# Structure
# + Determining Reasonableness
# = Problem Solving Success

Jessica Scandurra and Robyn Tedesco
K-6 Math Coaches
Stratford, CT and Norwalk, CT

@jess_scandurra

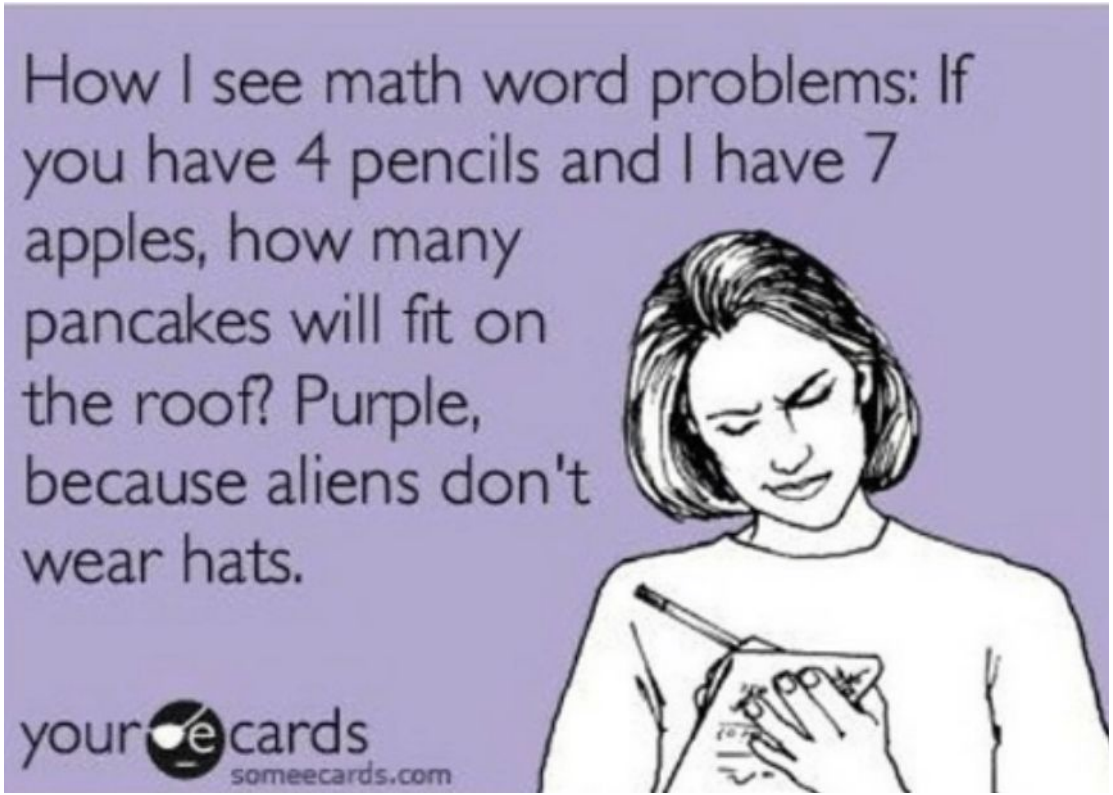
http://bit.ly/problemsolvingsuccess

# Why this Workshop?


THIS IS THE TYPE OF GUY YOU READ ABOUT IN MATH PROBLEMS


UHHH... HOUSTON, WE HAVE A WORD PROBLEM.
IF A TRAIN LEAVES THE STATION AT 9:00AM HEADING NORTH AT 55 MPH. AND ANOTHER TRAIN
STATION AT 10
SOUTH AT 72
BOTH
©2010 Scott Hilburn/Distributed by Universal Uclick
1/16

# Because.....


How I see math word problems: If you have 4 pencils and I have 7 apples, how many pancakes will fit on the roof? Purple, because aliens don't wear hats.
someecards.com


Found one of those people you hear about in a math problem
whisper

# Or this .....

# Today we will discuss...

- Number plucking and how it affects problem solving
- Finding the right problem
- Developing a problem solving routine
- Metacognition and Problem Solving

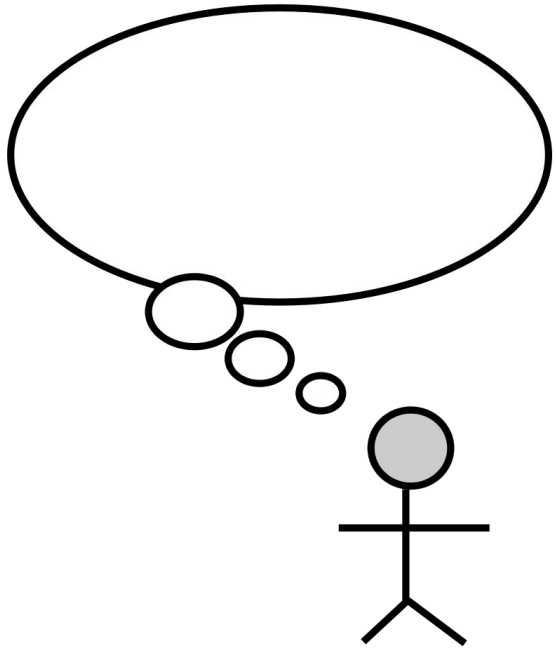
# Let’s look at some word problems.

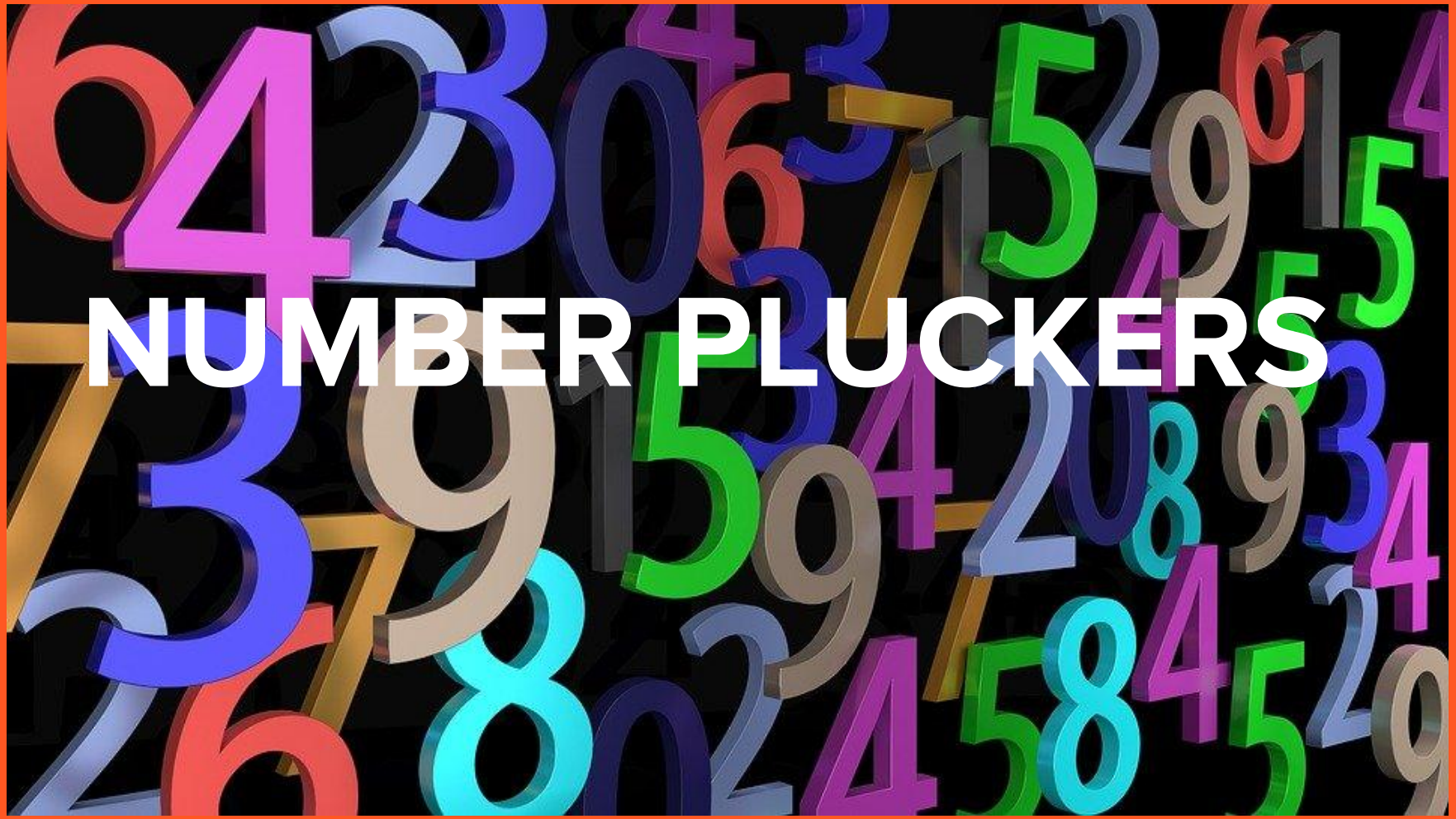
# Solve

Mr. Soto’s ruptors cin tirate 75 stobbers blah versing.  Sarei woter 49 stobbers.  Okto ist more wo sarei sonos ito obis ito 75?

# Reactions

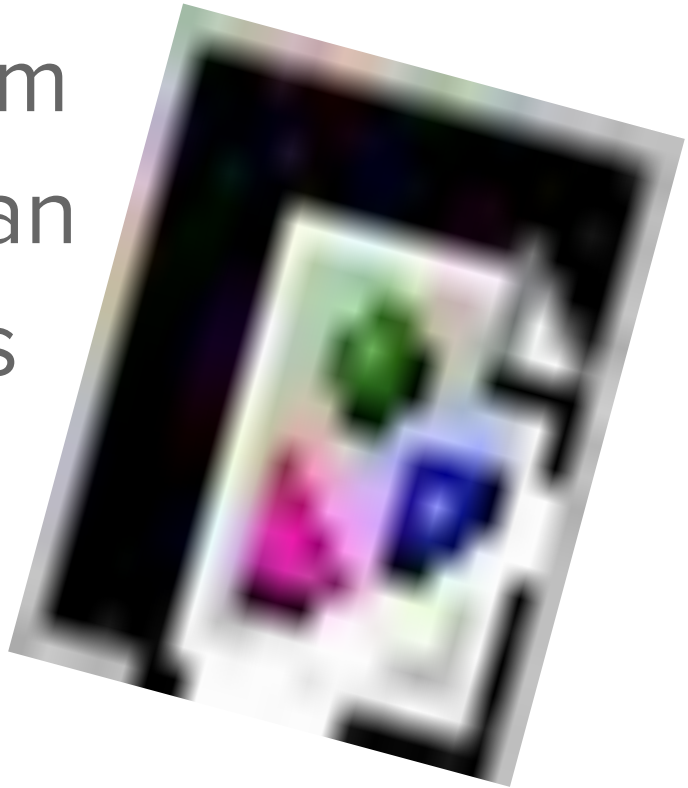
- What were you thinking when you saw the word problem?
- Did you have a strategy?
- What would your students do?



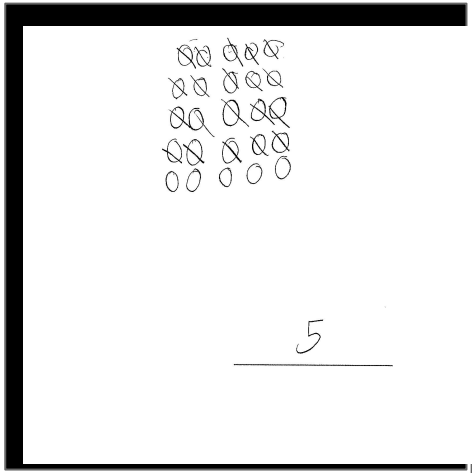

NUMBER PLUCKERS

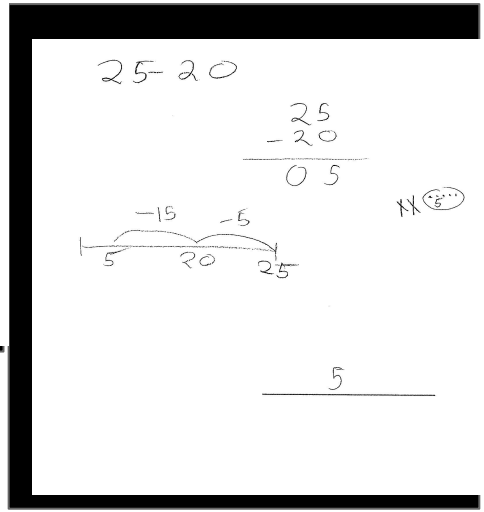
# When Number Plucking Goes Wrong

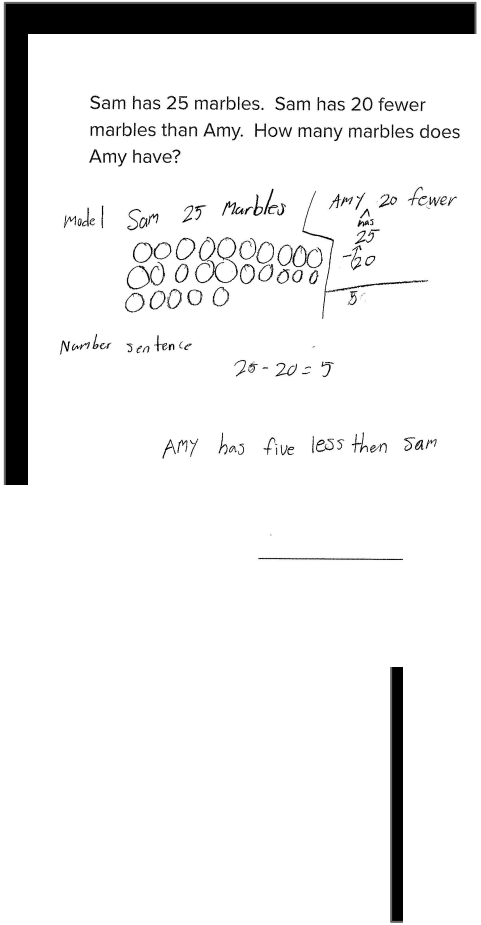
Sam has 25 marbles. Sam has 20 fewer marbles than Amy. How many marbles does Amy have?

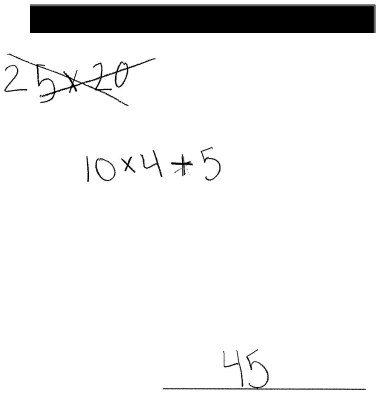


# What Students did...



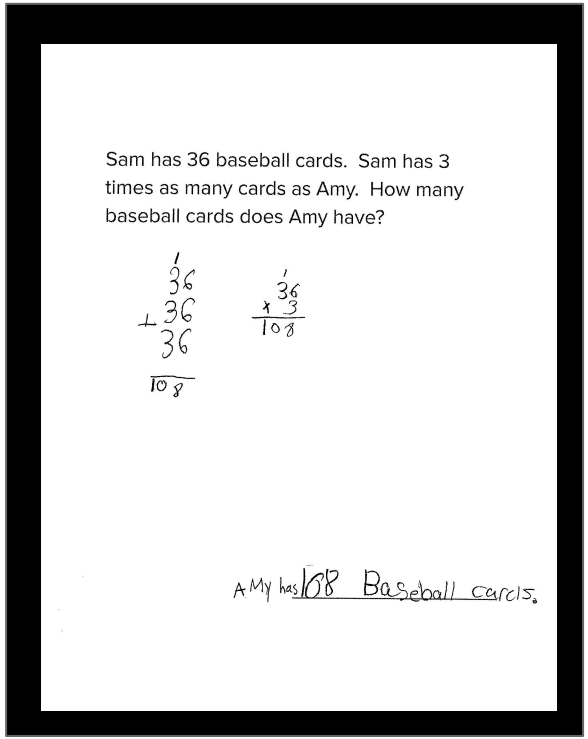



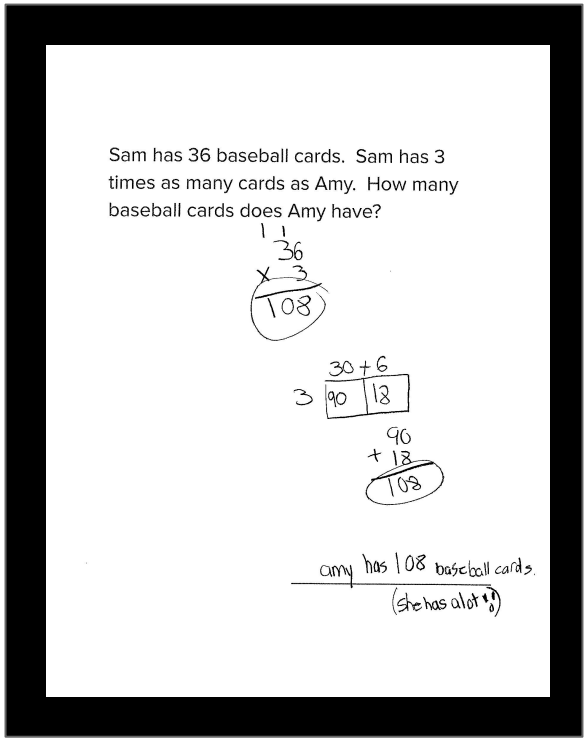



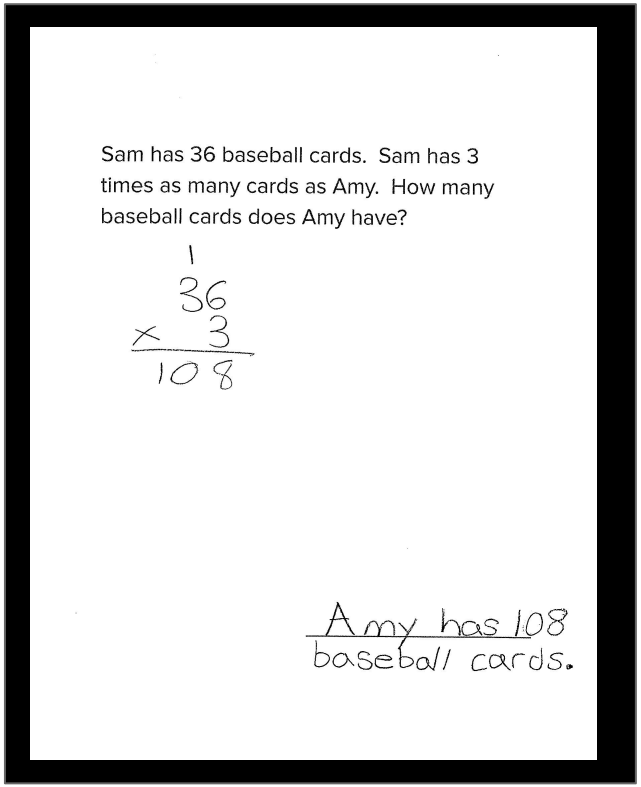
# When Number Plucking Goes Wrong

Sam has 36 baseball cards. Sam has 3 times as many cards as Amy. How many baseball cards does Amy have?

# What Students did...



# Finding the Right Problem

# Finding the Right Problem

- Language
- Context
- Promote Student Discourse
- Interesting/Feasible

# Numberless Word Problems

# Numberless Word Problems

“Are a scaffolded approach to presenting word problems that get students thinking before they ever have numbers or a question to act on”

- Brian Bushart

bstockus.wordpress.com

# Let's try a Numberless Word Problem

Setting the stage:

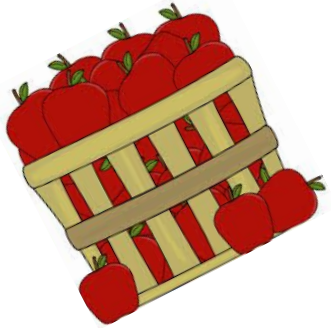
Apple Picking

Bob has some apples.  Sam has fewer apples than Bob.

Teacher Question:  What math do you see in this problem?

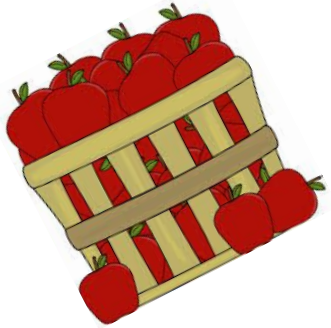
Bob has 24 apples.  Sam has fewer apples than Bob.

Teacher Questions:  What changed?  What do we know now?



Bob has 24 apples.  Sam has 10 fewer apples than Bob.

Teacher Questions: What new information do we have? How does this change your understanding of the situation? What do you think the question will be?



Bob has 24 apples.  Sam has 10 fewer apples than Bob.  How many apples do they have all together?

Teacher question: Were you surprised by the question?  How was it the same/different than what you thought?

# Why use Numberless Word Problems

- Engaging & non-threatening
- Provide differentiation & scaffolding
- Promote rich discussion
- Help make sense of relationships
- Attend to and make sense of language
- Visualize the problem

# When to Use Numberless Word Problems

- To introduce a new problem type
- First exposure to a new operation
- To slow students down from rushing and making careless mistakes

# Mathematical Bet Lines

# Mathematical Bet Lines

In ELL Literacy instruction:

Bet Lines are key stopping points (text lines) where teachers ask students to dialogue about what they have just read and make predictions about the future.

-Soto-Hinman and Hetzel 2009, p. 95

# Mathematical Bet Lines

- Teacher **shares the first part** of word problem
- Students **make predictions** about what comes next
- **Process continues** through the rest of the problem
- **Students** continue to **make** & **revise predictions**

# Let’s try using Mathematical Bet Lines

There were 18 fish

Teacher question: What do you bet will come next?

There were 18 fish.  There were 3 fish tanks.

Teacher questions: What new information do we have?  What do you bet will come next?  What operation do you think we will use?

There were 18 fish.  There were 3 fish tanks.  Sam put an equal number of fish in each tank.  How many fish were in each tank?

Teacher question: How will you solve this problem?

# Mathematical Bet Lines

Tips:

- Have the problem with stopping points written out
- Stop before information that suggests what operation or gives a new number
- Keep predictions math related and reasonable
- Limit bets to 2 or 3
- Utilize turn and talk

# Why use Mathematical Bet Lines?

- FUN
- Engaging & non-threatening
- Help monitor sensemaking
- Promote rich discourse
- Applies a known reading strategy

# Developing a Problem Solving Routine

# Developing a Routine

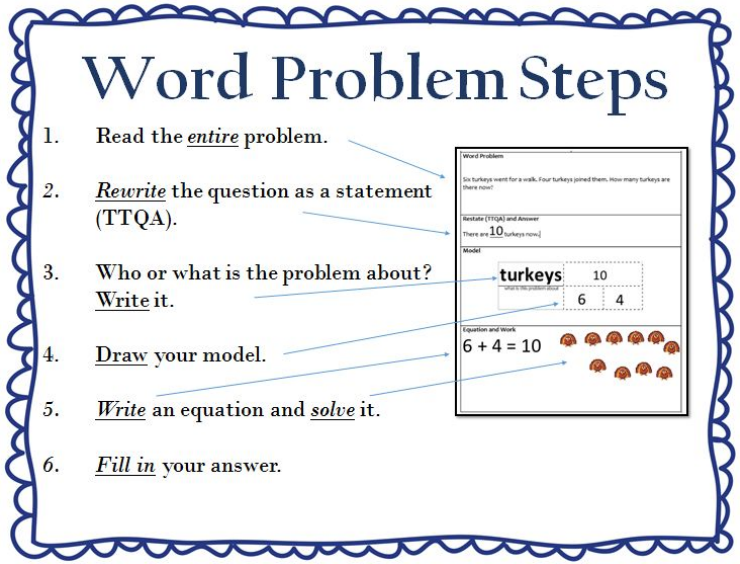
- **Read** the problem **3 times.** Asking:
  - What is this problem about?
  - What are you trying to find out?
  - What information is important?
- Isolate the **question**. Turn it **into a statement**.
  - How many basketballs are there in all?
  - There are _____ basketballs in all.

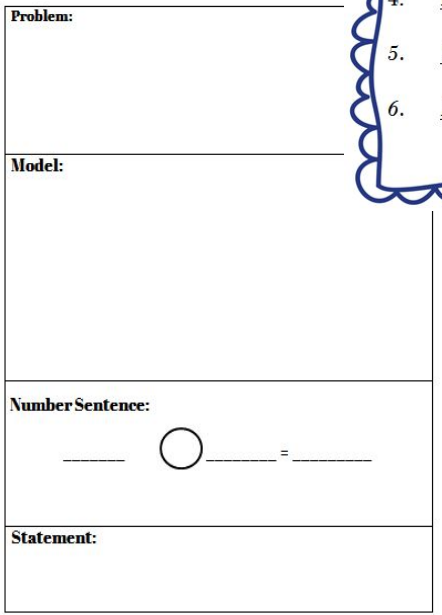
# Routine continued

- **Solve**
  - Encourage the use of representations & models
- Put the numerical **answer into the statement.**
  - There are 8 basketballs in all.
- **Check** you answer **for reasonableness**
  - Ask yourself, does this answer make sense?
  - Solve the problem in another way.

# Supporting the Routine

- Anchor charts
- Graphic organizers
- Checklists
- Bookmarks



# Let's Try the Routine

Drew wants to run 6 miles this month. He plans to run 1/4 miles each day. How many days will it take Drew to run 6 miles?

- ❏ Read the problem 3 times
- ❏ What is the problem about?
- ❏ What is the question?
- ❏ What information is important?
- ❏ Make a statement.

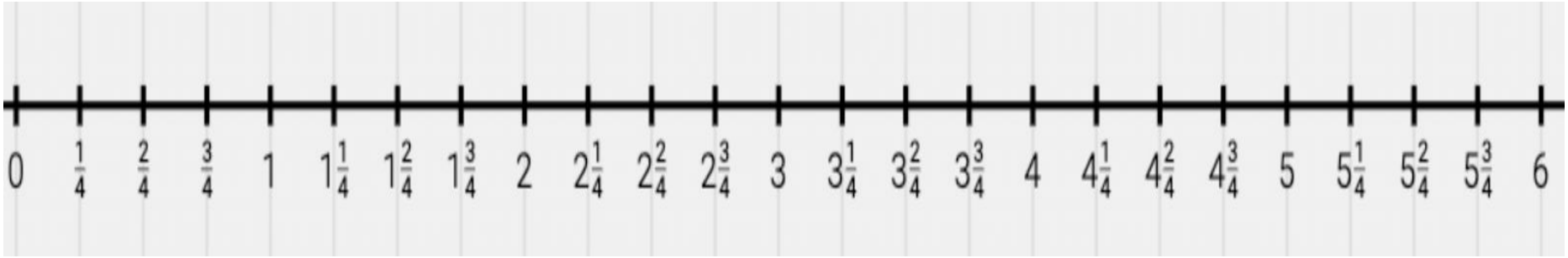
# Solve - What Models will you use?

# Share student answers

Drew wants to run 6 miles this month.  He plans to run 1/4 miles each day.  How many days will it take Drew to run 6 miles?

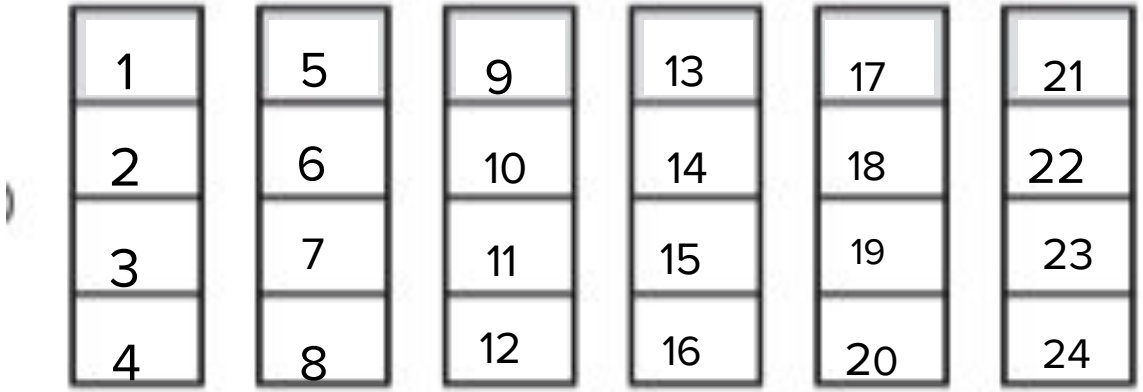
# Compare Models - Number Line

Divide each mile into 4 - 1/4-sized pieces.  I can count 24 partitions.  So it will take Drew 24 days.



# Compare Models - Area Models

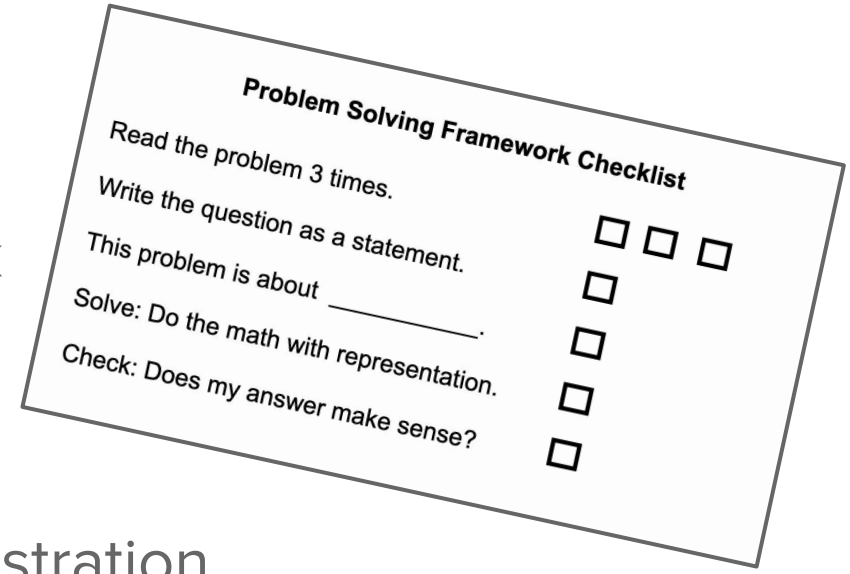
I partitioned 6 wholes into 4 pieces each to represent the 1/4 - mile runs. I labeled each piece with a number. I count 24 days.



# Metacognition

# Focus on Metacognition

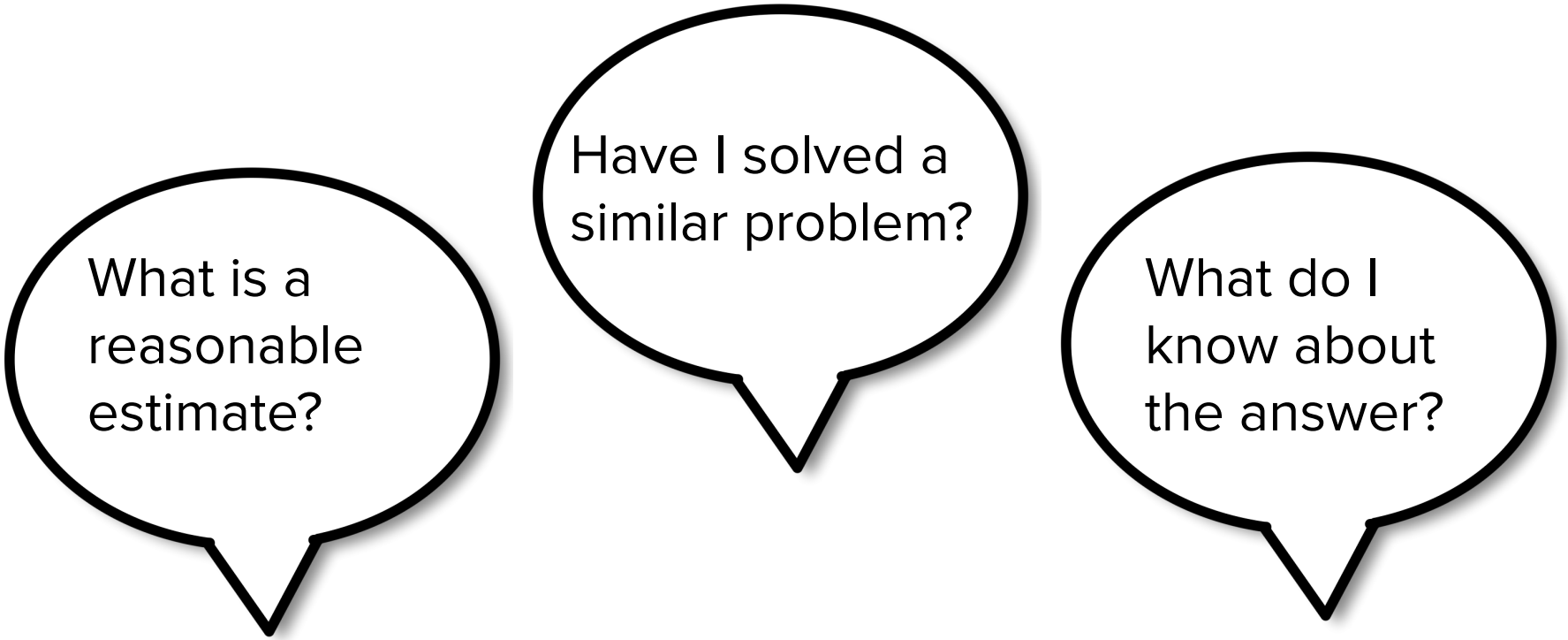
- Self-talk
  - Think-aloud
  - Talk oneself through the task




- Self-monitoring
  - Helps with regulation and frustration
  - Checklist, rubric, organizers
  - Checking for reasonableness

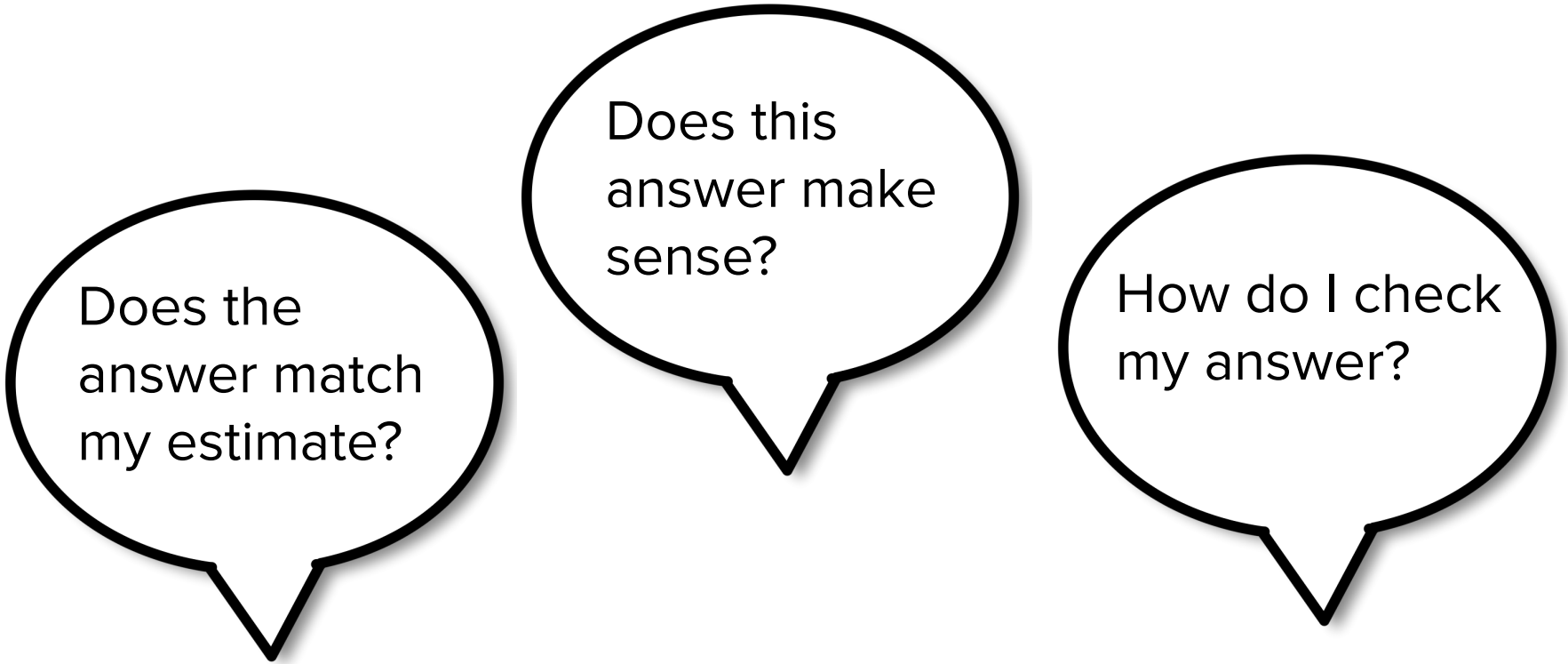
# Self-Monitoring for Reasonableness -- Why?


# Self-Monitoring -- Before Solving



# Self-Monitoring -- During Solving

# Self-Monitoring -- After Solving



# Questions - Final Thoughts

Thanks for coming!

# Contact Information


Jessica Scandurra

Math Coach -- Eli Whitney School

Stratford, CT

Email: scandurraj@stratk12.org

Twitter: @jess_scandurra

Robyn Tedesco

Math Specialist -- Fox Run School

Norwalk, CT

Email: tedescor@norwalkps.org


http://bit.ly/problemsolvingsuccess