Number Theory Written Assessment

Assessment Objectives

Students will be able to…

- Correctly define key terms: prime number, composite number, divisible, multiple, and factor.
- Correctly classify numbers as either prime or composite given the numbers.
- Correctly identify factor pairs of given numbers.
- Correctly construct different rectangles from the same number of squares with each based on different set of factor pairs of that number given graph paper and the number of squares to be used.
- Articulate, orally and in writing, solutions and strategies to given Shikaku puzzles using mathematical terms and language.
- Adequately demonstrate deductive reasoning skills given Shikaku puzzles.
- Correctly explain the Fundamental Theorem of Arithmetic.
- Correctly identify the prime factorization of any given number.
- Correctly identify common factors and the greatest common factor (GCF) of two given numbers.
- Correctly identify common multiples and the least common multiple (LCM) of two given numbers.
- Correctly recognize the relationship between the lowest common denominator and the LCM.

Number Theory Assessment

Problems 1-2: Draw a line to match the definition to the word   Composite number

1) A number that has exactly two factors: 1 and itself   Prime number

2) A number that has more than two factors

Problems 3-8: Fill in the blank with the appropriate word: divisible, factor, or multiple. (These words may be used more than once.)

3) The number 24 is _____ by 4 because 24 divided by 4 has no remainder.

4) The number 24 is a _____ of 4 because 24 is divisible by 4.

5) The number 4 is a _____ of 24 because 24 is divisible by 4.

6) The number 49 is _____ by 7 because 49 divided by 7 has no remainder.

7) The number 49 is a _____ of 7 because 49 is divisible by 7.

8) The number 7 is a _____ of 49 because 49 is divisible by 7.

Problems 9-12: Consider each number. Write "prime" next to the number if it is prime; write "composite" next to the number if it is composite.

9) 51

10) 23

11) 121

12) 53

Problems 13-14: Circle the letter of the correct answer.

13) The greatest common factor of 85 and 51 is

   a) 3
   b) 15
   c) 17
   d) 13

14) The least common multiple of 3 and 7 is

   a) 10

    b) 21

    c) 14

    d) 12

Problem 15-16: Write the prime factorization of the given numbers.

15) 123

16) 78

Problem 14: Mark the statement True or False. If the statement is false, make it true by adding rectangles or by crossing out rectangles. For added rectangles, draw a rectangle and label with the dimensions; do not draw each individual square.

17) _____The following rectangles account for all of the rectangular arrangements of 96 tiles.

4
24

3
32

2
48
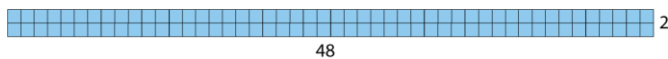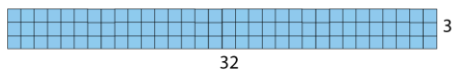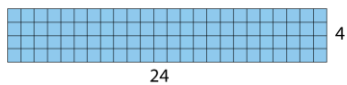
Problems 18-23: Use the Shikaku[i] puzzle to answer the questions.
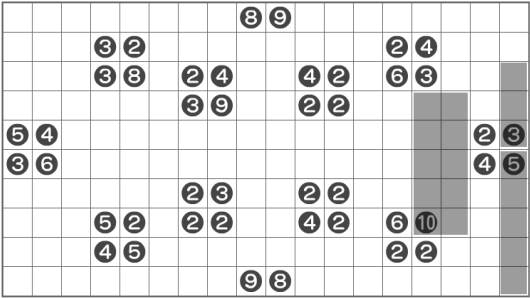
18) Explain why the arrangement of tiles for the 3-tile shaded rectangle is the only possible arrangement.

_____

_____

_____

19) Explain why the orientation of the 5-tile shaded rectangle is the only possible orientation.

_____

_____

_____

20) Explain why the arrangement of tiles for the 10-tile shaded rectangle is the only possible arrangement. Consider other arrangements of 10 tiles and why those arrangements don't work.

_____

_____

_____

21) Explain why the orientation of the 10-tile shaded rectangle is the only possible orientation.

_____

_____

_____

22) Consider the number 2 that is below the 10-tile shaded rectangle. With the puzzle as shown, i.e. with only the three shaded rectangles shown, explain why a 2-tile rectangle cannot be shaded with certainty.

_____

_____

_____

23) Shade in two more rectangles and explain why the arrangement of tiles and the orientation of the rectangles are the only possible ones.

_____

_____

_____

Problem 24: Select the best answer.

24) Select the statement or statements that characterize the *Fundamental Theorem of Arithmetic*?

   a) Any integer greater than 2 can be written as a product of prime numbers.

   b) The set of prime numbers for any given number is unique to that number.

   c) Any integer greater than 1 can be written as a product of prime numbers.

   d) A and B

   e) B and C

Problem 25: Write the answer in complete sentences.

25) Given the fractions 4/5 and 2/3, what is the relationship between their common denominator and the least common multiple of the numbers 5 and 3?

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[i] Nikoli.com, 2010