Math 6 Unit 1 test: Factors, multiples, GCF and LCM

Name _____ Date _____ Period _____

13 questions, 45 points

1. Kevin writes the block 47 over and over to make longer and longer numbers: 47, then 4,747, and so on. (3 points)

(a) What is the fewest number of blocks that makes a number divisible by 3? Write that number.

(b) What is the fewest number of blocks that makes a number divisible by 9?

2. Lily runs the sieve on a board from 1 to 200. (3 points)

(a) Andre writes $195 = 13 \times 15$ and says lantern 195 goes out in round 13. Is he right? Explain.

(b) Explain why a lantern that goes out in round 5 cannot be even and cannot be a multiple of 3.

(c) Which lanterns from 150 to 200 go out in round 5?

3. (3 points)

(a) What is the smallest composite number that has no prime factor less than 11?

(b) What is the smallest composite number that has no prime factor less than 20?

(c) For part (a), explain how you know that no smaller composite number works.

4. (3 points)

(a) Use the digit-sum test to show that 9 is a factor of 4,095.

(b) Find the prime factorization of 4,095, written with exponents, smallest prime first.

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5. Lily's number is $2{,}352 = 2^4 \cdot 3 \cdot 7^2$. (3 points)

(a) Using only the prime factorization, decide whether 2,352 is divisible by 3, and whether it is divisible by 9.

(b) What do your answers to (a) tell you about the digit sum of 2,352? Check by adding the digits.

6. A town's recycling truck collects glass every 6 days, paper every 8 days and metal every 10 days. All three were collected today. (3 points)

(a) In how many days are all three next collected on the same day?

(b) In the next 365 days, not counting today, on how many days are all three collected?

7. The two largest proper factors of a number are 35 and 21. (3 points)

(a) Find the number, and explain why no other number works.

(b) Is the number perfect, abundant or deficient? Show the sum.

8. Numbers such as 444 and 8,888 have all their digits the same. (4 points)

(a) Explain why every three-digit number with all its digits the same (111, 222, . . ., 999) is divisible by 3.

(b) Which three-digit numbers with all their digits the same are divisible by 9?

(c) Which four-digit numbers with all their digits the same are divisible by 3? Which are divisible by 9?

9. Hiro stacks 2,730 identical cartons of crayons into one solid block, so many cartons long, so many wide and so many high. The three edge lengths are three whole numbers in a row (like 4, 5 and 6). (4 points)

(a) Find the prime factorization of 2,730.

(b) Use it to find the three edge lengths. Explain how the primes led you to them.

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10. A marching band has 270 members. The director wants them in a rectangle of equal rows, with at least 4 rows and at least 4 members in each row. (4 points)

(a) Write the prime factorization of 270.

(b) Use it to list every possible number of rows.

(c) Which rectangle is closest to a square?

11. A scout leader packs identical camp kits from 72 granola bars, 108 juice boxes and 126 bandannas, using all of them. (4 points)

(a) What is the largest number of kits she can pack, and what goes in each?

(b) Another box of 9 bandannas turns up, so she now has 135 bandannas. What is the largest number of identical kits she can pack now, using everything, and what goes in each?

12. (4 points)

(a) Take a prime number and any whole number other than 0. Explain why the GCF of the two numbers can only be 1 or the prime itself, and say when it is the prime.

(b) Use this to find GCF(23, 92) and GCF(29, 100).

13. (4 points)

(a) Write 1,188 and 1,980 as products of primes.

(b) Find the GCF and the LCM of 1,188 and 1,980.

(c) Check your answers to (b) with the product rule.

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