Strategies for Problem Solving

Contemporary Math (MAT-130)

Solve the following problems using any method.

1. When 15 gallons are put into a gas tank the indicator goes from $\frac{1}{3}$ full to $\frac{5}{6}$ full. What is the total capacity of the gas tank?

2. When 9 gallons are put into a gas tank the indicator goes from $\frac{1}{6}$ full to $\frac{2}{3}$ full. How much gasoline must be added to fill the tank?

3. Jim deposits his paycheck into his checking account. He uses $\frac{1}{2}$ of the money to pay his bills. He then puts $\frac{3}{5}$ of what is left into his savings account. Finally he lends $\frac{1}{8}$ of the remainder to his friend Linda. He has $70 left over. How much was Jim's paycheck?

4. Greg buys 3 pizza pies for him and his three friends. His first friend eats $\frac{1}{2}$ of a pie, his second friend eats $\frac{3}{4}$ of a pie, and his third friend eats $\frac{5}{8}$ of a pie. Greg then eats $\frac{1}{3}$ of what is left. How much pizza is left when everyone is done eating?

5. A mathematician was asked how old he was. He responded, "I am $\frac{1}{5}$ of my age plus 32." How old is the mathematician?

6. Frank's grandson is 2. Frank says that in 4 years his age will be the square of his grandson's age in 7 years. How old is Frank now?

7. John can mow a lawn in 3 hours; Jim can mow a lawn in 4 hours. How long will it take for both of them to mow a lawn?

8. Five of Santa's elves can make 60 presents in four hours. How many presents can one elf make in one hour?

9. Seven mechanics can fix 14 cars in 3 hours. How long would it take 3 mechanics to fix 8 cars?

10. Wendy does not want anyone to know how old she is. When asked she replies with a riddle. She says "The square root of my age in 15 years will be the same as the square of my age 15 years ago. How old is Wendy?

11. Five people are standing in a circle. Every person shakes hands once with everyone else in the circle. How many handshakes take place?

12. What are the final two digits of 7^{335}?

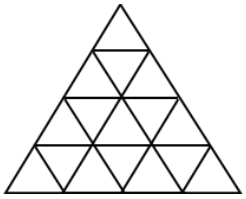
13. What is the final digit of 3^{612}?

14. If 5ψ=15¥, 20¥=100₡, and 4₡=8ζ. How many ζ is 1 ψ?

15. Alan, Bob, Catherine, Danielle, and Frank ran in a race. Alan did not come in first or last. Frank finished before Alan but after Catherine. Bob finished before Frank but did not win. Danielle came in last. In what order did they finish?

16. In the number 1978 the last two digits plus the first two digits equal the middle two digits (i.e. $19 + 78 = 97$). What is the largest 4 digit number where this is true?

17. How many triangles are in this figure?



18. Fill in the digits to make the following problem correct.

$$\begin{array}{r} 6\square 8 \\ 95\square \\ +\square 27 \\ \hline \square 101 \end{array}$$

19. A magic square is a square array of numbers where the sum or any row, column or diagonal is the same. Complete the square below so that it becomes a magic square, and the digits 1-9 are used only once.

2	7	☐
☐	5	☐
☐	☐	8

20. Repeat problem 4 such that all counting numbers from 1-16 are used once and the sum of any row, column, or diagonal is 34.

☐	14	☐	3
☐	4	☐	☐
12	☐	5	2
6	☐	☐	16

Solutions:

1. 30 gallons
2. 6 gallons
3. $\$400$
4. $\frac{3}{4}\ of\ a\ pie$
5. 40 years old
6. 77
7. $\frac{12}{7}$
8. 3 presents
9. 4 hours
10. 21 years old
11. 10 hand shakes
12. 43
13. 1
14. 30 ζ
15. Catherine, Bob, Frank, Alan, Danielle
16. 8901
17. 27
18. $\begin{array}{r} 618 \\ 956 \\ +527 \\ \hline 2101 \end{array}$
19. $\begin{array}{ccc} 2 & 7 & 6 \\ 9 & 5 & 1 \\ 4 & 3 & 8 \end{array}$
20. $\begin{array}{cccc} 9 & 14 & 8 & 3 \\ 7 & 4 & 10 & 13 \\ 12 & 15 & 5 & 2 \\ 6 & 1 & 11 & 16 \end{array}$