

## Number Sense and Reasoning Routines to Jumpstart Math(3-8)



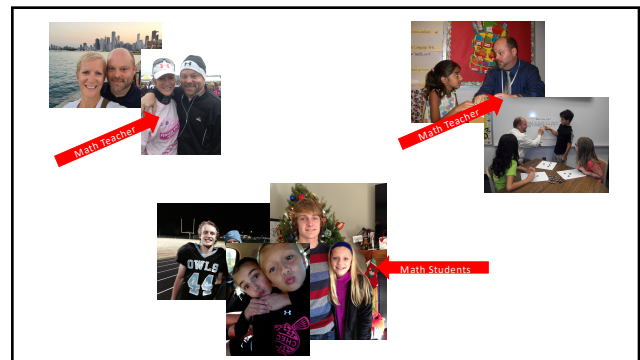
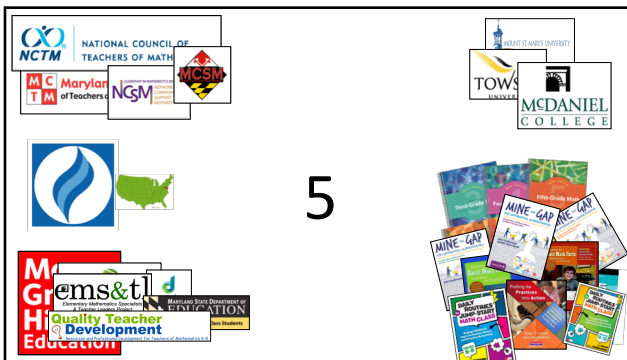
John SanGiovanni  
john.sangiovannis@gmail.com

@JohnSanGiovanni



## Share with a Colleague

What is your favorite number?  
Why is it your favorite number?



## Rethinking What I (We) **HAVE** to DO

- Hijacked lessons
- Loss of instructional time
- Setting the “wrong” tone for lessons
- Missed opportunities for thinking and reasoning



www.tinyurl.com/howardcountymath



Daily Routines to Jumpstart Math Class K-5 (Corwin, 2019)  
Daily Routines to Jumpstart Math Class 6-8 (Corwin, 2018)

## About the Day

- Identify the value of leveraging daily routines for number sense and reasoning
- Start a collection of activities for daily routines



www.tinyurl.com/howardcountymath



Daily Routines to Jumpstart Math Class K-5 (Corwin, 2019)  
Daily Routines to Jumpstart Math Class 6-8 (Corwin, 2018)



Would You Rather?



Deal A 	Deal B 
36 for \$39.99	18 for \$15.47



Would You Rather?



Deal A 	Deal B 
36 for \$39.99	18 for \$15.47
60 for \$70.04	48 for \$49.99



Would You Rather?



Box A 	Box B 
$39 \times 48$	2,000
$410 \times 8$	2,000
$12 \times 20 \times 10$	2,000

Would You Rather?



Box A 	Box B 
$4 + 1$	7
$12 - 10$	4
30	19

Would you rather...

- Have 4 boxes of these ice cream sandwiches
- Or 8 boxes of these ice cream sandwiches?



Would You Rather...

Option A or Option B?

3 tens + 2 ones

2 tens + 3 ones

A

B



Describe a student who has  
number sense.

What makes this student  
come to mind?

What is Number Sense?

---

- an awareness and understanding about what numbers are
- their relationships,
- their magnitude,
- the relative effect of operating on numbers,
- including the use of mental mathematics and estimation

Fennell and Landis (1994)

## Number Sense

---

- mental calculation (Hope & Sherrill, 1987; Trafton, 1992);
- computational estimation (for example; Bobis, 1991; Case & Sowder, 1990);
- judging the relative magnitude of numbers (Sowder, 1988);
- recognizing part-whole relationships and place value concepts (Fischer, 1990; Ross, 1989)
- problem solving (Cobb et.al., 1991)

## Number Sense

---

“a **well organized conceptual framework** of number information that enables a person to understand numbers and number relationships and to solve mathematical problems that are not bound by traditional algorithms” (Bobis, 1996).

## Number Sense

---

An **intuitive understanding** of numbers, their magnitude, relationships, and how they are affected by operations.

-Learn NC, University of North Carolina

Number Sense is the perfect problem.

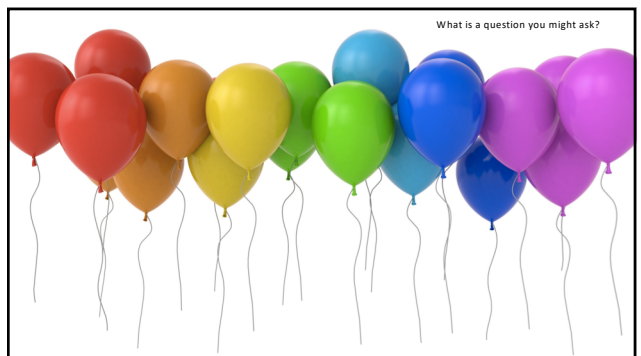
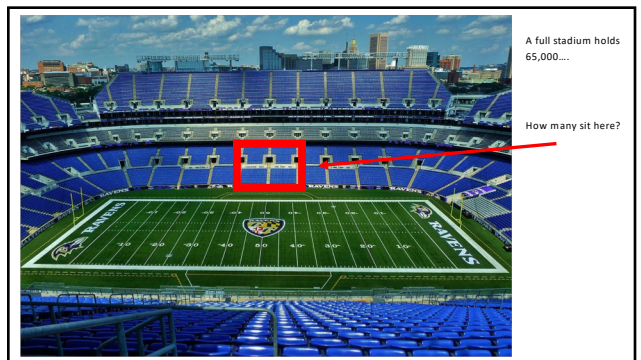
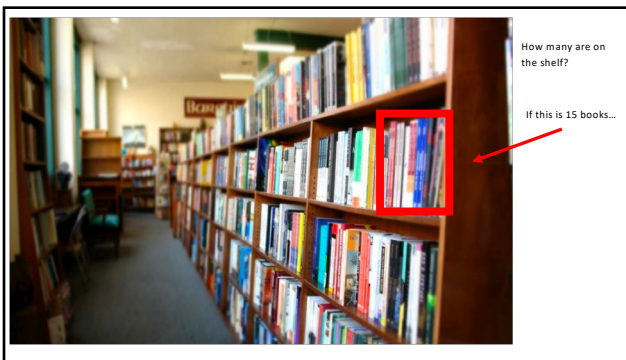
---

It's not measured.  
It's not a specific standard.  
It's not a lesson.

Number Sense is the perfect problem.

“They just don’t have any number sense.”

“So, what are you doing about it?”





- What do you notice about the box?
- How many more for 20 donuts?
- What's an equation you could write to describe the box of donuts?
- How did you count them?

27

### Picture Perfect

- Pose a picture.
- Have students notice mathematics or reason and estimate to respond to a prompt.



### What's a Daily Routine?

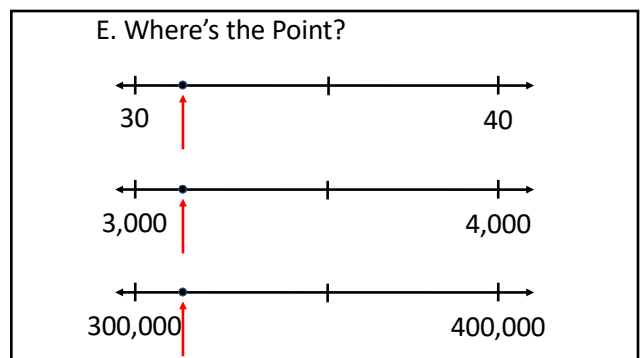
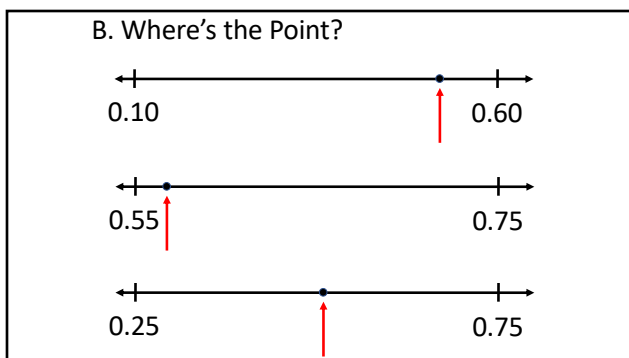
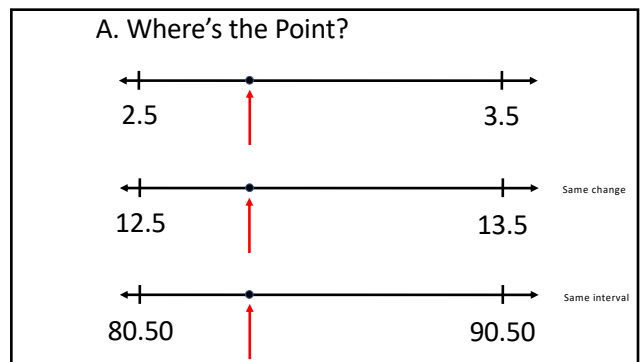
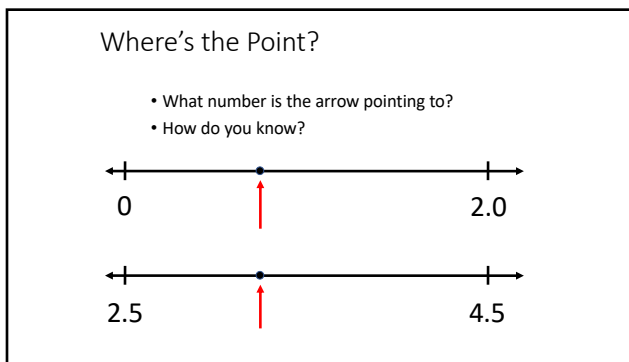
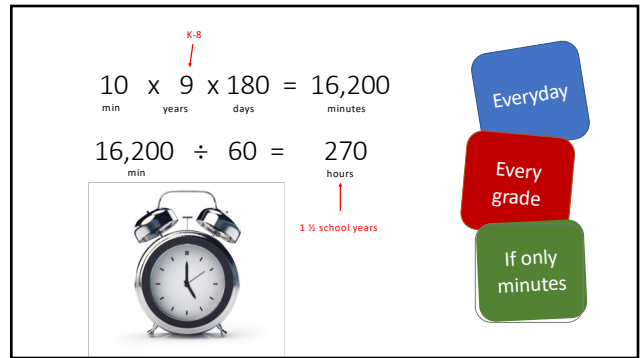
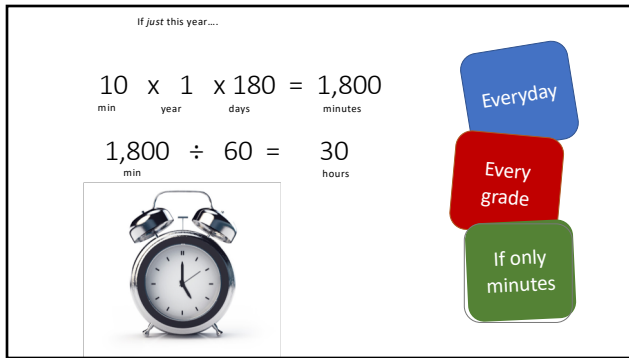
- Brief (5-7) minute activity for promoting engagement, reasoning, and discourse
- Intends to reimagine the way we begin mathematics class (HW/WU)
- Develop number sense and reasoning

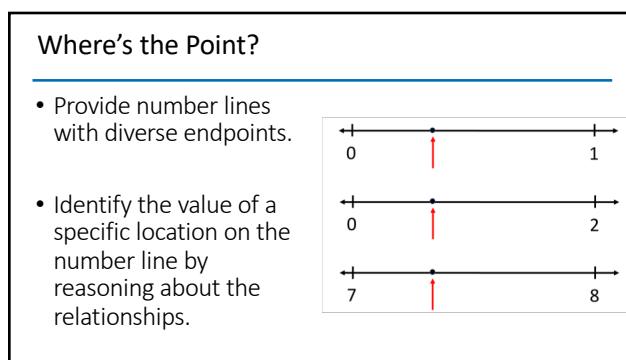
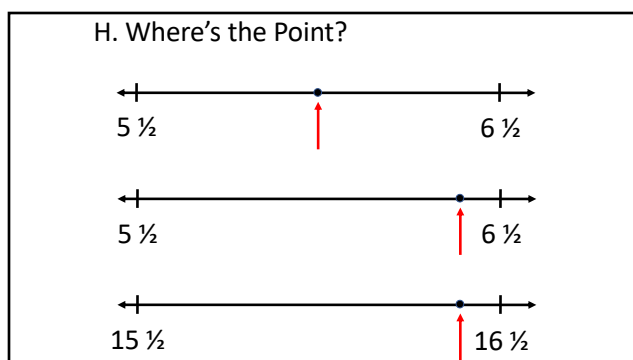
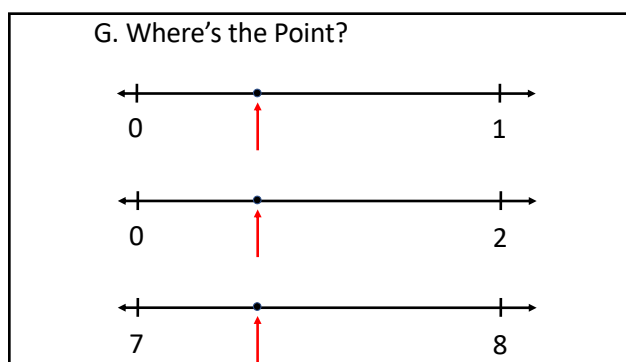
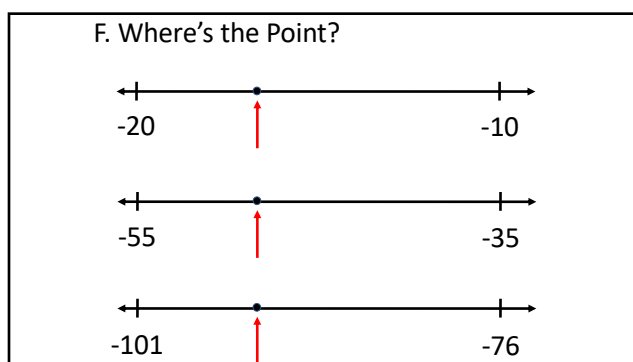
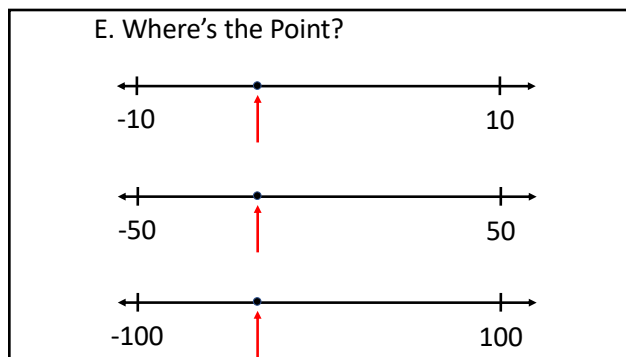
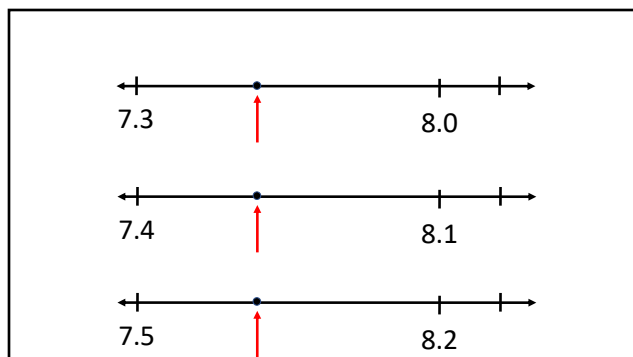


10,000 hours

10,000 hours	÷	180 days	= 55.6 years
-----------------	---	-------------	-----------------







### Routines: When?

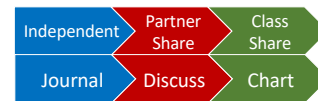
- 5-7 minutes but no more than 8-10 minutes
- A math lesson could begin or conclude with a routine.
- In a block schedule, a routine might occur midway through the time period.



San Diego City Schools (2014)

### Routines: Facilitating a Routine.

- Students engage mentally
- Students share with partners
- Group share
- Teacher records and facilitates BUT does not influence or dictate



### Routines: Timing

- About\* 2 minutes for students to reason
- About\* 1 minutes for partners to discuss
- About\* 3-5 minutes for the class to discuss



### Routines: Keep in Mind

- EVERY student doesn't have to share
- EVERY "solution" doesn't have to be explored
- EVERY prompt doesn't have to be offered



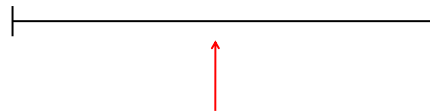
### Is This the End?

The arrow is pointing at 3.45.  
What are the endpoints?



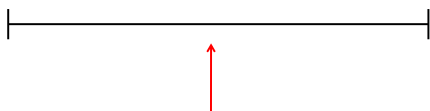
### A. Is This the End?

The arrow is pointing at -13.  
What are the endpoints?



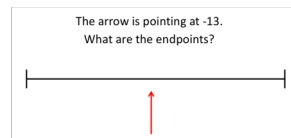
## B. Is This the End?

The arrow is pointing at  $2\frac{6}{8}$ .  
What are the endpoints?



## Where's the End?

- Provide a number line with a known location and no endpoints.
- Identify possible endpoints using relationships between numbers.



## Routines: Modifications

- **Adjust the number of prompts in a routine**
  - i.e 3 words for Math Yapper
  - i.e. 2 number lines for Where's the Point?
- **Adjust how the routine engages students**
  - Where's the Point vs Is this the End?
- **Have students create prompts and possible solutions.**

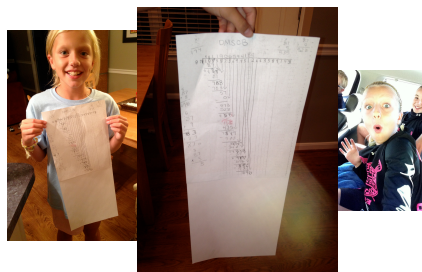
## Math Yapper

## Math Yapper

- Provide numbers or vocabulary terms for students to describe.
- Students give clues so that their partner can guess what's on the screen.



## Routines: Quality Practice



### Routines: Quality Practice

- Practice refers to a **variety of tasks or experiences**, spread over numerous class periods, each addressing the same basic idea.
- Practice helps students become **comfortable and flexible** with an idea.
- Practice emphasizes fluency.

San Diego City Schools (2014)

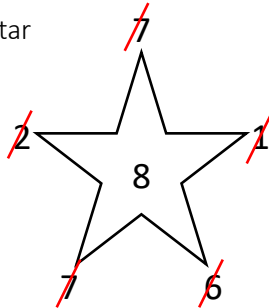
### Routines: Quality Practice

- Practice is **NOT mindless** drill of computational procedures that rely on rote memory with little understanding.
- Lengthy drills of algorithmic skills tend to diminish flexibility and reflective thought.

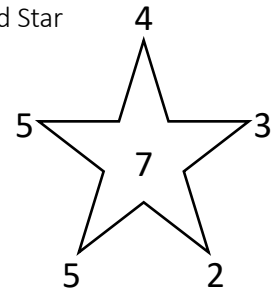
San Diego City Schools (2014)

#### Numbered Star

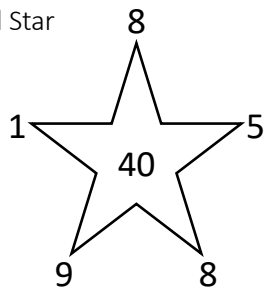
$$\begin{aligned} 7 + 2 &= 9 \\ 7 - 1 &= 6 \\ 6 \div 6 &= 1 \\ 9 - 1 &= 8 \end{aligned}$$



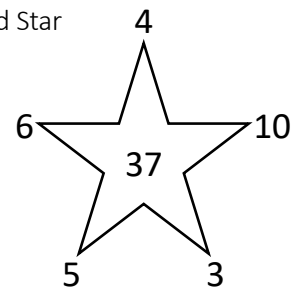
#### A. Numbered Star



#### B. Numbered Star

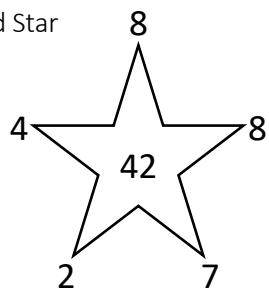


#### C. Numbered Star

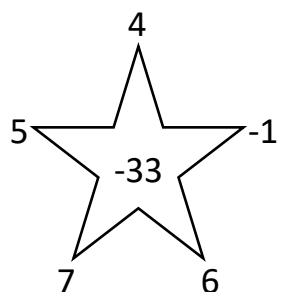
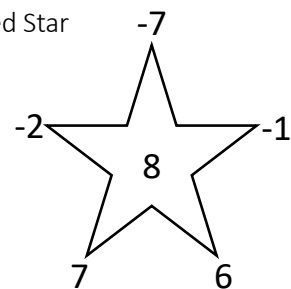




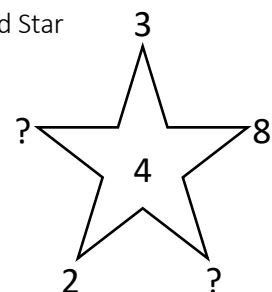
D. Numbered Star



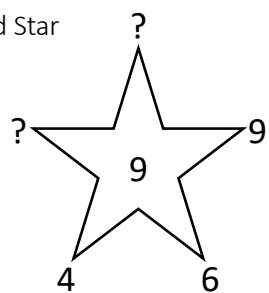
E. Numbered Star



G. Numbered Star

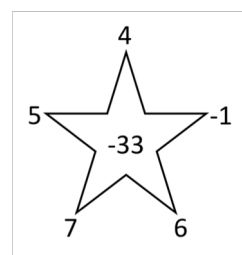


H. Numbered Star



### Numbered Star

- A star with 5 values and a middle value is presented.
- Students use the points in any order, with any operation, to arrive at the value in the middle.



### Routines: Other Impacts

- On standardized tests, mental computation, estimation, or a nonstandard approach is often **twice as fast as memorized algorithms**, especially when the format is multiple-choice.
- The **distracter choices** on standardized tests are designed to match the typical errors that students make in mindless application of the algorithms.

### Routines: Other Impacts

- Students who have **practiced thinking are much less likely** to make these errors and will actually be able to complete these tests more quickly and with greater accuracy.
- Routines allow students to gain confidence, practice thinking and improve accuracy.

A. Will each be more or less than **50**?

A. $2.7 \times 15.8$	B. $10.25 \times 4.99$
C. $83.3 - 29.9$	D. $50.5 \div .9$

Will each be more or less than 5.0?

A. $2.7 + 1.7$	B. $12.7 - 8.1$
C. $8.3 - 2.9$	D. $.9 + 3.5$

Will each be more or less than **50**?

A. $27 + 17$	B. $127 - 81$
C. $83 - 29$	D. $9 + 35$

A. Will each be more or less than **10**?

A. $2 + 5$	B. $16 - 4$
C. $72 - 60$	D. $8 + 8$

A. Will each be more or less than **1.0**?

A. $.2 + .5$	B. $16 - .4$
C. $7.2 - 6.0$	D. $.8 + .8$

B. Will each be more or less than 0.5?

A. $6 \times 0.02$	B. $1.3 - 0.9$
C. $87.1 - 86.9$	D. $11 \div 8.1$

C. Will each be more or less than 25?

A. $19.5 \times 0.99$	B. $7 \times 3.9$
C. $31.4 - 4.9$	D. $151.75 \div 5.1$

D. Will each be more or less than 25?

A. $19.5 \times 0.49 + 10$	B. $2 \times 3 \times 4.27$
C. $26.5 - 1.9 - 0.09$	D. $2 \times 50 \div 4.3$

E. Will each be more or less than 0?

A. $-9 - 15$	B. $-47 + 48$
C. $32 - 16 - (-16)$	D. $27 \div -3$

G. Is the value of y more or less than 10?

A. $y + 6.5 = 14$	B. $73 - 50 = y$
C. $4y + 2 = 72$	D. $5(y - 2) = 50$

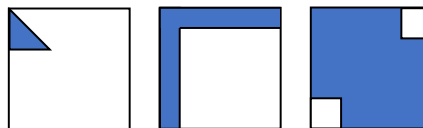
### More or Less

- Students are given a benchmark and expressions.
- Students consider if the expression will be more or less than the benchmark.

F. Will each be more or less than -20?			
A	$-19 + 1$	B	$-20 - 13$
C	$-5 \times -4 - 20$	D	$-18 \times -2$

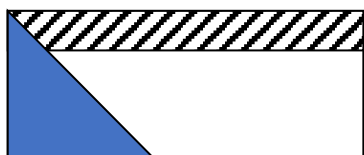
### It's About

- Estimate the shaded amount of each figure.



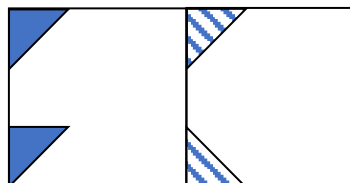
### A. It's About

- Estimate the shaded amount of the figure.



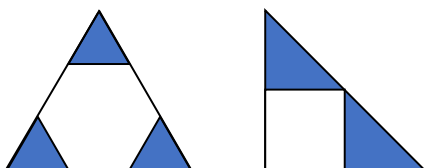
### B. It's About

- Estimate the shaded amount of the figure.



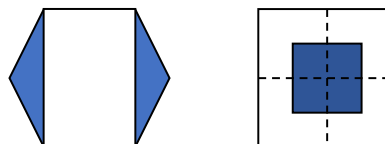
### C. It's About

- Estimate the shaded amount of each figure.



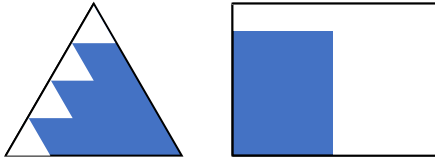
### D. It's About

- Estimate the shaded amount of each figure.



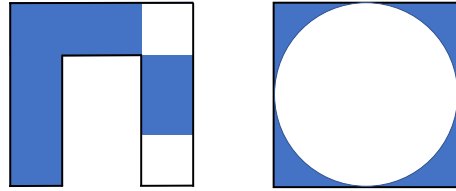
E. It's About

- Estimate the shaded amount of each figure.



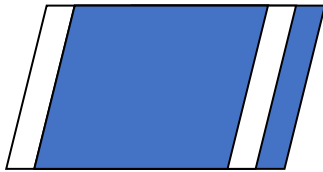
F. It's About

- Estimate the shaded amount of each figure.



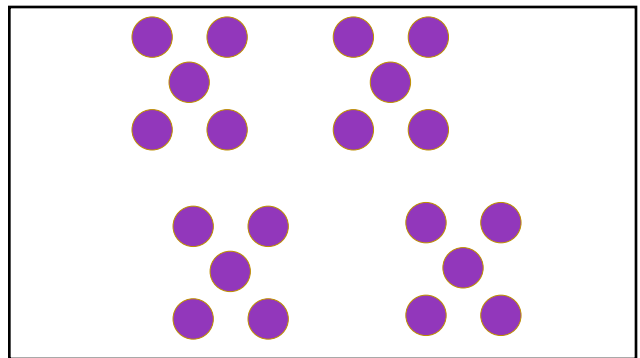
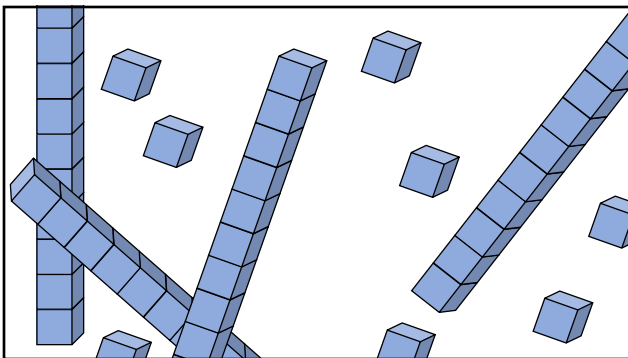
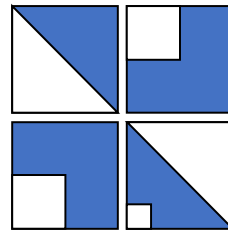
G. It's About

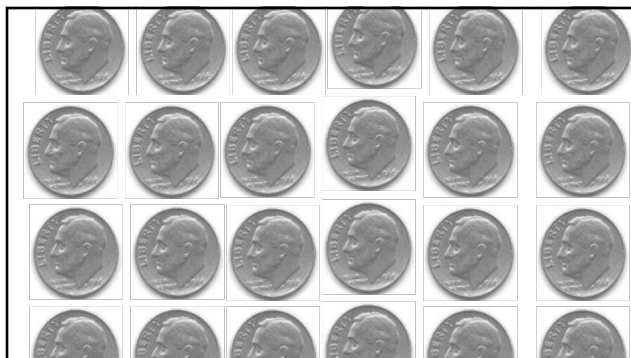
- Estimate the shaded amount of each figure.



H. It's About

- Estimate the shaded amount of each figure.

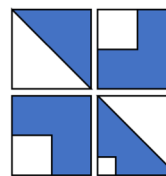




### It's About

- Provide a shaded region without exact partitions.
- Have students determine the fractional amount shaded.

• Estimate the shaded amount of each figure.

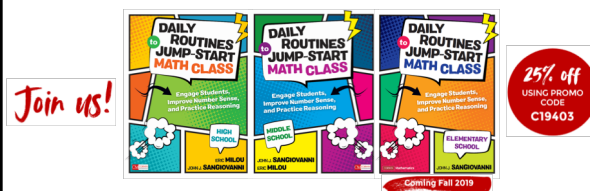


### Routines: Where Can I Find More?

- Daily Routines to Jump-start Math Class (Corwin)
- Number Talks (Math Solutions)
- [www.tinyurl.com/howardcountymath](http://www.tinyurl.com/howardcountymath)
  - K-2 and 3-5 routines with examples

### Daily Routines to Jump-Start Math Class

John J. SanGiovanni | Eric Milou



Visit the Corwin booth for a Meet and Greet with John SanGiovanni & Eric Milou!  
FRIDAY, APRIL 5 | 3:00PM – 3:30PM

\$24.95 (reg.)  
\$26.21\* (25% off)

\*Approximate. Does not include shipping and tax.

### Closure

- What is a take away from the session that resonates with you?
- Which routine would you like to try first?

### Number Sense and Reasoning Routines to Jumpstart Math(3-8)



John SanGiovanni  
john.sangiovanni5@gmail.com

@JohnSanGiovanni

