

Readings: Barnes S. & R. V. Preston, (1999). Reflections on the Teaching and Learning of Problem Solving, Draft manuscript.

Please attempt all problems

1. How many 0's are there at the end of **100!**? (Remember 100! is equal to $100 \times 99 \times 98 \dots \times 3 \times 2 \times 1$)

2. Stan spilled ice cream on his homework. He could no longer read the equivalent expression he had written. Help him fill in the missing part. (Try to give an example that no one else in the class would come up with. Your answer will only be accepted if no one else has the same answer.)



- a. He was working with whole numbers.
- d. He was working with polynomials.

b. He was working with fractions.

- e. He was working with radicals.
- c. He was working with positive and negative integers.

3. (*Algebra I: A Process Approach* Pg. 86 #2) By using 4 threes with grouping symbols and the operations +, -, x. ÷, we can write an expression that simplifies to the number 1:

$$1 = 3^3 \div 3^3$$

We can also write an expression that simplifies to the number 5:

$$5 = (3+3) \div 3 + 3$$

Find other expressions that simplify to each number from 1 to 10.

4. A recent survey conducted at Lincoln Middle School found that dogs, cats, and fish were the most common pets among the student body. Fifty-six percent of the students had dogs, 34% had cats, and 14% had dogs and fish. Sixteen percent of the students have dogs and cats and 14% have only cats. If seven percent of the students have all three kinds of pets and 16% do not have any pets, what part of the students have fish?

Name.....

5. Mystery Numbers.

a. (Prime Time Teachers Guide, Connected Mathematics Project Pg. 72, #7) What is the mystery number?

Clue 1: My number is between the square numbers 1 and 25.

Clue 2: My number has exactly two factors.

Clue 3: Both 66 and 605 are multiples of my number.

- b. What is the mystery number?
- Clue 1: My number is between 150 and 200.

Clue 2: I am a square number.

Clue 3: I am two more than a prime number.

c. Create your own mystery number problem like the ones above for a number larger than 1,000. Make sure that *all three* clues are necessary to find your number *and only your number*.

- 6. The Skeleton Tower (from Problems with Patterns and Numbers: An Examination Module for Secondary Schools).
 - a. How many cubes are needed to build this tower?



b. How many cubes are needed to build a tower like this, but 12 cubes high?

c. Explain how you worked out your answer to part (b).

d. How would you calculate the number of cubes needed for a tower *n* cubes high?

Name.....

7. A teacher posed the following problem to her class:

The Great Eastern Railway is a shortline specializing in the regional delivery of crops, gravel, and phosphate. Their reports to the Federal Transportation Commission must include the amount of traffic over their railway. This traffic is given in number of axles that each train consists of (an axle is a rod that holds a pair of wheels in place). The engines on the Great Eastern Railway all have six axles and the cars (tankers and hoppers) all have four axles. If a recent train consisted of 43 units and had 178 axles, how many engines and how many cars were in the train?

When it came time to discuss the problem, students were first asked to simply tell the strategy they used to approach it. As a teacher, try to put yourself in the place of the students and work the problem in the manner that you anticipate the student has worked it.

a. LaMarcus said that he used guess-and-check to get his numbers.

b. Iris noted that she set up equations and graphed them on her calculator.

c. Drew remarked that he used tables on his graphing calculator for his solution process.

d. Megan claimed that only after drawing pictures was she able to get the answers.

Writing Assignment #3: Many times students say, "If only I had a hint I think I could solve this problem." Were there any problems on Problem Set #3, you wish you had a hint for? Which problem(s)? What have you tried so far? What would you like to know?