



# Greater Good in Education

SCIENCE-BASED PRACTICES FOR KINDER, HAPPIER SCHOOLS

## FINISHING MATH WORD PROBLEMS

*"Everything around you is mathematics. Everything around you is numbers. Without mathematics, there's nothing you can do."*

—*Shakuntala Devi*

### OVERVIEW

Students will “finish” math problems by making connections between solutions to problems and everyday life, with the goal of seeing themselves represented in the math.

### PLANNING FOR IT

#### WHEN YOU MIGHT USE THIS PRACTICE

- To help students identify the relevance of math to their daily lives
- To support students in making meaning from mathematics beyond the simple “correctness” of their answers or process
- To break the pattern/idea of finding the correct answer as the end goal of math reasoning and processes

#### TIME REQUIRED

- ≤30 minutes

#### LEVEL

- Upper Elementary
- Middle School
- High School

#### MATERIALS

- Paper
- Pencil/pen

#### LEARNING OBJECTIVE

Students will:

- Interpret mathematical solutions in terms of context and conceptual meaning
- Consider the implications of mathematical solutions

## ADDITIONAL SUPPORTS

- [Making Practices Culturally Responsive](#)
- [Adapting Practices for Students with Special Needs](#)
- [Making Classrooms and Schools Trauma-Informed and Healing-Centered](#)

## CHARACTER STRENGTHS

- Curiosity
- Purpose
- Meaning

## SEL COMPETENCIES

- Self-Awareness
- Social Awareness
- Responsible Decision-Making

## MINDFULNESS COMPONENTS

- Focused Attention
- Open Awareness
- Non-Judgment

## HOW TO DO IT

### REFLECTION BEFORE THE PRACTICE

Take a moment to think about how you personally feel about math.

- When does math feel most relevant to your life?
- What are you already doing to help your students see math as relevant to their lives?

### INSTRUCTIONS

#### BEFORE YOU BEGIN

When solving math word problems with students, teachers often use the following three steps:

1. Read the problem closely to determine the appropriate information and procedure needed to solve the problem.
2. Model the problem mathematically; extract the numbers; set up an equation.
3. Solve the equation.

After finding the solution to a problem, teachers tend to move on quickly without much discussion of what the solution means. When this happens, the meaning of math is reduced to simple correctness and overtime this can lead students to struggle to find meaning in math beyond whether or not they can solve a problem. Research finds that this can lead students to disengage from math as it feels irrelevant to their lives.

#### THE ACTIVITY

To better support students, teachers help students to “finish” a problem by adding the following step to the above method.

4. Re-insert the answer into the word problem and work with students to interpret the conceptual and contextual meaning of the solution.

For example:

*In June, 2007 Steve Jobs introduced the first version of the iPhone for \$499. This was the first smartphone ever released by Apple. In 2017, the iPhone 7 Plus is the latest model and is priced as \$769. Since the iPhone was introduced in 2007, what has been the percent increase on the price?*

The solution to the problem is 54%. To help students connect the problem to their lives, ask the following kinds of questions:

- What does a 54% increase in the iPhone actually mean? Is that fair?
- What might be some reasons for the increase?
- Would you buy this product? Why or why not?
- Given your understanding of the change in price would you recommend this product to others? Why or why not?

Three potential interpretations include:

- Inflation: Money is worth less than it was in the past, therefore you need more money to buy the same things now.
- Apple markup: Apple realized that they have a really popular product so now they are able to charge more money for it. But is that fair? Why or why not, discuss?
- Better product: Maybe today's iPhone is actually 54% better than it was 10 years ago (e.g., faster, more options, more storage space).

The purpose is not to find the correct interpretation for the occurrence, but to give students the opportunity to discuss the answer with depth and to see how the answer and math is relevant to everyday life and decisions.

#### REFLECTION AFTER THE PRACTICE

- Do you notice a difference in your students' engagement with math problems? What other steps could you take to make math more relevant to students' lives?

#### THE RESEARCH BEHIND THE PRACTICE

#### EVIDENCE THAT IT WORKS

A [mixed-methods study](#) of 419 mainly Black and Latino 5th-9th graders found that teachers' use of teaching strategies that connect classroom mathematical concepts to the outside world and that allow students to see themselves in the mathematics help predict adolescent's growth in valuing mathematics.

#### WHY DOES IT MATTER?

Teachers have the opportunity to promote inclusion and equity through how they teach math. [Equitable teaching practices](#) in high school math, such as heterogeneous grouping and student responsibility for peer learning, can increase achievement and decrease inequities in math performance. At the individual level, this is important given that math achievement can [open doors](#) to higher education and career opportunities. But math achievement goes

beyond simply setting up students for career success; it can also help students become [better citizens](#), more able to understand the world and [contribute to transforming](#) it.

## SOURCE

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