NATIONAL GEOGRAPHIC LEARNING

TEACHER TRAINING SERIES

TIPS *for* SUNDAY MORNING

Episode 4, May 2021

DEVELOPING MATH SKILLS: English Language Learners

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National Geographic Learning

TEACHER TRAINING SERIES

NATIONAL GEOGRAPHIC LEARNING

TIPS *for* SUNDAY MORNING

PROFESSIONAL LEARNING COMMUNITY

Share current trends in education

Share Activities and lessons for today's blended classrooms

Tips from Teachers and Leaders in the field

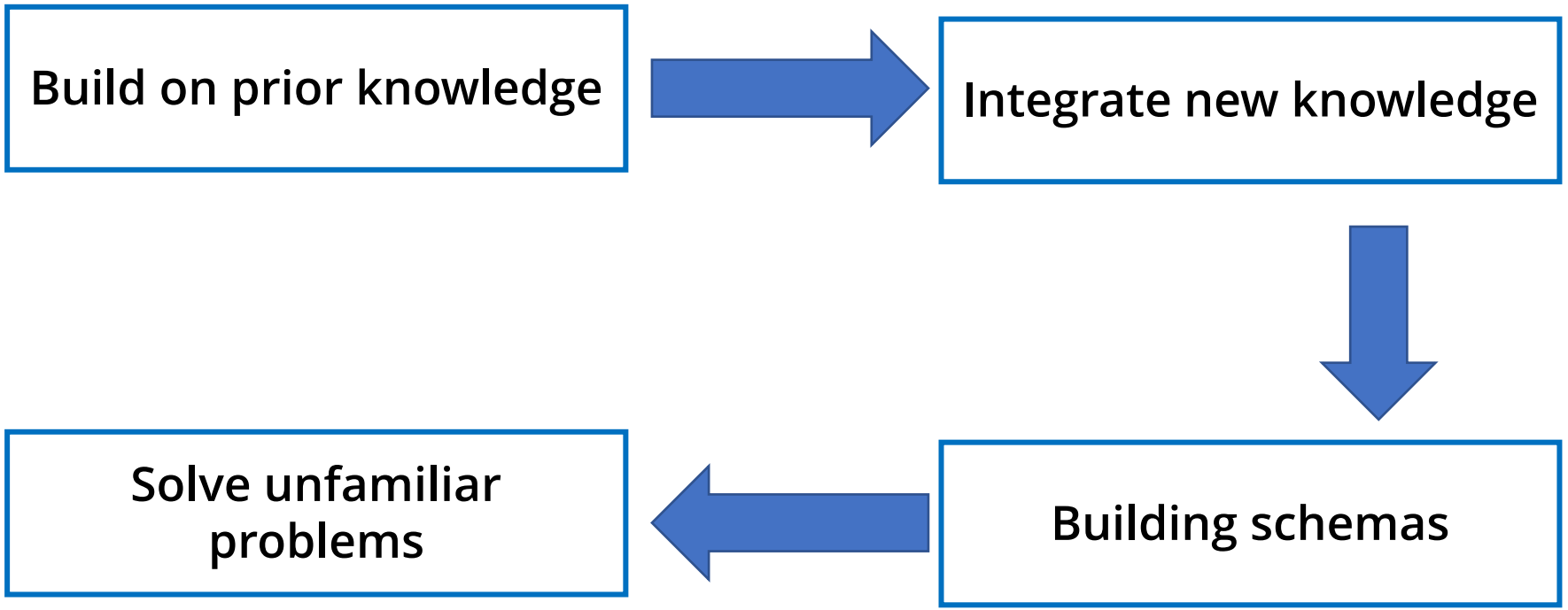
Balanced Approach to teaching mathematics

NATIONAL GEOGRAPHIC LEARNING

CONCEPTUAL UNDERSTANDING

NATIONAL GEOGRAPHIC LEARNING

Conceptual Understanding



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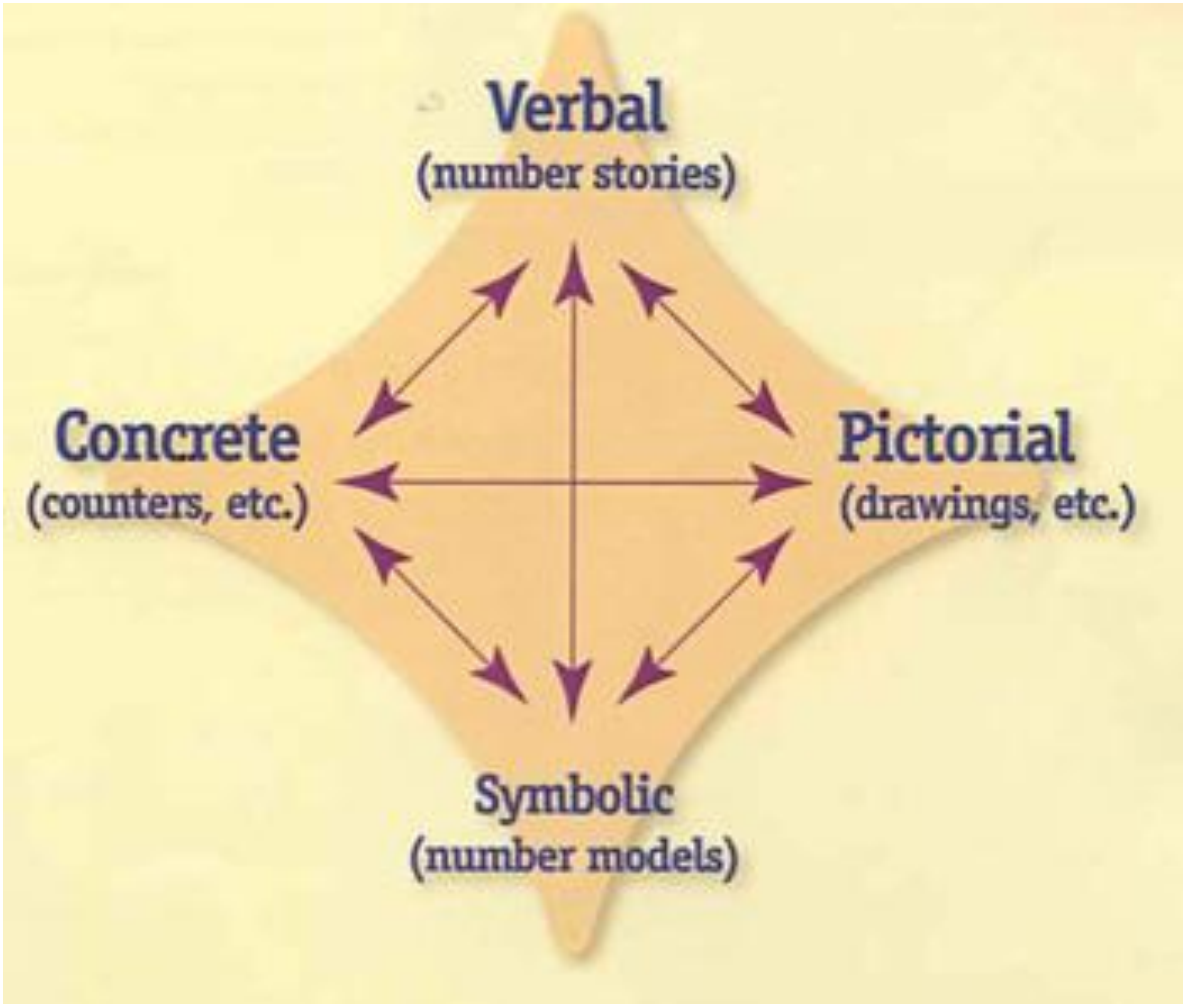
Conceptual Understanding:

Bridging the gap for Elementary Students



University of Chicago, School Mathematics Project

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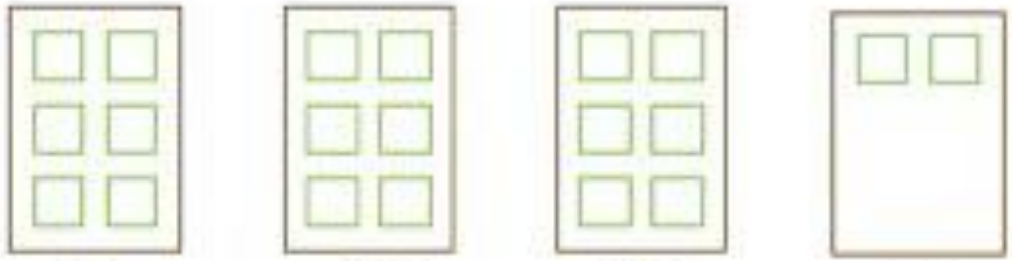
Problem 6: Tina is storing 20 packages of seeds in boxes. Each box holds 6 packages. How many boxes does Tina need to store all the packages?



Tina needs 4 boxes.
1 box is not full.

A picture solution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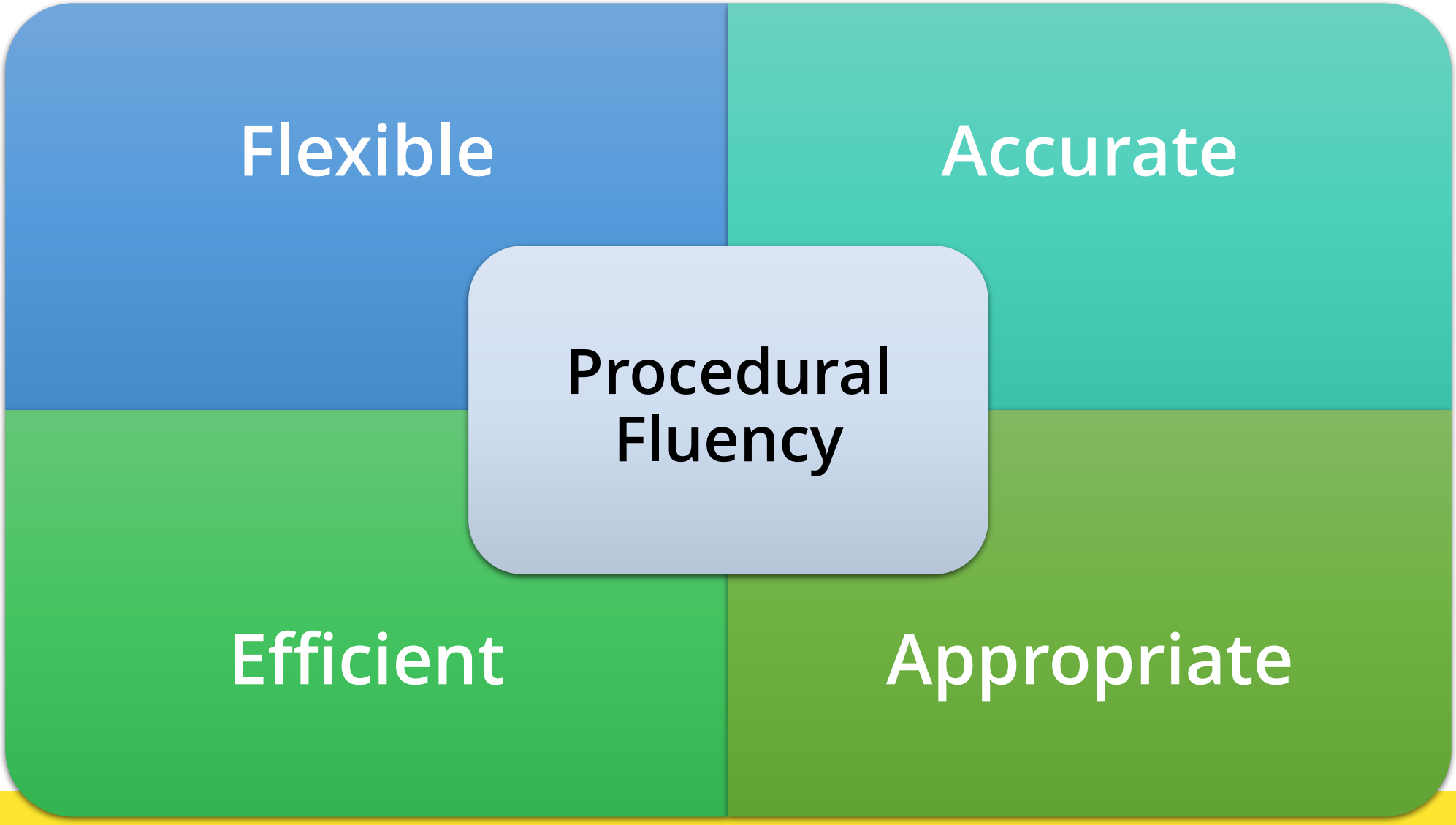
LEARNING
PROCEDURAL FLUENCY


Flexible
Accurate
Procedural Fluency
Efficient
Appropriate

NATIONAL GEOGRAPHIC LEARNING

Procedural Fluency

Flexible → Carry out problems easily, keep track of subproblems, and make use of intermediate results to solve the problem

Accurate → Produces the correct answer

Efficient → Uses more than one approach, chooses appropriate strategies, and can re-check answers

Appropriate → Knows when to apply a particular procedure

Procedural Fluency

Learn with clear, stepped-out teaching and examples, and become fluent through **Self-Assessment, Practice,** and **Review & Refresh.**

EXAMPLE 1 **Graphing $f(x) = a(x - p)(x - q)$** WATCH

Graph $f(x) = -(x + 1)(x - 5)$. Find the domain and range.

SOLUTION

Step 1 Identify the x-intercepts. Because the x-intercepts are $p = -1$ and $q = 5$, plot $(-1, 0)$ and $(5, 0)$.

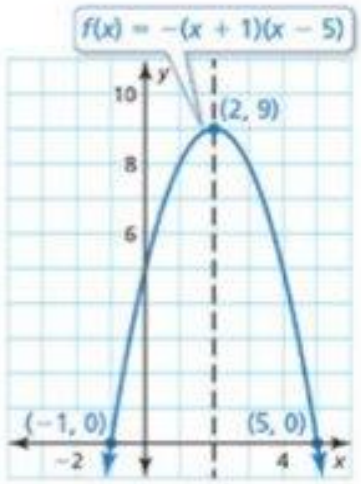
Step 2 Find and graph the axis of symmetry.

$$x = \frac{p + q}{2} = \frac{-1 + 5}{2} = 2$$

Step 3 Find and plot the vertex. The x-coordinate of the vertex is 2. To find the y-coordinate of the vertex, substitute 2 for x and evaluate.

$$f(2) = -(2 + 1)(2 - 5) = 9$$

So, the vertex is $(2, 9)$.



Step 4 Draw a parabola through the vertex and the points where the x-intercepts occur.

▶ The domain is all real numbers. The range is $y \leq 9$.

HIGH SCHOOL EXAMPLE:

Big Ideas Math ALGEBRA 1

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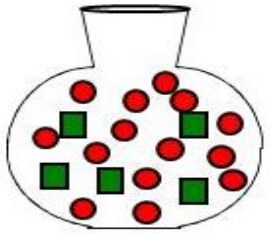
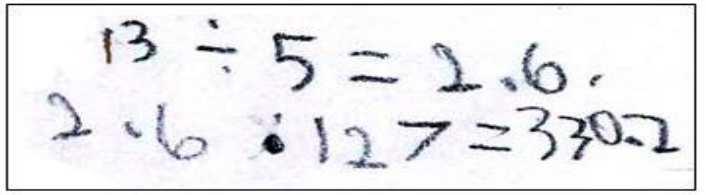
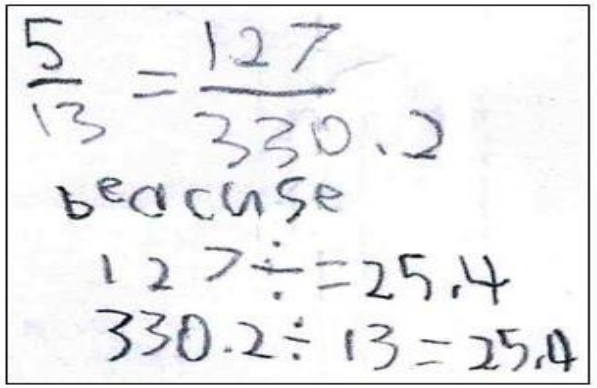
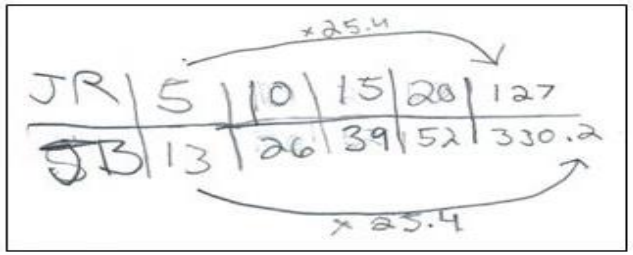
Procedural Fluency



$$\frac{5}{13} = \frac{127}{x}$$

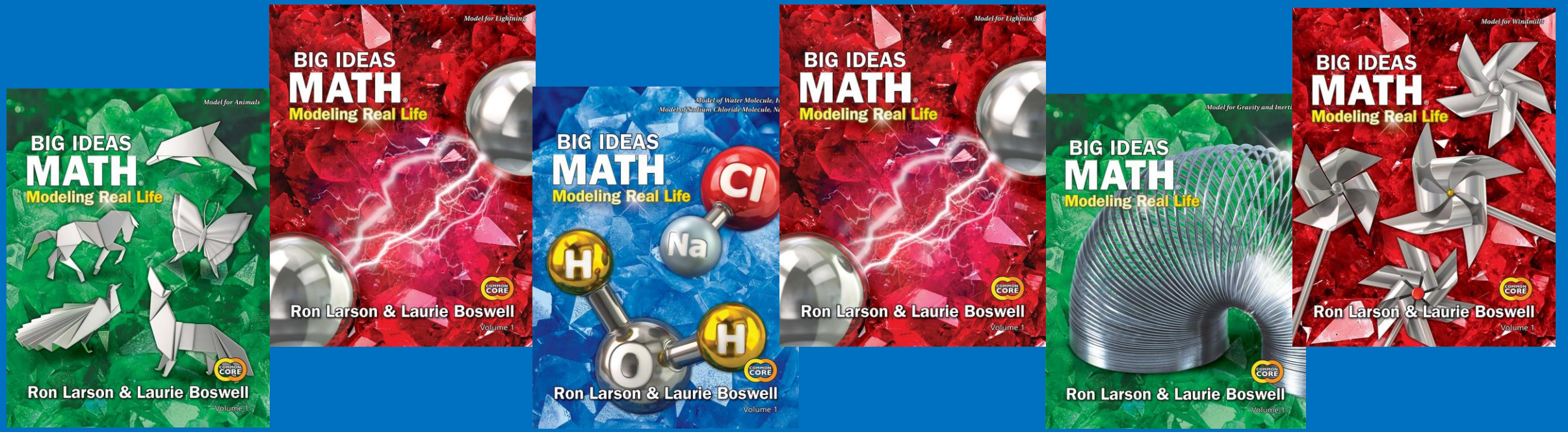






NCTM NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS

APPLICATON


BIG IDEAS
MATH
Modeling Real Life
Ron Larson & Laurie Boswell
Volume 1
Model for Animals
Model for Lightning
Model for Windmills
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Application

Make meaning of mathematics

Make connections

Real world application

Apply and Grow: Practice

3. $? + 8 = 9 + 6$

$? + 8 = \_\_\_\_$

$\_\_\_\_ + 8 = \_\_\_\_$

So, $\_\_\_\_ + 8 = 9 + 6$.

4. $13 - 8 = ? - 6$

$\_\_\_\_ = ? - 6$

$\_\_\_\_ = \_\_\_\_ - 6$

So, $13 - 8 = \_\_\_\_ - 6$.

5. $14 - 6 = ? + 2$

$\_\_\_\_ = ? + 2$

$\_\_\_\_ = \_\_\_\_ + 2$

So, $14 - 6 = \_\_\_\_ + 2$.

6. $15 - ? = 3 + 3$

$15 - ? = \_\_\_\_$

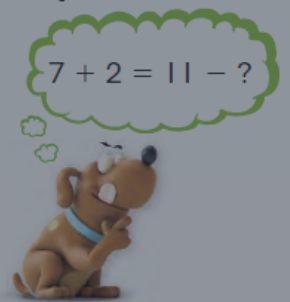
$15 - \_\_\_\_ = \_\_\_\_$

So, $15 - \_\_\_\_ = 3 + 3$.

7. $\_\_\_\_ - 6 = 3 + 2 + 1$

8. $6 + 4 + 4 = 6 + \_\_\_\_$

9. **YOU BE THE TEACHER** Newton says 2 makes the equation true. Is Newton correct? Show how you know.



Think and Grow: Modeling Real Life

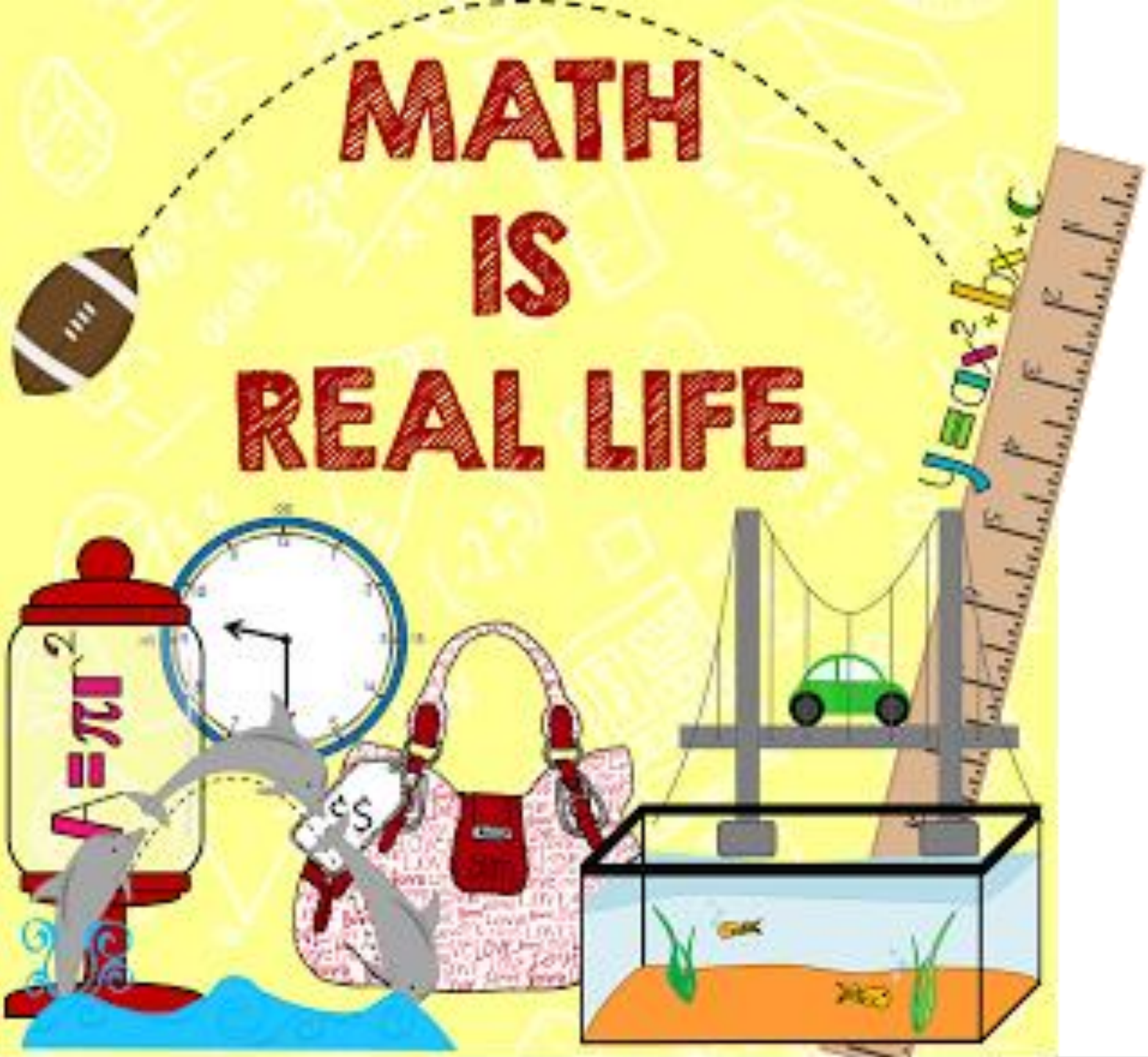
You catch 11 butterflies. 4 fly away. Your friend catches 3 butterflies. How many more butterflies must your friend catch to have the same number as you?

Equation:

$\_\_\_\_ - \_\_\_\_ = \_\_\_\_ + ?$

$\_\_\_\_$ butterflies

Apply to a REAL WORLD situation for relevance.


MATH
IS
REAL LIFE
$A=\pi r^2$
$y=ax^2+bx+c$

Paper planes

They're not just a distraction. Creating a paper plane that flies the length of the room (or further) is an introduction to the careful design, testing, and refinement involved in engineering. For math teachers it's also an engaging way to get students experimenting with measurement and shapes

Takeout container challenge

If structural engineering and computer science aren't really your students' thing, try takeout food instead! Challenge students to create an insulated container that can keep food hot or cold for as long as possible. In addition to the science stuff, measuring and tabling the temperature will build their number sense.

Bridge-building

Building a model bridge exposes students to the world of structural engineering, while honing mathematical understandings of measurement and ratio. All you need are wooden popsicle sticks or skewers and plenty of glue (optional string if your students want to get really creative and make a suspension bridge).

Website: https://www.3plearning.com/blog/math-stem-activities/

Lesson Type	Purpose	Lesson Objective
Conceptual Understanding	"I learned something new about math today."	"Understand that..."
Fluency/ Procedural Skills	"I learned and/or practiced a more efficient way to do math and I understand why it works."	"Practice or acquire skill in..."
Application	"I used my math knowledge today to solve a problem."	"Apply knowledge of ___ in order to..."

TEACHING TIPS

Ngl-emea.com/k12

THE NATIONAL GEOGRAPHIC LEARNING EMEA HOMEPAGE FOR K-12

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