



# Increasing Mastery: Open Middle™ Problems



## How Can Open Middle Problems Help Your Students?

Have you ever felt like your students understood what you taught them only to find out later that you were mistaken? This happens all too often and what makes this feel especially frustrating is that sometimes we don't see these issues during the lessons because it really seemed like students understood.

This is where Open Middle problems can really help. They are:

- Great for uncovering hidden misconceptions
- Require students to think deeply about concepts
- Help you identify issues you may not be aware of
- Give you time to address misunderstandings before it is too late

You'll also love the conversations, strategies, and enthusiasm that come out when using them. Be careful, though, because you may find that if you start using them and stop, kids will keep requesting them because they make math so much fun!



## Tips for Using Open Middle Problems With Your Students

When using Open Middle problems with your students, consider:

- These problems can be more challenging than you'd expect. Be sure to solve the problem ahead of time as it will make the lesson go much more smoothly.
- Students may want to give up when trying these problems at first because they can't robotically follow steps in their notes to complete the problems. One way to support their perseverance is to provide a copy of the Open Middle Worksheet available in the Teacher Resource Masters on Ed. The worksheet has boxes for three attempts and awards points for each attempt as well as reflecting on the strategy they used.
- Each problem has hints in the Teacher Solution Key to assist students and nudge them in the right direction, yet still allow them to make their own discoveries.
- If you notice that students frequently repeat the same digit, consider giving them the digits on small tiles or slips of paper to help them keep track of what's been already used.



# Try these Open Middle Problems with your class today!

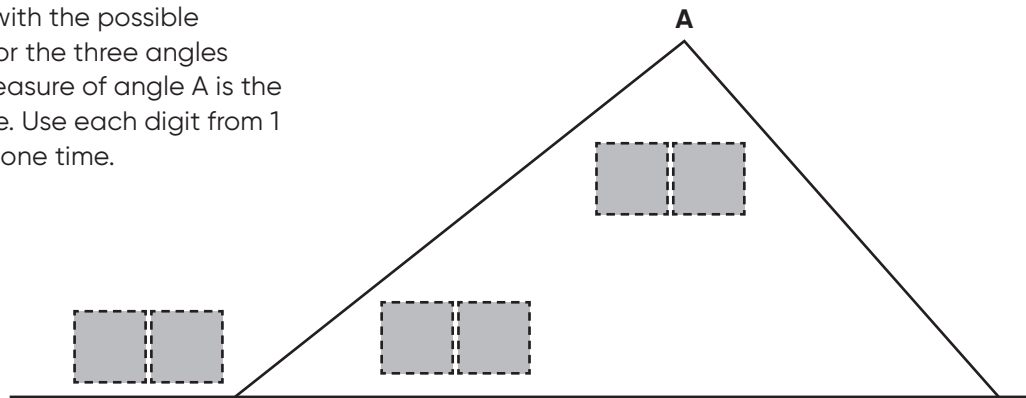
## Algebra 1

Using the digits 1 to 9 at the most one time each, fill in the boxes to make a true statement.

$$\sqrt{\square} + \sqrt{\square} = \square$$

## Geometry

Fill in the boxes with the possible measurements for the three angles such that the measure of angle A is the greatest possible. Use each digit from 1 to 9 at the most one time.



## Algebra 2

Using the integers  $-9$  to  $9$ , at most one time each, fill in the boxes to create a polynomial function and solutions whose  $x$ -intercepts are as close together as possible.

$$x^4 + \square x^2 + \square$$
$$x = \square, \square, \square, \text{ or } \square$$

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