

# Review Game: Number Theory

March 10, 2024

(1 point) Three fourths of a pitcher is filled with pineapple juice. The pitcher is emptied by pouring an equal amount of juice into each of 5 cups. What percent of the total capacity of the pitcher did each cup receive?

- (A) 5                      (B) 10                      (C) 15                      (D) 20                      (E) 25

(2 points) Luka is making lemonade to sell at a school fundraiser. His recipe requires 4 times as much water as sugar and twice as much sugar as lemon juice. He uses 3 cups of lemon juice. How many cups of water does he need?

- (A) 6                      (B) 8                      (C) 12                      (D) 18                      (E) 24

(3 points) How many factors of 2020 have more than 3 factors?

- (A) 6                      (B) 7                      (C) 8                      (D) 9                      (E) 10

(4 points) How many positive integers can fill the blank in the sentence below?

"One positive integer is \_\_\_\_\_ more than twice another, and the sum of the two numbers is 28"

- (A) 6                      (B) 7                      (C) 8                      (D) 9                      (E) 10

(5 points) Two integers are inserted into the list 3,3,8,11,28 to double its range. The mode and median remain unchanged. What is the maximum possible sum of two additional numbers?

- (A) 56                      (B) 57                      (C) 58                      (D) 60                      (E) 61

(6 points) Which of the following is equivalent to

$$(2 + 3)(2^2 + 3^2)(2^4 + 3^4)(2^8 + 3^8)(2^{16} + 3^{16})(2^{52} + 3^{32})(2^{64} + 3^{64})?$$

- (A)  $3^{127} + 2^{127}$
- (B)  $3^{127} + 2^{127} + 2 \cdot 3^{63} + 3 \cdot 2^{63}$
- (C)  $3^{128} - 2^{128}$
- (D)  $3^{128} + 2^{128}$
- (E)  $5^{127}$

(7 points) What is the greatest integer less than or equal to

$$\frac{3^{100} + 2^{100}}{3^{96} + 2^{96}}?$$

- (A) 80                      (B) 81                      (C) 96                      (D) 97                      (E) 625