Handout: Approaches to Modifying Tasks[1]

There are many approaches that can be used to modify mathematics exercises or problems to encourage reasoning and provide opportunities to engage in mathematical practices, such as:

- *Change the constraints of a story problem so that the problem has more than one possible answer*

Original problem	***Modified problem***
Ali's garden is 4 feet wide and 3 feet long. How much fencing does she need to put up a fence all the way around her garden?	Ali bought 14 feet of fence for her garden. Figure out different possibilities for how wide and long her garden might be? (Assume that the dimensions are whole numbers and that she uses all of the fencing) How do you know you have found all the possibilities?
(with pattern blocks) How many triangles fit on the trapezoid?	*(with pattern blocks)* What different combinations of pattern blocks fit exactly on top of the trapezoid? What different combinations of pattern blocks fit exactly on top of the hexagon?

- *Change the problem to work backwards (i.e., give a solution and ask students to write expressions to equal a specific answer)*

Original problem	***Modified problem***
5 + 8 =	___ + ___ = 13
20 x 3 =	Write a multiplication problem that equals 60.

- *Change the problem to involve more than one step*

Original problem	***Modified problem***
Sara bought 5 candy bars. If each one cost 50¢, how much money did she spend?	Sara wants to buy 5 candy bars for 50¢ each. She has $3. Is that enough money? If not, how much more money does she need? If it is enough, does she get any change back? How much?
(picture of different kinds of animals at a birthday party) How many bears are in the picture?	*(picture of different kinds of animals at a birthday party)* How many more bears need to come to the party so that there are more bears than any other animal?

[1] Used with permission from the Mathematics Methods Planning Group at the University of Michigan. Adapted from the Teaching Children Mathematics course, Fall 2004.

- *Ask students to write story problems to go with particular calculations*

Original problem	***Modified problem***
56 ÷ 8 =	Write a story to go with 56 ÷ 8.
2 ÷ 1/2 =	Make a picture that shows 2 ÷ 1/2.

- *Change specific cases to requests to generalize across cases or beyond the range of the initial problem by using phrases like "find all ___ that ___"*

Original problem	***Modified problem***
6 + 4 =	Write all the problems that add two whole numbers together to equal 10.
Circle the even numbers: 2 5 10 17 21 30	Find all the even numbers less than 32.
How much are two dimes plus one nickel?	What are all the ways to make change for 25¢? Prove that you have all the possibilities.

- *Rephrase closed problems as ones that encourage conjectures by using phrases like "What happens if…"*

Original problem	***Modified problem***
True or False: A square is a parallelogram.	If a square is a parallelogram, is a parallelogram a square?
249 x 17 =	If 249 x 17 = 4233, what happens to the product if you place a decimal point at different places in either factor?

- *Change problems from find solutions and generate justifications to involve analysis of an alternative method, a general claim, evaluation of correctness or validity, and if incorrect, error analysis*

Original problem	***Modified problem***
Which is more? $\frac{4}{7}$ $\frac{7}{8}$	A student claims that she has found a new method for comparing fractions less than 1. She looks at the numerator and denominator and the closer they are to one another, the greater the fraction. An example: $\frac{4}{7}$ $\frac{7}{8}$ She explains her example: "The difference between 4 and 7 is 3, and the difference between 7 and 8 is 1. This means that 7/8 is greater than 4/7." Is the general claim true?
Subtract: 3002 - 783	What method for subtraction was used here? 299 12 ~~3002~~ - 783 2219 How does it work, and why? Would it work for any subtraction problem?
Multiply: 2.75 × .24	Here is someone's solution to a multiplication problem: 2.75 × .24 1090 550 65.90 Is it correct or incorrect? If it is correct, how can you show that? If it is incorrect, what is wrong, and what caused the error?