

Routines + Great Questions + Small

Number Sense





Welcome!

My name is Alison Mello.

I am the K-8 Math/Science Curriculum Director in
Foxborough, MA (home of the NE Patriots)

I am also a math consultant, doctoral student,
and serve on the Board of ATMIM and
MassMATE.

GOALS FOR OUR SESSION:

- Learn a variety of routines that help to develop number sense
- Discover the importance of language and attending to precision
 - Realize that small changes to your practice can yield HUGE returns in student learning!



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Number Sense

Number Sense is memorization and practice. The secret to getting good at number sense is to learn how to recognize and then do the rules accurately . Then learn how to do them quickly. Every practice should be under a time limit.

WHAT IS NUMBER SENSE?

What do you think of this definition found online?

True or False?

Discuss what you think at your tables and share your thoughts in 3 minutes.



NUMBER SENSE IS

A person's general understanding of number and operations along with the ability to use this understanding in flexible ways to make mathematical judgements and to develop useful strategies for solving complex problems.

(Burton, 1993; Reys, 1991)



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A cartoon illustration of a female teacher with brown hair in a ponytail, wearing a black suit with a white collar. She is standing in a classroom, pointing her right index finger upwards. A large white speech bubble originates from her mouth, containing the text "SO WHAT DOES THAT LOOK LIKE?". The classroom background includes several yellow desks and chairs, a window with blue blinds, a brown desk with a stack of books, and a green chalkboard on the right wall.

SO WHAT DOES
THAT LOOK
LIKE?

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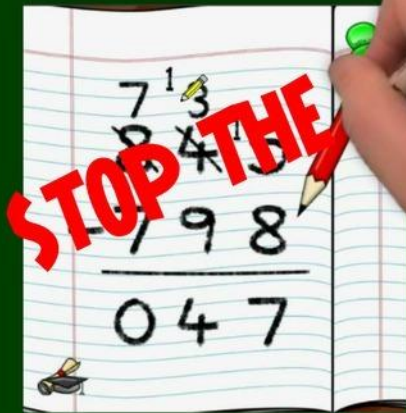
GRADE 3

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...ight?

...o)

Imagin



What could this look like instead?



What if students used the fact that there is an 800 hiding in the 845?
How would that make this problem easily done using mental math?

What if students thought about jumping on a number line?
How could that help? Would it make more sense than crossing out?






LET'S TAKE A LOOK...

$$845 = 800 + 45$$

$$\begin{array}{r} - 798 \\ \hline \end{array}$$

2


$$2 + 45 = 47$$



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OR.....

$$\begin{array}{r} \text{+2} \\ \text{-----} \\ 798 \quad 800 \qquad \qquad \qquad 845 \end{array}$$

+45



A cartoon illustration of a female teacher with brown hair in a ponytail, wearing a black suit with a white collar. She is smiling and pointing her right index finger towards a large white speech bubble. The speech bubble contains the text "SO HOW CAN WE GET KIDS THINKING THIS WAY?". The background is a classroom with several yellow desks and chairs, a window with blinds, a brown desk with a stack of books, and a green chalkboard.

SO HOW CAN WE
GET KIDS
THINKING THIS
WAY?

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USE DAILY ROUTINES THAT
GET THEM THINKING
FLEXIBLY, TALKING ABOUT



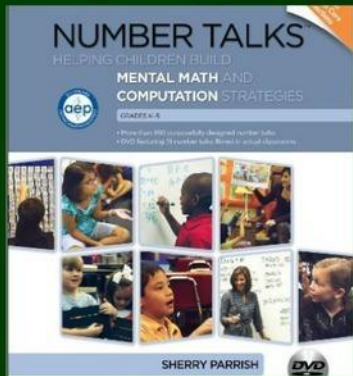
USE DAILY ROUTINES THAT
GET THEM THINKING
FLEXIBLY THINKING ABOUT
MATH MAKE THEIR



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BEST BANG FOR YOUR BUCK: NUMBER TALKS



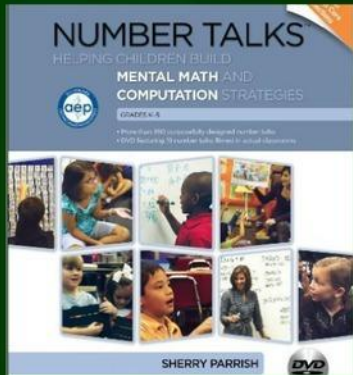
FINGERS PLEASE...



On a scale of 1-5, how familiar
are you with Number Talks?

1 = no experience
5 = expert

BEST BANG FOR YOUR BUCK: NUMBER TALKS



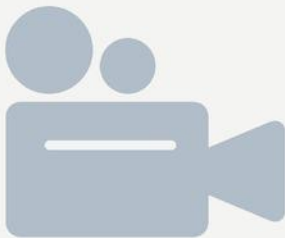
FINGERS PLEASE...



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NUMBER TALKS IN ACTION...



OTHER AMAZING ROUTINES:

- Count around the room
- Disappearing Dan
- Eliminate One
- True or False?
- Math Aerobics PV/ Fraction Aerobics
- Number Line Detective
- Tell Me All You Know
- Today's Number
- Figure it Out! (who can sit?)
- I Was Walking Down the Hall...
- Plates (aka What's My Number)
- Guess My Rule



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A cartoon illustration of a female teacher with brown hair in a ponytail, wearing a black suit with a white collar. She is smiling and pointing her right index finger upwards. A large white speech bubble originates from her hand, containing the text 'SO..WHAT ELSE CAN WE DO TO PROMOTE NUMBER SENSE?'. The background is a classroom with several yellow desks and chairs, a window with blinds, a brown desk with books, and a green chalkboard.

SO..WHAT ELSE
CAN WE DO TO
PROMOTE
NUMBER
SENSE?

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ATTEND TO PRECISION!!

Consider this scenario....

If students were adding the following:

$$\begin{array}{r} 765 \\ + 177 \\ \hline \end{array}$$

What words would they use to explain their process?

THERE WERE 3 DIFFERENT
7'S IN THAT PROBLEM

DO THEY ALL MEAN THE
SAME THING???

A cartoon illustration of a female teacher with brown hair in a ponytail, wearing a black suit with a white collar. She is standing in a classroom with yellow desks and a green chalkboard. She is pointing her right hand towards a large white speech bubble that contains text. The background includes a window with blinds and a brown podium.

WE HAVE TO
HIGHLIGHT THE
DIFFERENCE
BETWEEN DIGITS
AND NUMBERS

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Three small changes that yield
BIG results!

#1: CONTEXT

Make problems REAL with authentic
CONTEXTS!!!! If we want students to
think, we need to give them
something interesting to think about!!

(see handout for samples)



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TRY THIS....

7 divided by $1/2$





what if I had asked how many half
days were in a week?

Did you or any of your colleagues
change your answer?

Does having a context make you more
confident in the reasonableness of
your solution?



LET'S TRY IT...

Imagine that you walk into the faculty room after school with your two closest colleagues.

There is a beautiful brownie on the table and you all agree to split it (because you deserve it!!).

Right after you cut it into 3 equal pieces, your principal comes in. Clearly she wants some but insists that you all must have some too (meaning that one of you cannot simply give up your piece)

How can you split the brownie equally amongst the 4 of you when you have already cut it in 3 pieces?

What tools could you use to model this?



A FEW MORE....



Bianca's chocolate dilemma
PAYDAY



Small changes that yield BIG results!

#2: MODELS

Make problems ACCESSIBLE with a variety of math models!!!!

Never underestimate the power of the open number line, bar models, or manipulatives such as paper folding, money, or fraction pieces.



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BEHOLD THE POWER OF THE MATHEMATICAL MODEL!

Elapsed time??
NO PROBLEM!

Fractions in a word problem?
PIECE OF CAKE!



Small changes that yield BIG results!

#3: GOOD QUESTIONS

Make THINKING VISIBLE by asking as many questions as possible. If we want kids to be THINKERS instead of just answer getters, then we have to ask them to EXPLAIN THEIR THINKING!!!



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SAMPLE QUESTIONS...

Do you agree? Why? Why not?

How did you solve?

Is there another way?

Could you both be right?

Can you make a model to show your thinking?

Is that always true?

Is there a more efficient strategy?



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IT'S ALL
ABOUT
THE 3 E'S...

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Let's focus on helping
students to discover
methods that are:

EFFICIENT
EFFECTIVE



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Let's focus on helping
students to discover
methods that are:

EFFICIENT
EFFECTIVE
EASY



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