Mental Math

Chiles Mini Mu

December 10, 2022

_____ **1.** Compute the sum of the first five natural numbers and whole numbers.

_____ **2.** Rachel loves crossing roads: she crosses 8 roads every 21 seconds and gets 13 points for every 4 roads crossed; how many points does she get in 42 seconds?

_____ **3.** If it costs \$4.50 for 1 gallon of gas and Cyrus' car holds 18 gallons of gas in the tank, how much money would he spend filling up half of the tank?

_____ **4.** From the previous question, if Cyrus' car is full of gas and his car travels 33 miles for each gallon, then how far can he travel with a full tank?

_____ **5.** Compute $2020 + 2021 + 2022 + 2023$.

_____ **6.** Linda and Jessica are writing a 111 word essay for their English class. If Linda and Jessica can write 7 words and 30 words in a minute, respectively, how fast can the two of them working together write the complete essay.

_____ **7.** What is the volume, in cm^3, of a rectangular prism with length 1 cm, width 1 m, and height 2 cm.

_____ **8.** If 7 Bevins equal 4 Bours, 2 Bours equal 7 Boos, and 4 Boos equal 1 Ace, then how many Bevins are equal to 4 Aces?

_____ **9.** Given that a and b are solutions to the equation $x^2 - 15x + 54 = 0$, then find $a + b + ab$.

_____ **10.** Cruz loves going on cruises, and he loves playing basketball on cruises (hoop!). Find the volume of the perfectly spherical ball with radius 1 rounded to the nearest whole number.

_____ **11.** The probability that Elise will place 1st in the bird event is $\frac{1}{2}$ while the probability that Cathleen will place 1st in the chemistry even is $\frac{1}{10}$. Find the probability that Elise will get 1st in the bird event while Cathleen does not get 1st in the chemistry event.

_____ **12.** Compute the sum of the number of even prime numbers and the number of even natural numbers less than 100.

_____ **13.** Find the sum of the number of edges, faces, and vertices of a cube.

_____ **14.** Find the distinguishable number of permutations of the word MINIMU.

_____ **15.** What is the remainder when $3^2 \cdot 7^2$ is divided by 17?

_____ **16.** Kun and Stephi are doing some long division. Help them compute the remainder when 2023 is divided by 8.

_____ **17.** How many days were in January and February this year (2022)?

_____ **18.** Find the value(s) of x such that $f(x) = 0$ where $f(x) = \sqrt{2x+3} - 7$.

_____ **19.** Let $x = 2^3 \cdot 5^2 + 3^4 \cdot 4^2$. Find $\frac{x}{2 \cdot 3 \cdot 4 \cdot 5}$.

_____ **20.** Given that you have 10 minutes to solve a test of 40 questions, what is the average number of seconds you have to solve each question if you want to solve all 40 questions?

_____ **21.** What is the slope of the line $72x = 42y - 27$?

_____ **22.** Assume that a and b are real and that $\frac{22}{2023} > \frac{a}{b} > \frac{21}{2022}$. Find the sum of the values of $\frac{b}{a}$ that are even numbers.

_____ **23.** Given that Nick is at $(4, 4)$ and he must touch grass lying on the line $x = 1$ before he goes to $(10, 9)$, what is the shortest distance he can travel?

_____ **24.** Find the sum of the coordinates where the two lines $x = y$ and $17x = 187y + 17$ intersect.

_____ **25.** Compute $\frac{1 \cdot 2 \cdot 3 \cdot 4 \cdot 6 \cdot 7 \cdot 8 \cdot 9 \cdot 10}{\sqrt{8!} \cdot \sqrt{9!}}$.

_____ **26.** What is the sum of the infinite series $\frac{1}{11} + \frac{1}{121} + \frac{1}{1331} + \cdots$.

_____ **27.** Find the area of a square with vertices $(1,3)$, $(7,11)$, $(15,5)$, and (x,y).

_____ **28.** Find the number of factors of 112. Hint: 2^4 divides 112.

_____ **29.** How many distinct combinations of 1 Theta, 1 Alpha, and 2 Mu students be chosen if there are 3 Theta, 4 Alpha, and 8 Mu students?

_____ **30.** Given that Grace chooses one proper factor of 6969 at random, what is the probability that she chooses a prime factor?

_____ **31.** Auska, Bruce, and Jiayi are playing a game. Auska will tell Bruce 2 distinct, positive integers. If an integer is odd or even, then Bruce will multiply the integer by 2 or 3, respectively, and tells Jiayi the new numbers. Jiayi's job is to yell the number of combinations of original integers that Auska could have told Bruce. If Auska tells Bruce the numbers 3 and 6, then what number should Jiayi yell out (assuming he is correct)?

_____ **32.** If Shilpa has \$25 in the form of \$1, \$5, and \$10 bills, then what are the number of possible distinguishable combinations of bills that Shilpa has?

_____ **33.** Jose and Julia are busy working on their physics homework with 30 problems. Jose takes 45 seconds to solve 2 physics problems while Julia takes 3 minutes to solve 10 physics problems. How much longer, in seconds, will it take Jose to finish the homework?

_____ **34.** Given that adults Sabrina and Nikki need to pay for 40 other students' movie tickets along with their own, how much money will they have to spend if adult tickets are worth \$9.50 and student tickets are worth \$5.

_____ **35.** Compute $31 \cdot 41$.

_____ **36.** Compute 75^2.

_____ **37.** Compute the sum of the 3rd and 8th Fibonacci number if the sequence starts off as $1, 1, 2, \cdots$.

_____ **38.** If two legs of a right triangle have lengths 9 and 40, then what is the length of the hypotenuse?

_____ **39.** Second to last problem! Compute $-1+1-1+1+1+1-1+1+1+1-1$?

_____ **40.** Last and easiest problem on the test! Compute $-1+0+0+0+0+0+0+0+1$?