1. [6pts] a) Choose one **Mental Addition Method**, create your own problem, state the method, and work the problem.

   Method: ________________________________

   Problem and work:

   [6pts] b) Choose one **Mental Subtraction Method**, create your own problem, state the method, and work the problem.

   Method: ________________________________

   Problem and work:

2. [6pts] Use the Repeated Subtraction Method to find the quotient of \( \frac{475789}{47} \).

3. [8pts] Find the following using the listing method
   a) GCF (32, 48)  
   b) LCM (32, 48)

4. [6pts] Given \( a = 2^2 \cdot 3^2 \cdot 5 \cdot 7 \) and \( b = 2^3 \cdot 3 \cdot 5^2 \cdot 11 \), state the following. Leave your answer in prime factorization form.
   a) LCM(a,b) =  
   b) GCD(a,b) =

5. [6pts] Use the Factor Tree Method to find the prime factorization of 2940.

6. [7pts] Use Lattice Multiplication to find the product of \( 367 \times 489 \).
7. [7pts] Use SCRATCH addition to find the sum. Show all scratches and carries.

```
  2 3 6 8
  1 4 5 5
  1 5 4 7
  4 5 6 2
  2 3 6 7
  1 8 1 3
```

8. [12pts] Complete the following

a) Fill in the blanks for the following sequence. 4, 8, 12, 16, ________, ________, ________
   type of sequence ____________  51st term _________  nth term _________

b) Fill in the blanks for the following sequence. 3, 12, 48, ________, ________, ________
   type of sequence ____________  51st term _________  nth term _________

c) Write the first 5 terms of the Fibonacci sequence

d) Write the first five terms of one of the sight sequences.
   51st term _______  nth term ________

9. [6pts] Use division by Primes Method to find the LCD(15, 26, 36)

10. [24pts] Use AREA MODEL to do the following calculations. Use a rectangular UNIT shape.

   For part a) Use two different colors for the addition problem.
   a) \[ \frac{2}{3} + \frac{3}{4} \]
   work:
   a) work by the algorithm
   Answer in drawing
10. b) \(\frac{2}{3} - \frac{4}{5}\)

   b) work by the algorithm

   work:

   Answer in drawing:

   c) Use two colors to find the product of \(\frac{2}{5} \times \frac{1}{2}\)

   c) work by the algorithm

   work:

   Answer in drawing

   d) Use the Area Model to find the quotient of \(\frac{3}{4} \div \frac{2}{3}\).

   D) work by the algorithm

11. [10pts] Work \(\frac{7}{9} + \frac{5}{6}\) by the

   a) LCD method (USA method). You must show how you obtained the LCD.

   b) Common Denominator method

12. [10pts] Perform the indicated operations by showing Q, N, and P:

   a) \(\frac{243}{five} + \frac{132}{five}\)

   b) \(\frac{312}{five} - \frac{223}{five}\)

13. [5pts] Rodrigo uses squares to create the pattern of figures below

   ![First figure](image1)
   ![Second figure](image2)
   ![Third figure](image3)
   ![Fourth figure](image4)

   How many squares does it take to build the 5th figure? Justify your answer without drawing them out.

1st way

2nd way

15. [9pts] Answer the following questions.

a) Find **ALL POSSIBLE** single digit numbers to put in the blank so that the following number is divisible by 3: 12549__8, Explain your answer by using the divisibility rules.

b) Find **ALL POSSIBLE** single digit numbers to put in the blank so that the following number is divisible by 4: 1245__4. Explain your answer by using the divisibility rules.

c) Find **ALL POSSIBLE** single digit numbers to put in the blank so that the following number is divisible by 5: 12346___. Explain your answer by using the divisibility rules.

16. [5pts] Fill in the following number pyramid using 27, 18, 15, and 19 at the base so that the largest sum is in the top box. Complete the pyramid.

```
    [ ]
   [ ] [ ]
  [ ] [ ] [ ]
 [ ] [ ] [ ] [ ]
```

17. [8pts] Fill in the blank with the correct mathematical term.

a) The answer to a multiplication problem is called the ________________.

b) The multiplicative inverse is also called ____________.

c) The answer to an addition problem is called the ________________.

d) A step by step process for working a problem is called _____________.

18. [6pts] Use the **Partial Product Method** to compute the following. Show all your work.

\[ 57 \times 65 \]
19. [6pts] Perform **ONE** of the following subtraction problems.

- New Zealand Method
  
  \[
  \begin{array}{cccc}
  & 5 & 2 & 4 \\
  - & 1 & 8 & 7 \\
  \hline
  & 8 & 7 & 4 \\
  - & 4 & 9 & 7 \\
  \end{array}
  \]

20. [6pts] USE **THE Pattern Blocks** to answer the following. All answers should be in reduced form.

   a) If red is 1, what is green? (name a fraction)
   b) If blue is 1, what is red? (name a fraction)
   c) If blue is 2/3, what is 1? (name a color)

21. Perform the following base operations.

   a) [4pts] Change \(342_{eight}\) to a base ten numeral.
   b) [4pts] \(254_{six} + 143_{six}\)
   c) [4pts] \(6T3_{twelve} \times 1E2_{twelve}\)

22. [8pts] State the property that is represented by each of the following examples. State the complete property with complete words.

   a) \(15 + (8 + 2) = (15 + 8) + 2\)
   b) \(7 \cdot 1 = 7\)
   c) \(9 + (3 + 5) = (3 + 5) + 9\)
   d) \(14 + 0 = 14\)

23. [4pts] Find a number that is not prime but is relatively prime to 18. Discuss how you choose this number. Explain why they are relatively prime.

24. [5pts] Choose **one** of the following problems to work. Circle the problems that you wish to be graded.

   1. Add 36 + 28 by the Sum of Ones and the Sum of Tens Method
   2. Add 78 + 26 by the Regrouping Method
   3. Add 57 + 46 by the Breaking Up and Bridging Method

25. [6pts] Simplify using Order of Operations as if you were teaching this method.

   \[14 - (8 - 2^2 + 3) - 4 \cdot 12 \div 2 \cdot 6\]