Making Modeling

MEANINGFUL

FINDING AND ADAPTING TASKS FOR GRADES 3-5

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IMMERSION

Dive into Math Modeling!

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What is Modeling?

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What is Modeling?

representation

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representation

system

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representation

system

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PRACTICE

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process

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PRACTICE

process

Mathematically proficient students can **apply** the mathematics they know to **solve problems** arising in everyday life, society, and the workplace….Mathematically proficient students who can apply what they know are comfortable **making assumptions** and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to **identify important quantities** in a practical situation and **map their relationships** using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can **analyze those relationships** mathematically to draw conclusions. They routinely **interpret** their mathematical results in the context of the situation and **reflect** on whether the results make sense, possibly improving the model if it has not served its purpose.

STEP 1: You see something worth doing.

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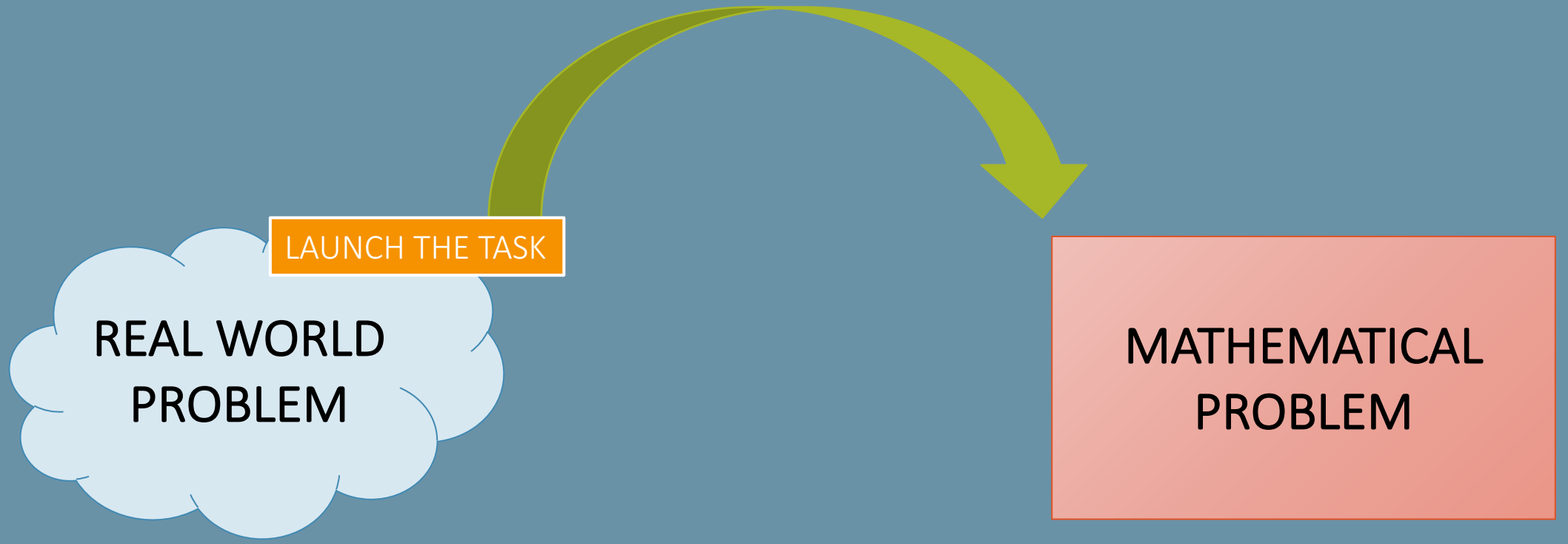
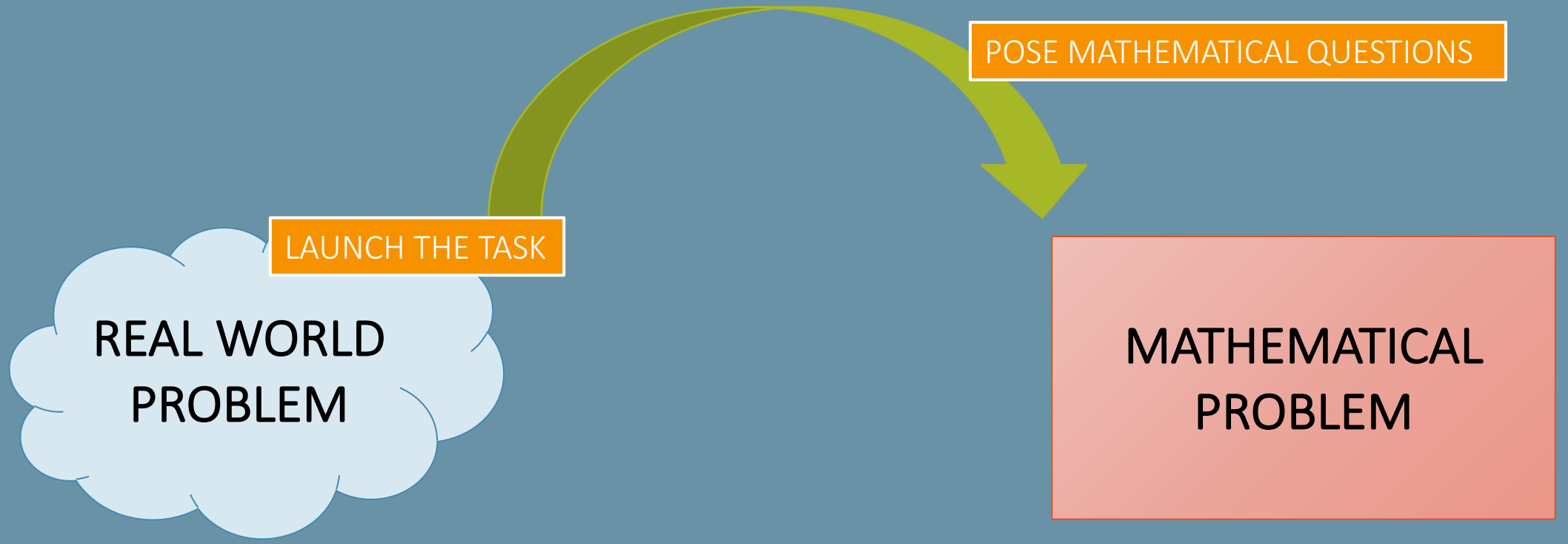


STEP 2: You do it.



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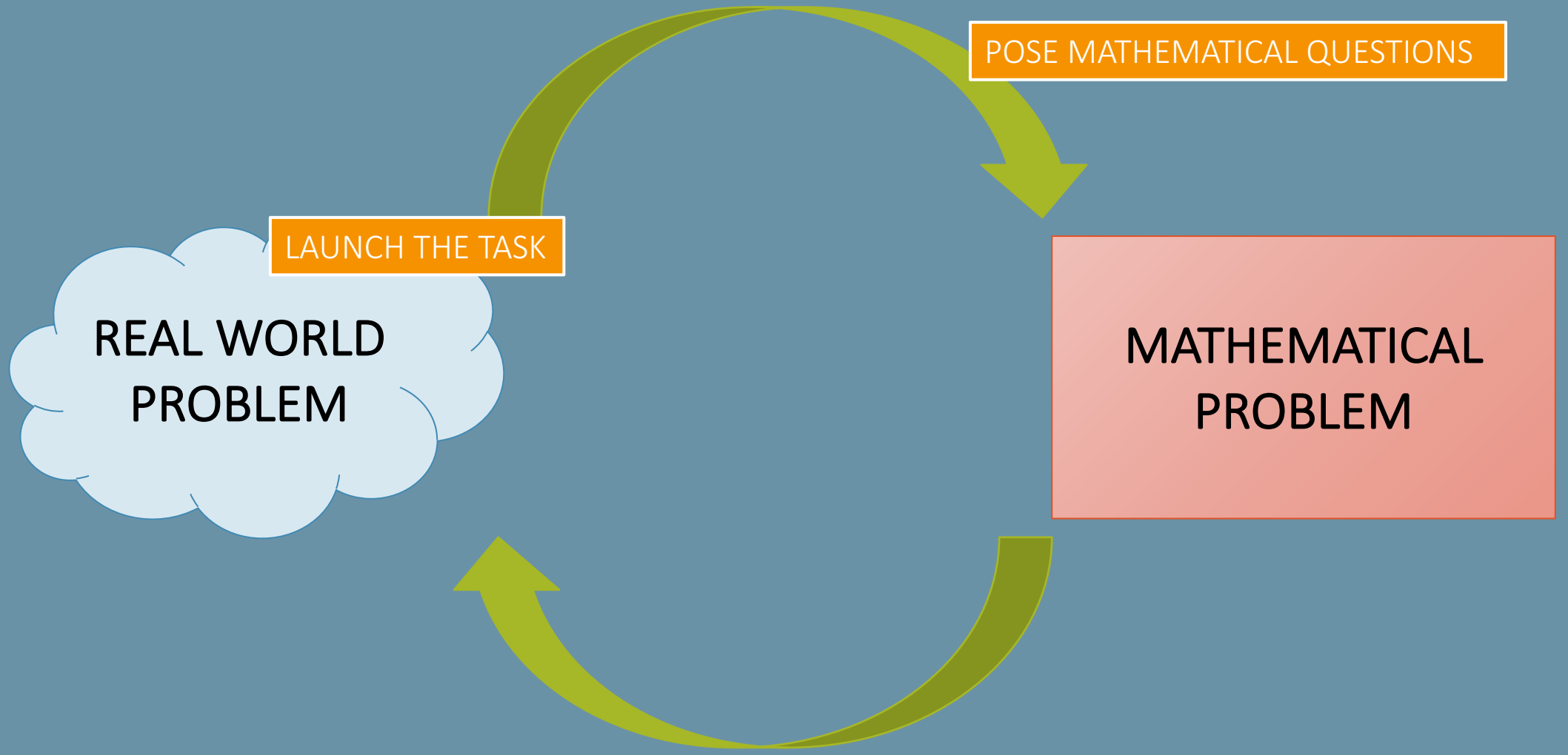

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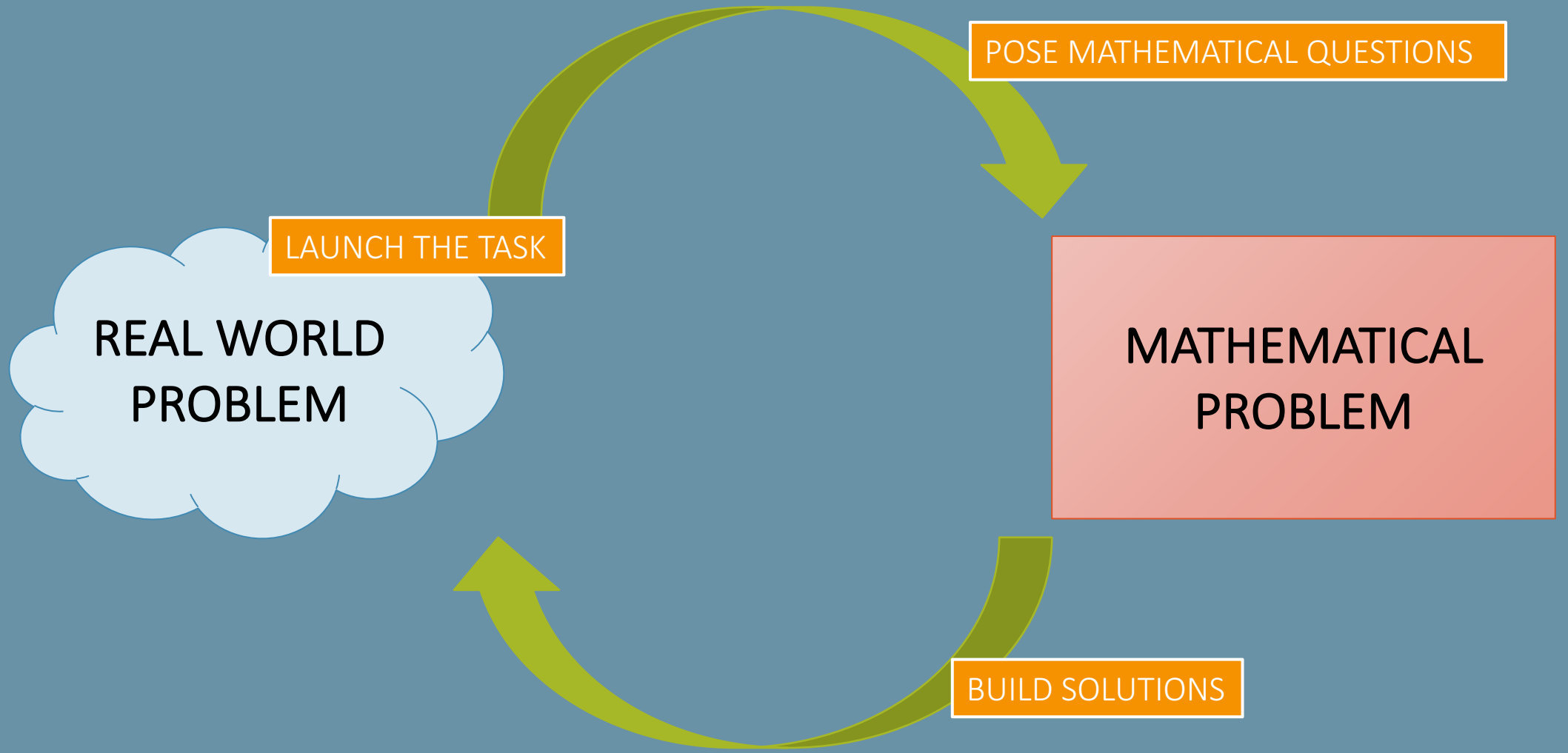

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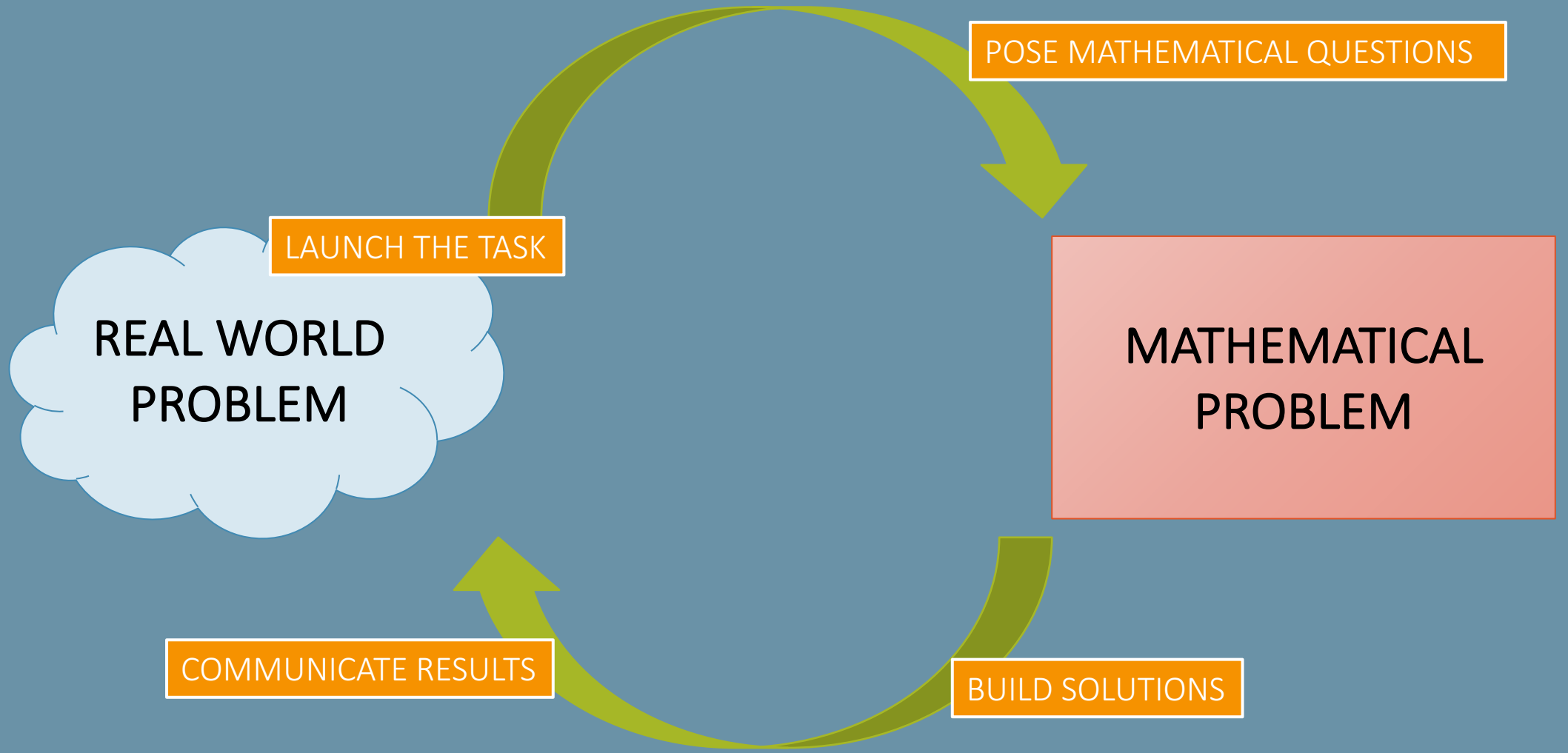
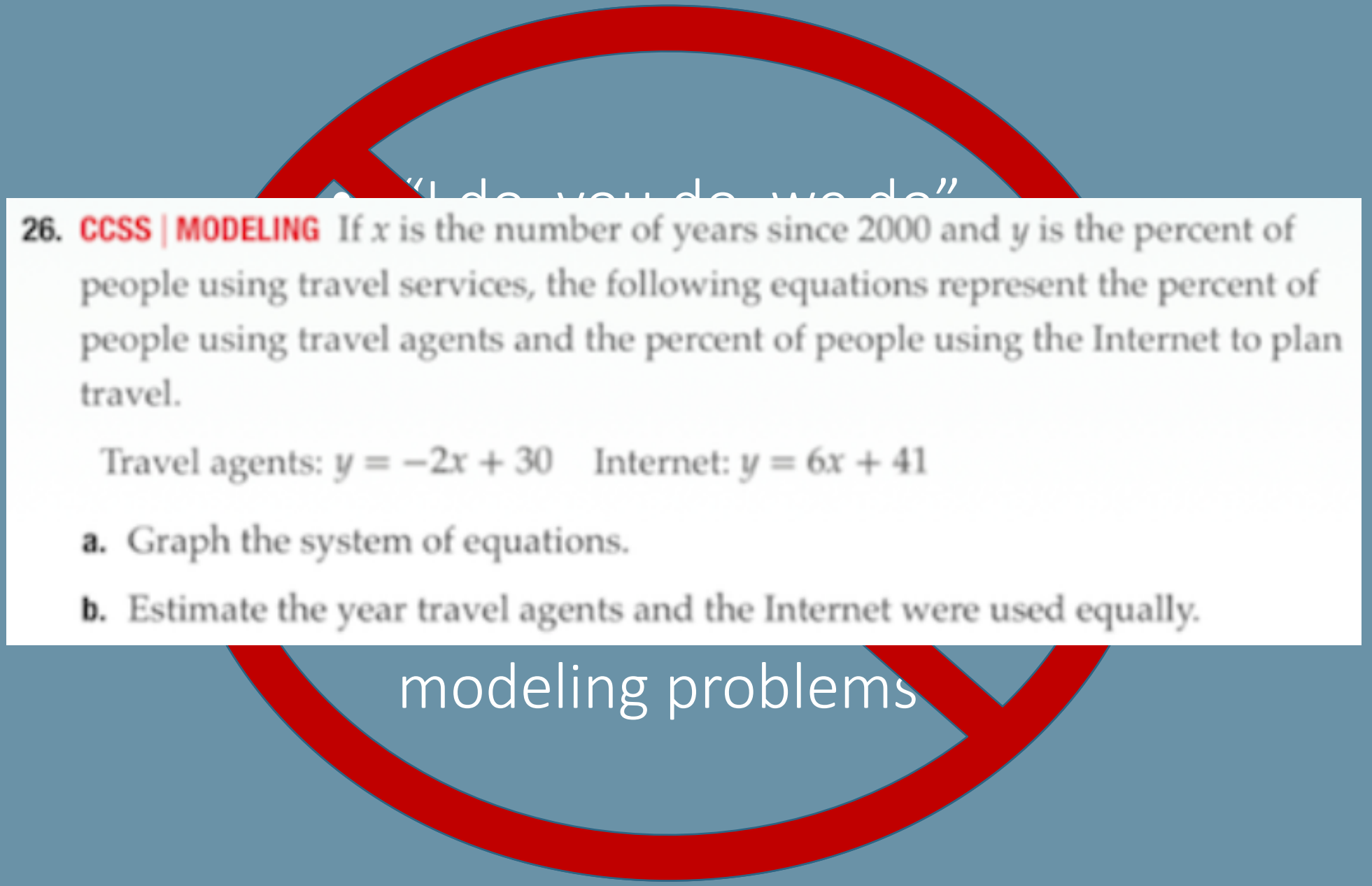


STEP 3: You see if you have actually done it.

Henry Pollack

- “I do, you do, we do”
- Using manipulatives
- Graphs, equations, and functions
- Application functions
- Many textbook modeling problems


• “I do, you do, we do”
• Using manipulatives
• Graphs, equations, and functions
• Application questions
• Many textbook modeling problems


"I do, you do, we do"
26. CCSS | MODELING If x is the number of years since 2000 and y is the percent of people using travel services, the following equations represent the percent of people using travel agents and the percent of people using the Internet to plan travel.
Travel agents: $y = -2x + 30$ Internet: $y = 6x + 41$
a. Graph the system of equations.
b. Estimate the year travel agents and the Internet were used equally.
modeling problems

Dan Meyer

TODAY

Guiding principles for creating and adapting modeling tasks

3

context

narrative

decisions

Occasions for wonderful ideas...

Occasions for wonderful ideas…

"There are two aspects to providing occasions for wonderful ideas. One is being willing to accept children's ideas. The other is providing a setting that suggests wonderful ideas to children – different ideas to different children – as they are caught up in intellectual problems that are real to them."

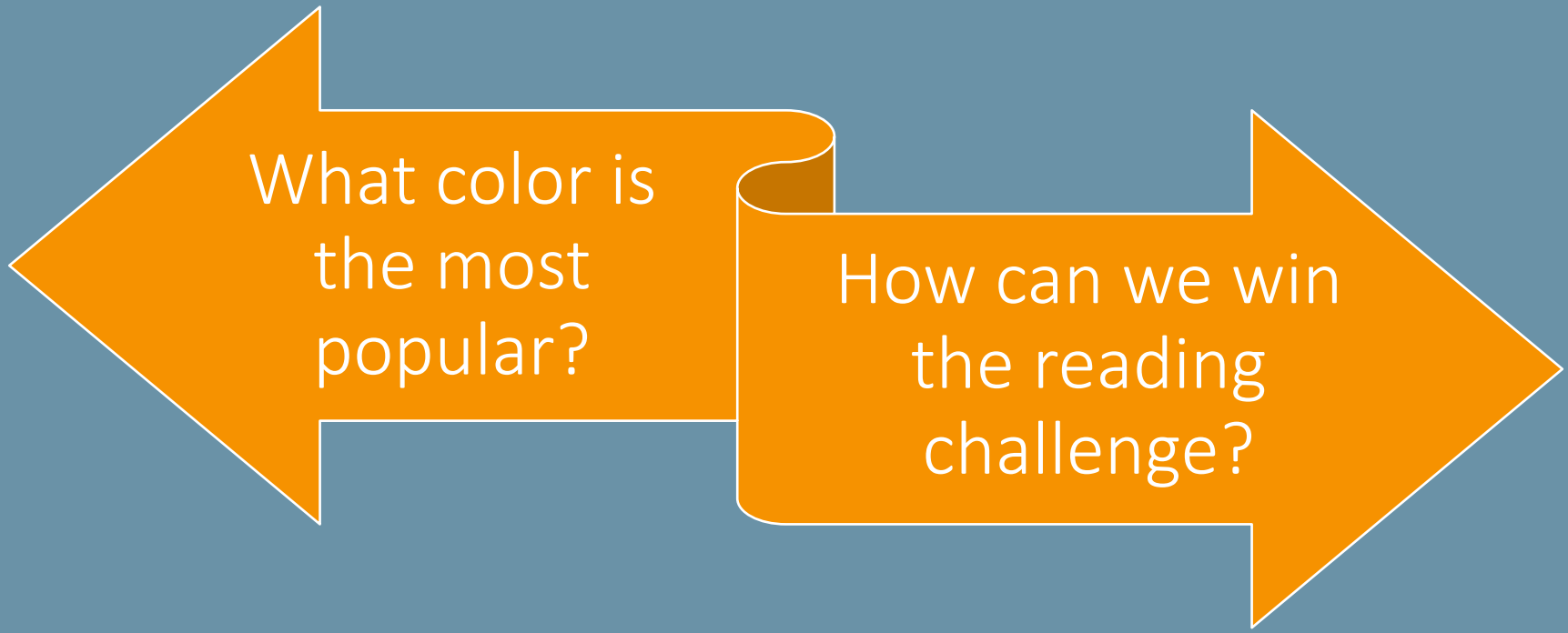
- Eleanor Duckworth

Occasions for wonderful ideas...

School Reading Challenge

An adapted modeling task used to address Common Core Standards in Grade 3: Measurement and Data

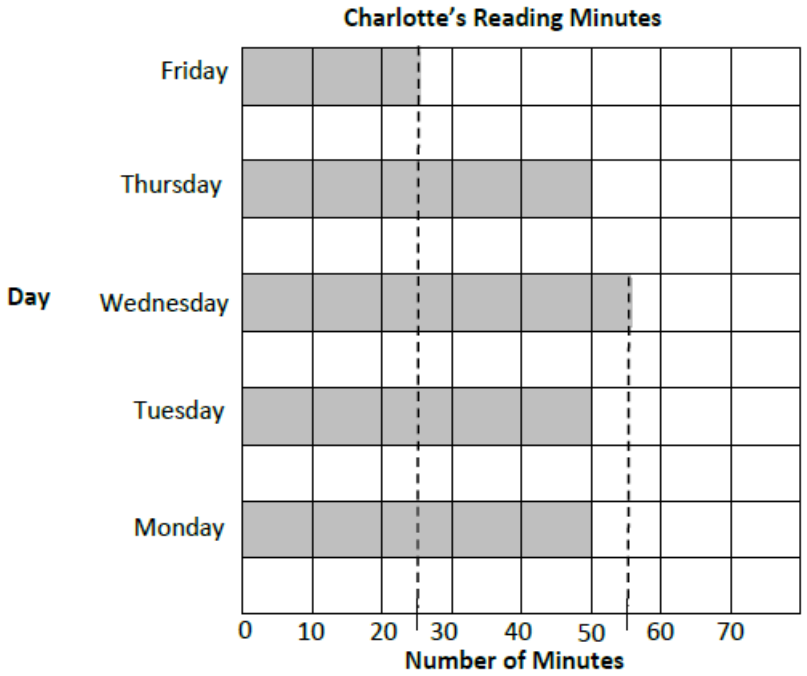
School Reading Challenge

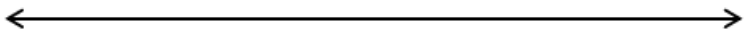


Analyzing and Interpreting Data Unit

School Reading Challenge

This bar graph shows the number of minutes Charlotte read from Monday through Friday.





The topic of reading minutes was found in the curriculum.

We made the connection to our school reading minute challenge.

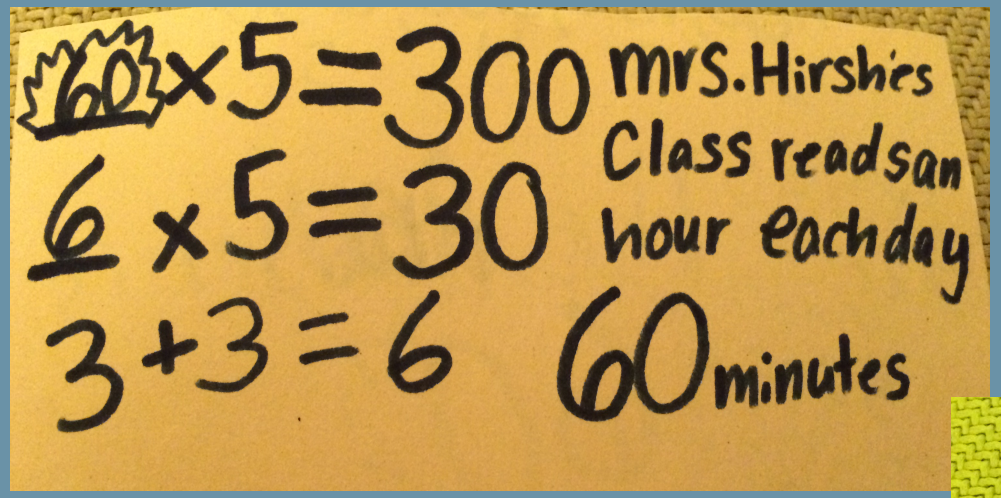
4. Use the graph's lines as a ruler to draw in the intervals on the number line shown above. Then plot and label a point for each day on the number line.

5. Use the graph or number line to answer the following questions.

   a. On which days did Charlotte read for the same number of minutes? How many minutes did Charlotte read on these days?

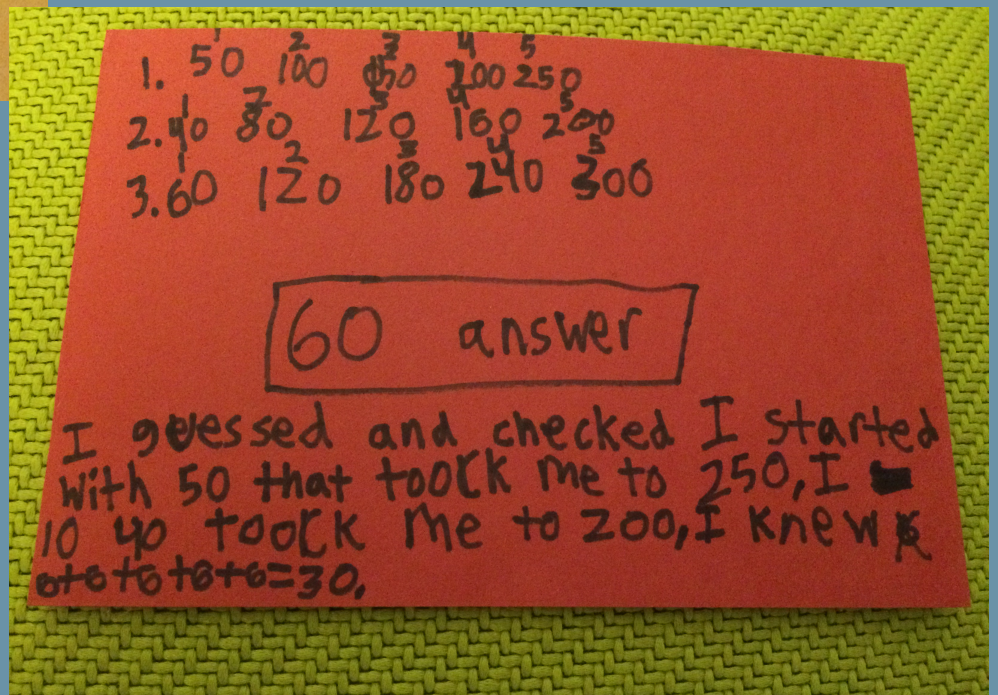
   b. How many more minutes did Charlotte read on Wednesday than on Friday?

School Reading Challenge



More Rich and Meaningful to Students

Students used data to analyze the reading habits of the top class.



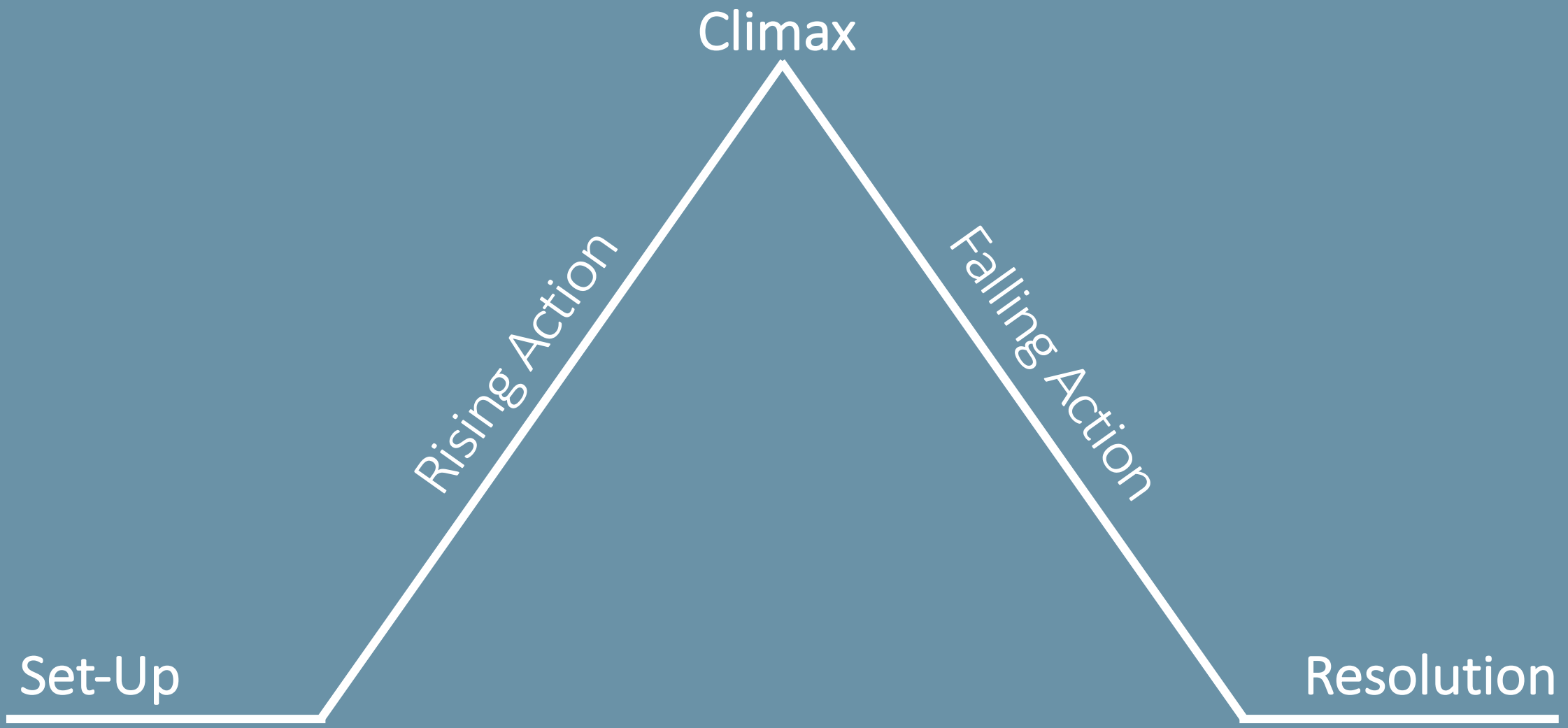
Contexts for Wonderful Ideas

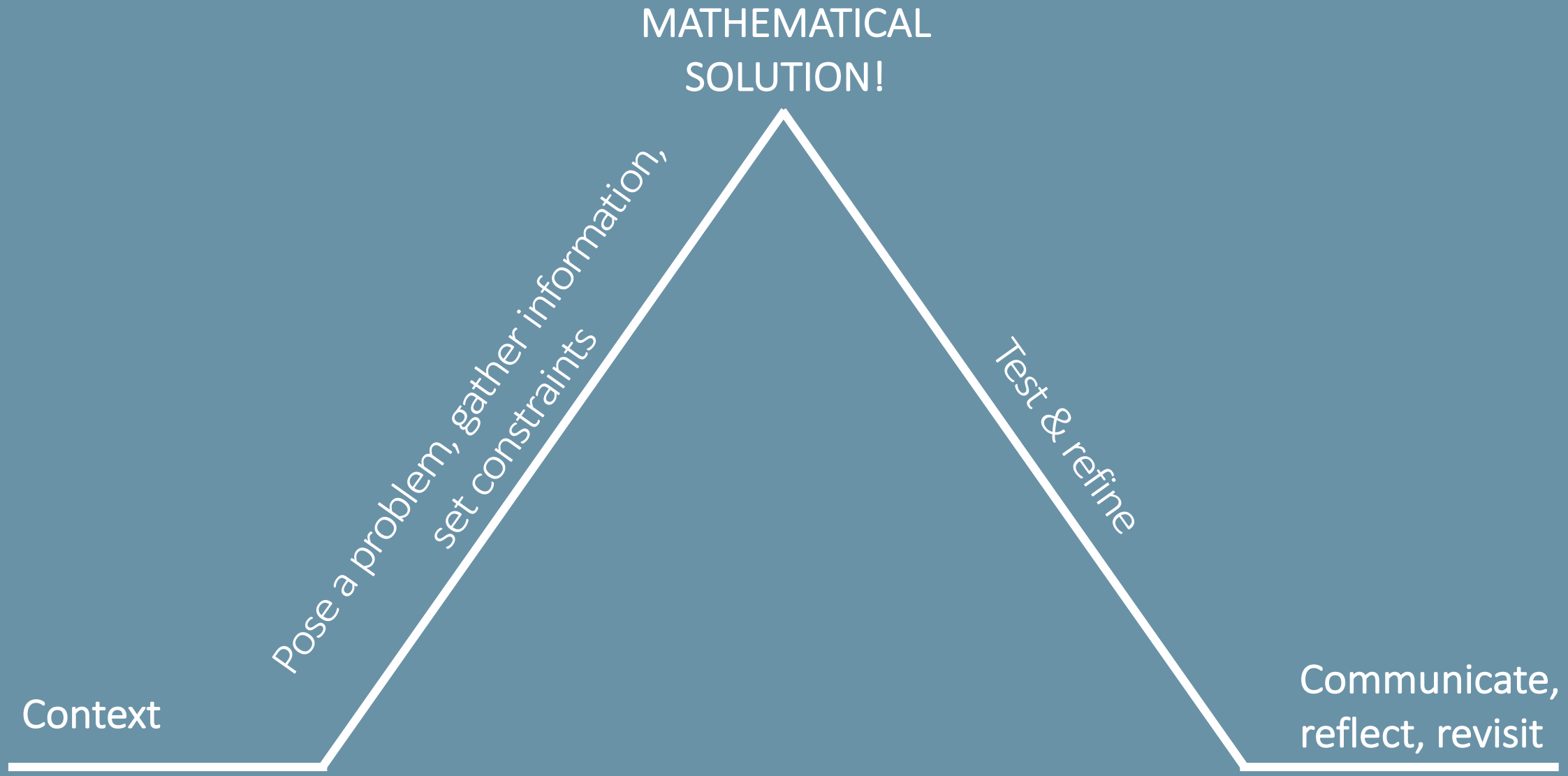
INTERESTING?

Important?

Already going on?

Narrative


Climax
Rising Action
Falling Action
Set-Up
Resolution


MATHEMATICAL SOLUTION!
Pose a problem, gather information, set constraints
Test & refine
Context
Communicate, reflect, revisit

Narrative

Things to Consider

- Money (budget / student cost)
- Safety*
- How Far it is
- Time
- Learning involved *
- Food / drink
- Travel Cost (Hotels, admission, ect)
- What is a Field trip? (Bus, Not superlong)

Constraints

- things we can not change.

1. Learning has to happen.
2. We have to be safe.
3. Bus cost:
   $51.50 per hour per bus
4. Time: 8:30 – 3:30
5. Each Bus only holds 45 people
6. Mr. Wild - 27
   Mrs. Kim - 28
   Mrs. Colombo - 28
   6 chaperones
7. Tours 2hrs long

Cost of bus for the whole day?

.50+.50=$1.00
$1.00+$1.00=$2.00
$50+$50=$100.00
$2.00+$1.00=$3.00
$100.00+$3.00=$103.00
3x7=21
$103.00x7= $721.00
$100x7=700

1 bus = $51.50
Per 1 hour

2 buses =$103.00

Mathematics that Tells a Story

How many will fit?
(multiplication, fractions, geometry)

WHAT IS FAIR?
(DIVISION)

What can we expect?
(ratio and rate)

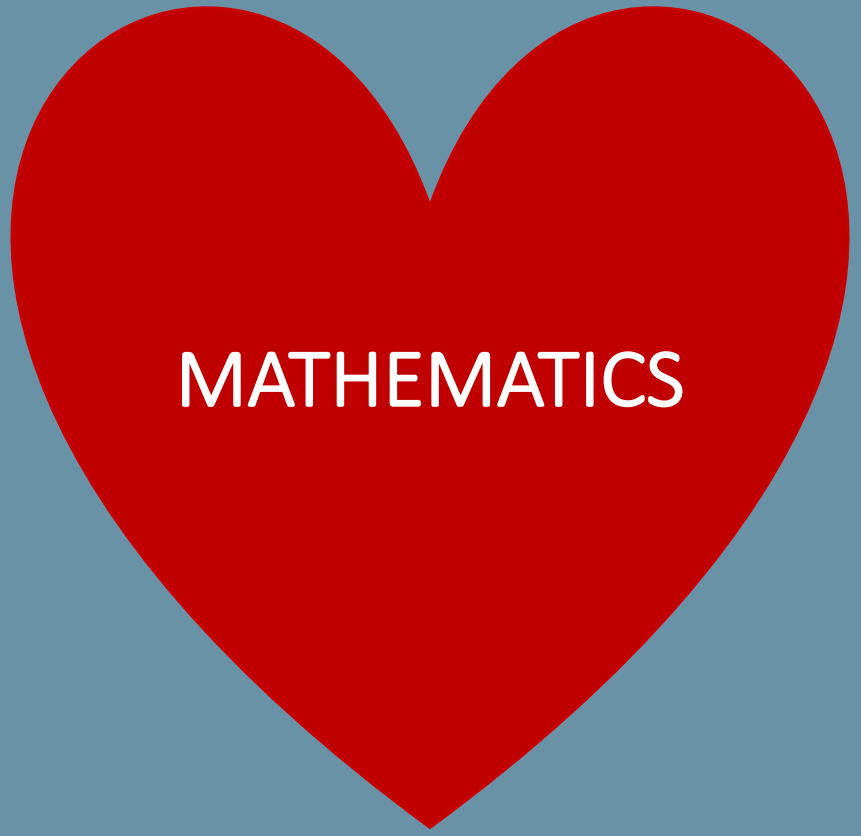
What is best for a group?
(data and statistics)

Mathematics that Tells a Story

- How could the mathematics in your curriculum become part of a narrative?
- Could this narrative be set in any of the contexts you listed?
- What content standards might you have an opportunity to address?

Using Mathematics to Make a Decision

Using Mathematics to Make a Decision



Using Mathematics to Make a Decision

MATHEMATICAL MODELING

Students develop a strategy or an expression for predicting the cost of a field trip. They test the strategy in different classrooms and for different sites, and use their findings to decide where they should go in the spring.

APPLYING MATHEMATICS

Students are told there will be an all fourth-grade field trip to the zoo. They are given facts like how many students will fit on a bus, the cost of a bus, and the cost of entry to the zoo. Students are asked to calculate how much the field trip will cost.

Lower-Case “d” Decisions

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students

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students

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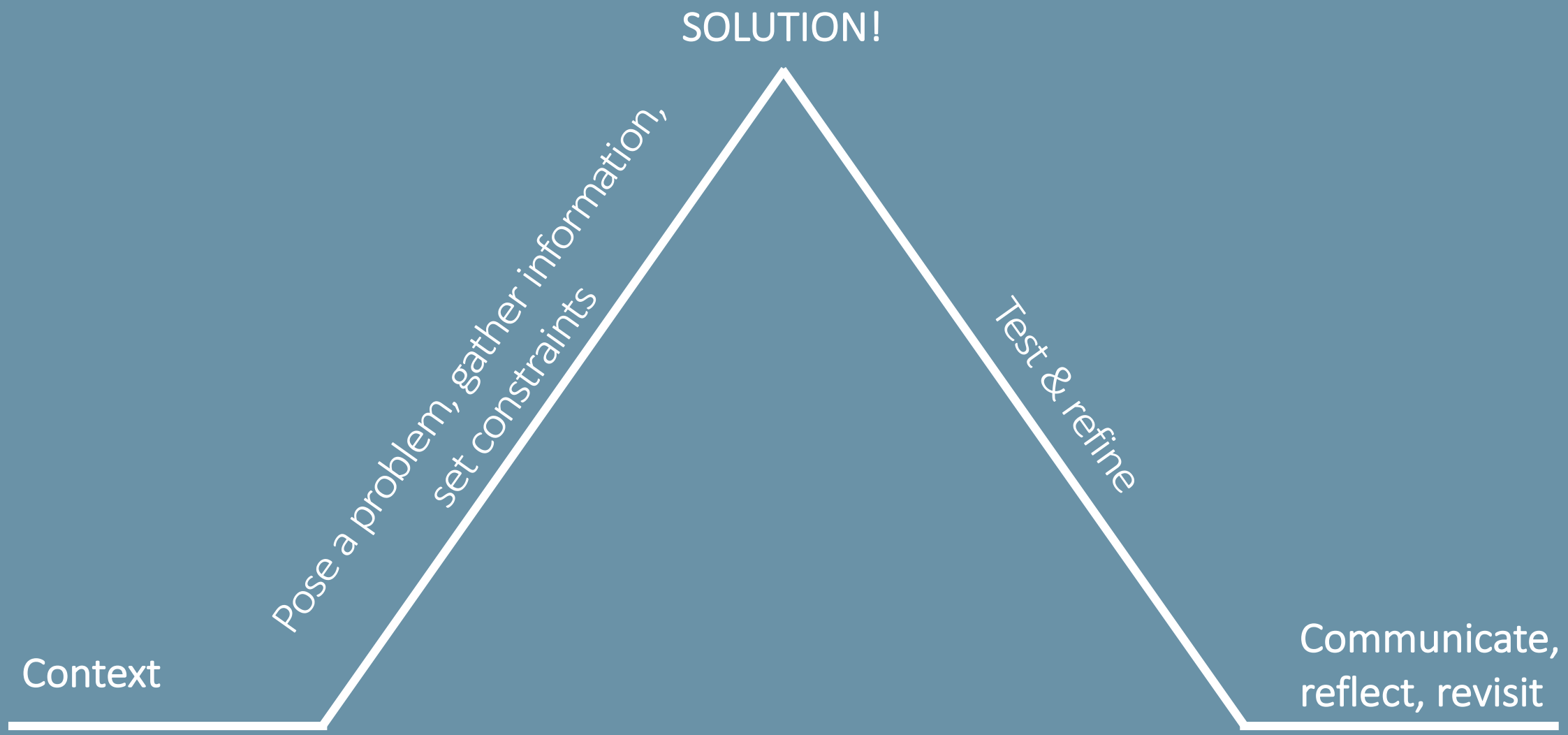
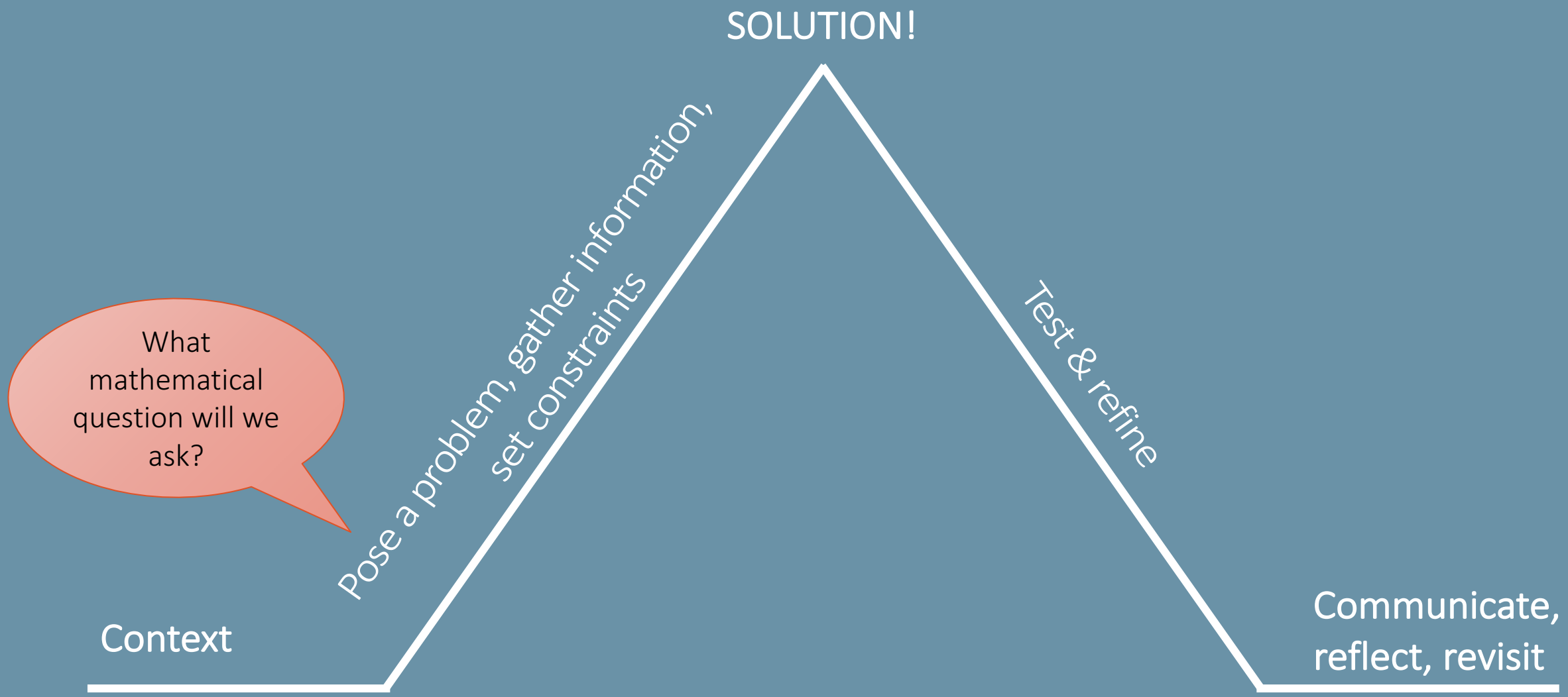
students


SOLUTION!
Pose a problem, gather information, set constraints
Test & refine
Context
Communicate, reflect, revisit


SOLUTION!
What mathematical question will we ask?
Pose a problem, gather information, set constraints
Test & refine
Context
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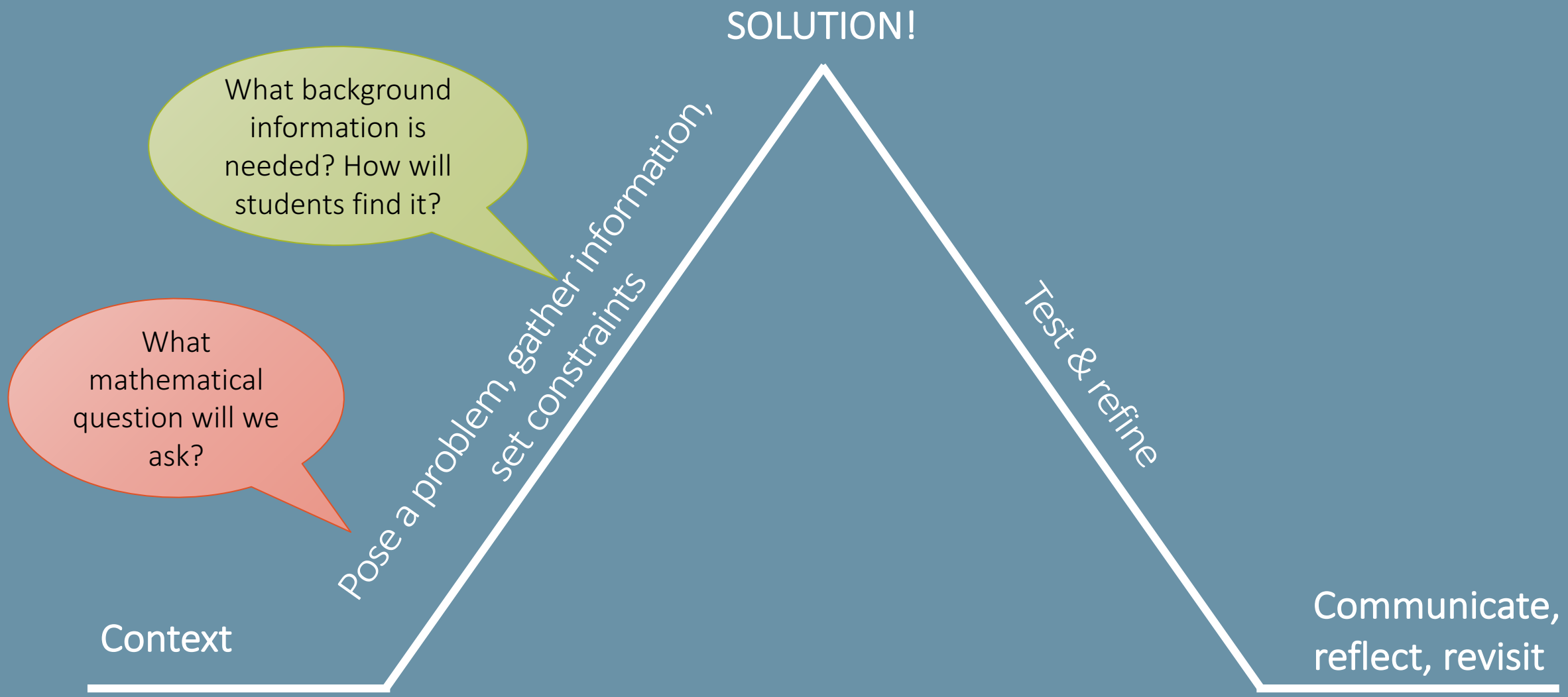
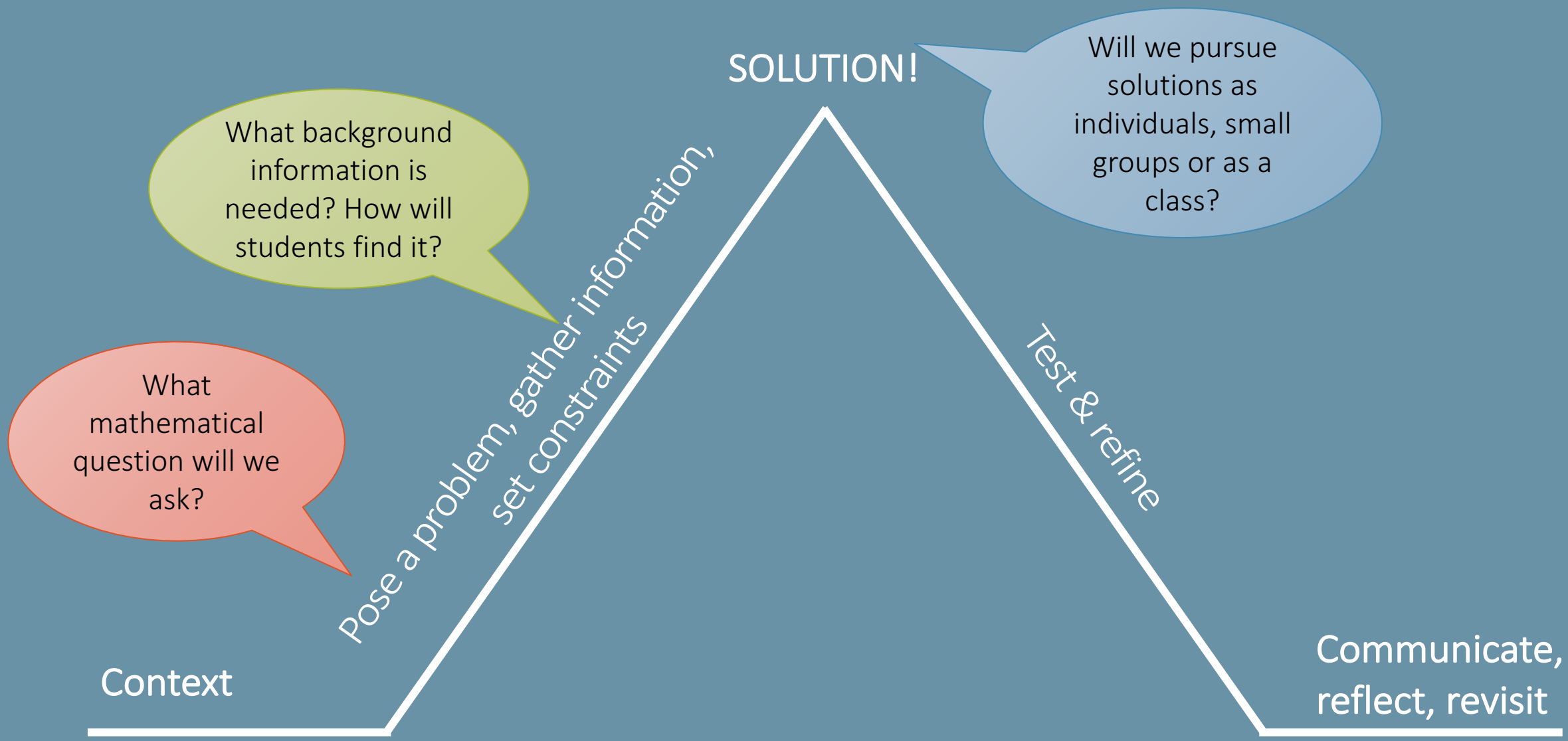

SOLUTION!
What background information is needed? How will students find it?
What mathematical question will we ask?
Pose a problem, gather information, set constraints
Test & refine
Context
Communicate, reflect, revisit


SOLUTION!
Will we pursue solutions as individuals, small groups or as a class?
What background information is needed? How will students find it?
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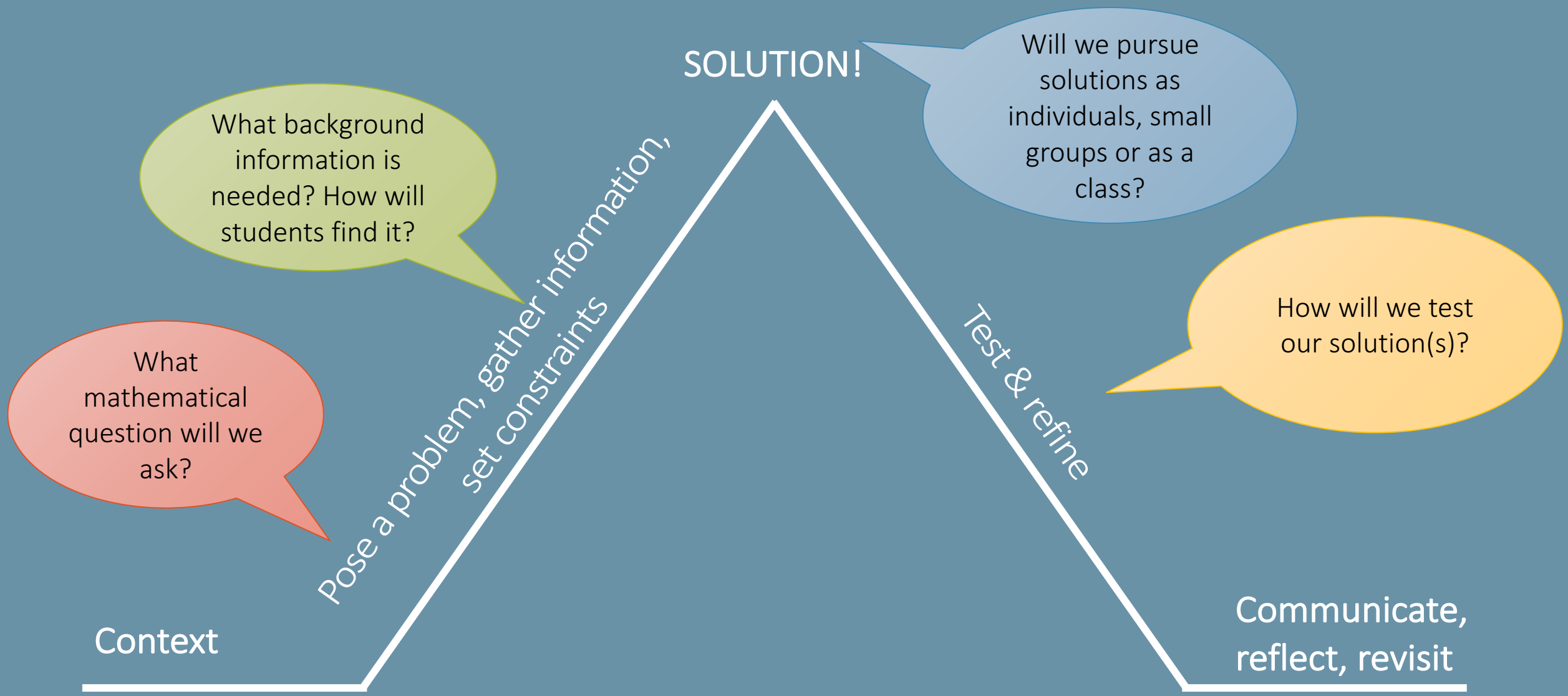
Pose a problem, gather information, set constraints
Test & refine
Context
Communicate, reflect, revisit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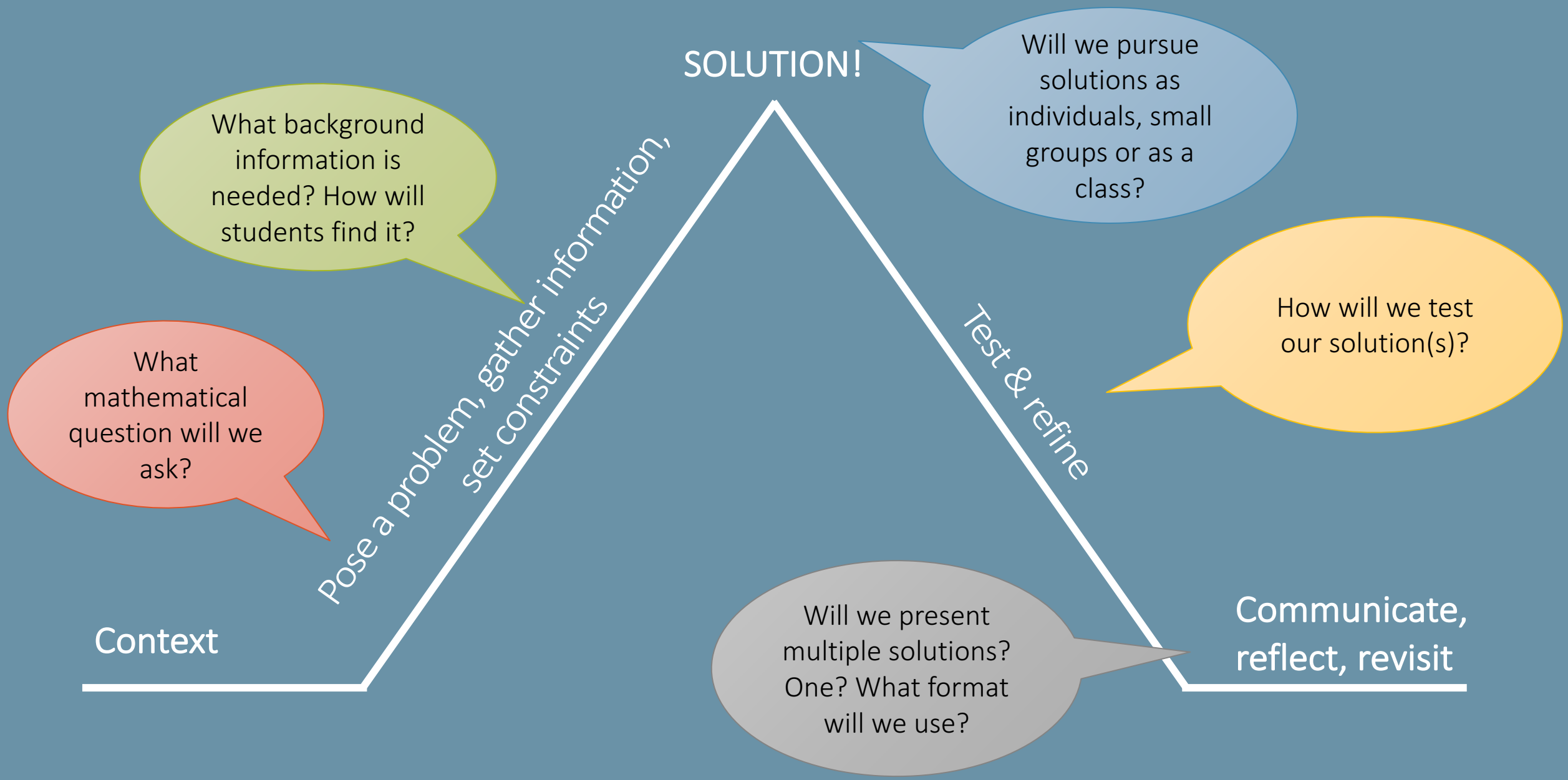
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What background information is needed? How will students find it?
How will we test our solution(s)?
What mathematical question will we ask?
Pose a problem, gather information, set constraints
Test & refine
Will we present multiple solutions? One? What format will we use?
Context
Communicate, reflect, revisit

PUT ch news paper

compation
Facts
prade
Magsin
cemershil
website
news
strch the truth
porsters

What is The best
way for Heart of The valley
To advertize This Summer

- What have you done To advertize In The past
- How much money do you have

“What does “best” mean in this situation?”

“How do we want to spend the budget of $4,000 over a 4-month period?”

“How should we share our decision with our client?”

H.O.V. Proposal

Client: Heart of the Valley Humane Society.

Address: 1549 East Cameron Bridge Road, Bozeman Mt

Created by Hannah P. and Lexi K.

-Two billboards $2,400

-Two bus stop posters $1,200

-Sunday Newspapers for 1 week

-Radio for 4 weeks 9:00 pm to 8:00 am

-Full color Ads for 8 weeks

We want to do 5 days in each month on the radio for the Summer.

11 hours in one night is $165

$165 × 5 = 825

5 days in one month is $825 which would equal

5 days in on month is $825

5 days in each month is $1,650

825 × 2 = 1,650

4,835 − 1,650 = 3,185

Using Mathematics to make Decisions

- What mathematical question could your students ask and answer in this task?
- How could mathematics be used to make a decision?
- What “lower-case d” decisions do you want students to make as individuals? In small groups? As a class?

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- STANDARDS: *Anticipated, but not always pre-determined*

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- STANDARDS: *Anticipated, but not always pre-determined*
- DIRECT TEACHING: *Motivated by the problem itself*
- TIME: *Yes…but…*

Making Modeling **MEANINGFUL**

integrated

Making Modeling **MEANINGFUL**

ENGAGING

integrated

Making Modeling **MEANINGFUL**

challenging

ENGAGING

integrated

Making Modeling **MEANINGFUL**

EMPOWERING

challenging

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Making Modeling **MEANINGFUL**

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Questions? Comments?

Thank you!