fluency Brochure – Fourth Grade

Addition: Partial Sums

Many times it is easier to break apart addends. Often it makes sense to break them apart by their place value. Consider 248 + 345

248 = 200 + 40 + 8
345 = 300 + 40 + 5
500 + 80 + 13 = 593

Sometimes we might use partial sums in different ways to make an easier problem. Consider 484 + 276

484 = 400 + 84
276 = 260 + 16
660 + 100 = 760

Addition: Adjusting

We can adjust addends to make them easier to work with. We can adjust by giving a value from one addend to another.

Consider 326 + 274. We can take 1 from 326 and give it to 274.

326 + 274
-1 +1
More Friendly Problem → 325 + 275 = 600

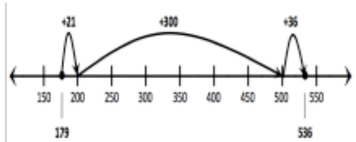
Consider 173 + 389. We can take 27 from 389 and give it to 173 to make 200.

173 + 389
+ 27 -27
More Friendly Problem → 200 + 362 = 562

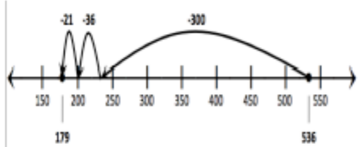
Subtraction: Count Up or Count Back

When subtracting, we can count back to find the difference of two numbers. In many situations, it is easier to count up.

Consider 536 – 179



We can count up from one number to the other. The difference is 300 + 21 + 36 or 357. (above)



We can count back from one number to the other. The difference is -300 (land at 236), -36 (land at 200), – 21 (end at 179).

Subtraction: Adjusting

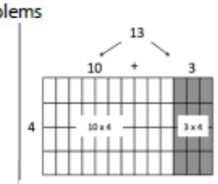
We can use "friendlier numbers" to solve problems. 4,000 – 563 can be challenging to regroup. But the difference between these numbers is the same as the difference between 3,999 – 562. Now, we don't need to regroup.

(Original problem) **4,000** - **563** =
(Compensation) - 1 - 1
3,999 - 562 = 3,437

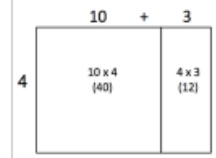
Multiplication: Area/Array

The area/array model for multiplication and the distributive property are used to solve multiplication problems

13 x 4 =
(10 x 4) + (3 x 4) =
40 + 12 =
52

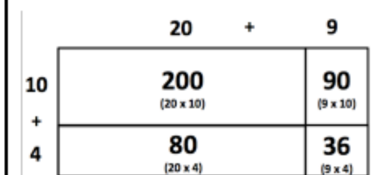


This is the same model without grid lines. It is considered an "open model."



40 + 12 = 52

The open model also works well with 2 or 3-digit factors. This supports development of algorithms later, as well as mental mathematics. Consider 29 x 14



200 + 90 + 80 + 36 = 406 So, 29 x 14 = 406

Multiplication: Multiples of 10

Understanding why we "add zeros."

3 x 6 = 18
3 x 6 tens = 18 tens
3 x 60 = 180

20 x 40 =
(2 x 10) x (4 x 10) =
2 x 4 x 10 x 10 =
8 x 100 = 800

FLUENCY BROCHURE – FOURTH GRADE

Multiplication: Partial Products

Students move from area/array models (other side) to working with numbers.

Consider 26 x 45, we can break apart each factor by its place value.

26 = (20 + 6)
45 = (40 + 5)

We can then multiply each of the "parts" and add them back together.

(20 x 40) + (20 x 5) + (40 x 6) + (6 x 5)
800 + 100 + 240 + 30
900 + 240 + 30
1,140 + 30
1,170

So, 26 x 45 = 1,170

It might seem like a lot of numbers above. But, when we think about it, the multiplication is quite simple. This understanding develops mental math, the traditional algorithm, and algebraic concepts including factoring polynomials.

Sometimes, it makes sense to work with different parts. Consider 51 x 21. We might think of 21 as 10 + 10 + 1:

(51 x 10) + (51 x 10) + (51 x 1)
510 + 510 + 51
1,020 + 51
1,071

So, 51 x 21 = 1,071

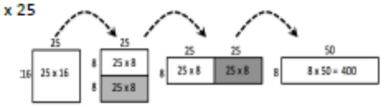
Another example, consider 4 x 327. We can break 327 into (300 + 20 + 7) then multiply.

4 x 300 = 1,200
4 x 20 = 80
+ 4 x 7 = 28
1,308

So, 4 x 327 = 1,308

Doubling and Halving

There are many strategies we can take advantage of so that computation is efficient. Doubling and halving is an example. When multiplying, we can double one factor and halve the other. The product is unchanged. This makes some numbers easier to work with. Consider 16 x 25



The image shows that we can halve 16 (8 + 8) and then double 25. So, 16 x 25 is the same as 8 x 50.

Division

4th grade students are beginning to develop an understanding of division with larger numbers. One approach is to take groups of numbers, usually "friendly numbers" out.

Consider this:
We have 252 buttons to put in 4 boxes. How many buttons can we put in each box? (252 ÷ 4)

We can put 50 in each box (4 x 50) = 200
We can put 10 in each box (4 x 10) = 40
We can put 3 in each box (4 x 3) = 12
63 252

So, we can put 63 buttons in each box.
252 ÷ 4 = 63

Another approach is to break apart the dividend into "friendly numbers." Consider 252 ÷ 4. We could break 252 into (240 + 12) and divide each by 4.

240 ÷ 4 = 60
12 ÷ 4 = 3
60 + 3 = 63
So, 252 ÷ 4 = 63

Fluency Brochure – Fifth Grade

Addition: Partial Sums

Many times it is easier to break apart addends. Often it makes sense to break them apart by their place value. Consider 248 + 345

248 = 200 + 40 + 8
345 = 300 + 40 + 5
500 + 80 + 13 = 593

Sometimes we might use partial sums in different ways to make an easier problem. Consider 484 + 276

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We can adjust addends to make them easier to work with. We can adjust by giving a value from one addend to another. Consider 326 + 274. We can take 1 from 326 and give it to 274.

326 + 274
-1 +1
More Friendly Problem → 325 + 275 = 600

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173 + 389
+ 27 -27
More Friendly Problem → 200 + 362 = 562

Addition: Traditional Algorithm

This algorithm is useful for adding large numbers. We add place values and regroup when needed.

1 1
13,089
+ 4,684
17,773

Subtraction: Count Up or Count Back

When subtracting, we can count back to find the difference of 2 numbers. In many situations, it is easier to count up. Consider 536 – 179.

Counting Up

179 + 21 = 200
200 + 300 = 500
500 + 36 = **536**

The total of our **counting up** is 357.
So, 536 – 179 = 357

Counting Back

536 - 36 = 500
500 - 300 = 200
200 - 21 = **179**
(-) 357

The total of our **counting back** is 357.
So, 536 – 179 = 357

Subtraction: Adjusting

We can use "friendlier numbers" to solve problems. 4,000 – 563 can be challenging to regroup. But the difference between these numbers is the same as the difference between 3,999 – 562. Now, we don't need to regroup.

(Original problem) **4,000** - **563** =
(Compensation) - 1 - 1
3,999 - 562 = 3,437

Subtraction: Traditional Algorithm

This algorithm is useful for subtracting large numbers. We regroup when necessary.

8 1
14,290
- 3,236
11,054

Multiplication: Partial Products

Students move from area/array models to working with numbers.

Consider 26 x 45, we can break apart each factor by its place value.

26 = (20 + 6)
45 = (40 + 5)

We can then multiply each of the "parts" and add them back together.

(20 x 40) + (20 x 5) + (40 x 6) + (6 x 5)
800 + 100 + 240 + 30
900 + 240 + 30
1,140 + 30
1,170

So, 26 x 45 = 1,170

It might seem like a lot of numbers above. But, when we think about it, the multiplication is quite simple. This understanding develops mental math, the traditional algorithm, and algebraic concepts including factoring polynomials.

Sometimes, it makes sense to work with different parts. Consider 51 x 21. We might think of 21 as 10 + 10 + 1:

(51 x 10) + (51 x 10) + (51 x 1)
510 + 510 + 51
1,020 + 51
1,071

So, 51 x 21 = 1,071

Another example, consider 4 x 327. We can break 327 into (300 + 20 + 7) then multiply.

4 x 300 = 1,200
4 x 20 = 80
+ 4 x 7 = 28
1,308

So, 4 x 327 = 1,308

Fluency Brochure – Fifth Grade

Multiplication: Partial Products Algorithm

In this algorithm, we break apart the numbers by place value to find parts of the product. We add them back together to get the final product. This algorithm begins in the ones place.

```
     48
   x 32
     16  ←—— (2 x 8)
     80  ←—— (2 x 40)
    240  ←—— (30 x 8)
 + 1200  ←—— (30 x 40)
  1,536
```

Multiplication: Partial Products Algorithm

In this algorithm, we break apart the numbers by place value to find parts of the product. We add them back together to get the final product. This algorithm begins in the tens place.

```
     48
   x 32
   1200  ←—— (40 x 30)
    240  ←—— (30 x 8)
     80  ←—— (40 x 2)
   + 16  ←—— (8 x 2)
  1,536
```

Multiplication: Traditional Algorithm

This is a digit-based algorithm. It is useful for multiplying large numbers. We begin in the ones place and proceed to multiply each digit. We combine products of each place value.

```
     48
   x 32
     96 ←—— (2 x 8) + (2 x 40)
 + 1440 ←—— (30 x 8) + (30 x 40)
  1,536
```

Division*

5th grade students continue to develop an understanding of division with larger numbers. One approach is to take groups of numbers, usually "friendly numbers" out.

Consider this:
We have 252 buttons to put in 4 boxes. How many buttons can we put in each box? (252 ÷ 4)

```
We can put 50 in each box (4 x 50) = 200
We can put 10 in each box (4 x 10) =  40
We can put  3 in each box  (4 x 3) =  12
            63                       252
```

So, we can put 63 buttons in each box.
252 ÷ 4 = 63

Another approach is to break apart the dividend into "friendly numbers." Consider 252 ÷ 4. We could break 252 into (240 + 12) and divide each by 4.

240 ÷ 4 = 60   60 + 3 = 63
12 ÷ 4 = 3   So, 252 ÷ 4 = 63

We may also consider Think Multiplication to work with division. Consider 932 ÷ 45.

We can think of "What times 45 equals 932?"

We might think 45 x 10 = 450, so...
45 x 20 = 900

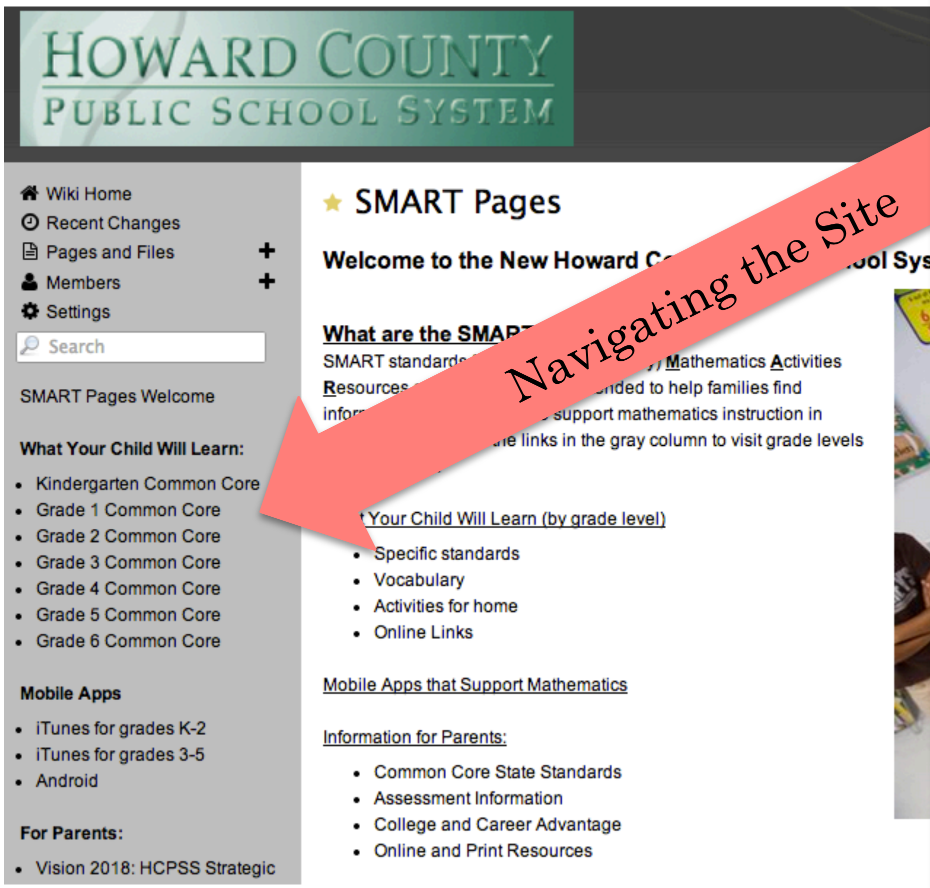
20 groups of 45 is 900. We have 32 leftover but that is not enough for another group.

932 ÷ 45 = 20 with 32 leftover.

* The long division algorithm is introduced in grade 6 after students develop deep understanding of grouping and division.

HCPSS - SMART PAGES

http://smart.wikispaces.hcpss.org



Navigating the Site

What Your Child Will Learn

- skills/concepts taught
- vocabulary
- activities at home
- links for games

Resources for Parents

- Information about Common Core
- Books

LearnZillion

- Provides teachers, parents and students a free and growing set of Math and English Language resources, for grades 2-12,

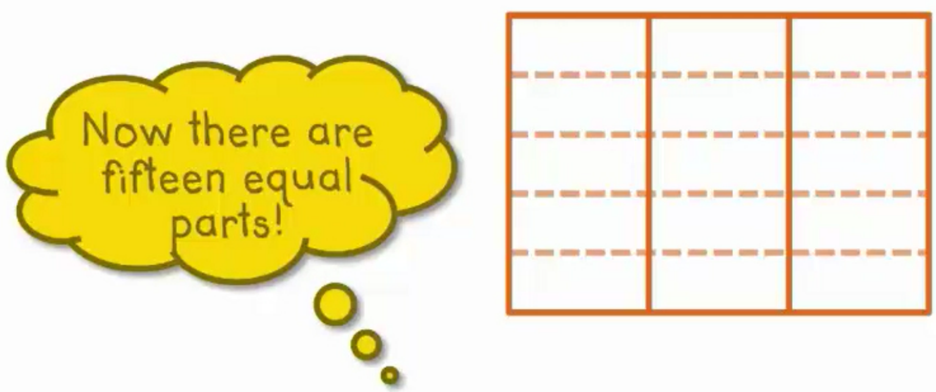
- Tools are developed by expert teachers directly from the Common Core State Standards.

- Free Educational Resource

LearnZillion

Core Lesson

In order to find a common denominator, Ben decides to divide one area model into both thirds and fifths.



LEARNZILLION

Math Activities

Fun and Easy games with a Deck of Cards

- 2-card Multiplication Battle
- 3-card Multiplication Battle
- 2-card Fraction Battle
- Hit the Target
- I Spy Products

Math Activities

Fun and Easy games with a pair of Dice

- Snake Eyes
- Block out (just need graph paper)
- Fraction Battle
- Stepping Stones
  - Addition
  - Multiplication
  - Fractions