

1. (2 points)

Suhas went to the barbershop to get a haircut. The top of his head was in the shape of a hemisphere with a radius of 4 ft before his haircut. However, during his haircut, there was an earthquake, and the barber messed up Suhas's hair. The top of his head is now in the shape of a cone with base radius 2 ft and a height of 2 ft! What is the positive difference of the volume of the top of Suhas's head before and after the haircut?

Volume of a sphere = $\frac{4\pi r^3}{3}$, volume of a cone = $\frac{\pi r^2 h}{3}$.

2. (2 points)

Let:

$$A = \frac{-3^2 + 5^2}{2 + 2}$$

$$B = 2 + 2 \div 2$$

$$C = (1 - 2) \times \frac{3}{1 - 2}$$

$$D = 6^0$$

Find: $A^2 + B^2 - C^2 \times D^2$.

3. (2 points)

Vib was planning his trip from Tallahassee to Atlanta but he sucks at math. He needs help in solving for the following values if he has to drive 230 miles and it will take 4 hours:

A = How many feet Vib will need to drive (1 mile = 5280 feet).

B = How many seconds Vib is driving for.

C = How many gallons of gas Vib will need if his car goes 10 miles per gallon of gas.

D = The number of distinct letters in Tallahassee minus the number of distinct letters in Atlanta.

Find: $A + B + C + D$.

4. (3 points)

Anish loves money and has at least 10,000 coins of every type (quarters, dimes, nickels, pennies). He wants to find out how many of each coin type he needs in order to pay a value of \$100.

A = The number of quarters he needs to pay \$100.

B = The number of dimes he needs to pay \$100.

C = The number of nickels he needs to pay \$100.

D = The number of pennies he needs to pay \$100.

Find $\frac{D}{B} + \frac{C}{A}$.

5. (3 points)

Natalie wants to rap as fast as Eminem but he cannot move his mouth that fast. He sees a sign while walking that says "Eminem is teaching rap lessons tomorrow starting at 1 pm! Find the following to attend." Unfortunately, like Vib, Natalie also sucks at math and needs your help to solve the following:

A = The number of times the letter Q appears in "Eminem".

B = The smaller angle that the hour and minute hand on a clock make when the rap lessons start.

C = The number of distinct arrangements there are in "Eminem".

D = The area of a triangle with base of 3 and height of 4.

Find $A \times \frac{B}{C+D}$.

6. (3 points)

For the following statements, add 1 to D for each statement that is true and add 2 to D for each statement that is false, assuming that the original value of D is 0.

1. The number of this question on the test is composite.
2. A right angle is an angle that points to the right.
3. The area of a triangle can always be found by multiplying its base by its height and dividing this by 2.
4. A quadrilateral is a shape with at least 4 sides.
5. A circle is a polygon.

Find the final value of D .

7. (3 points)

Viswa is a professional card dealer and always knows what card he gives without looking. He always carries a standard deck of 52 cards in his pocket with 4 different suits (hearts, spades, diamonds, clubs) and 26 red and 26 black cards. Using this information, solve for the following:

A = the probability of drawing a heart from his deck

B = the probability of drawing a red card from his deck

C = the probability of drawing the ace of spades from his deck

D = the probability of drawing a red card, removing it from the deck, and then drawing a club

Find the sum of the numerators of the simplified fraction forms of A , B , C , and D .

8. (4 points)

Vib loves drinking milk. He loves it so much that he even researched what it is made of. He found out that one cup of milk (249 grams) has 12 grams of carbohydrates, 8 grams of fat, 8 grams of protein, and 1 gram of calcium. However, he does not like these numbers and want them to be in a common fraction form. Solve for the following values.

A = the fraction of carbohydrates in a cup of milk

B = the fraction of fat in a cup of milk

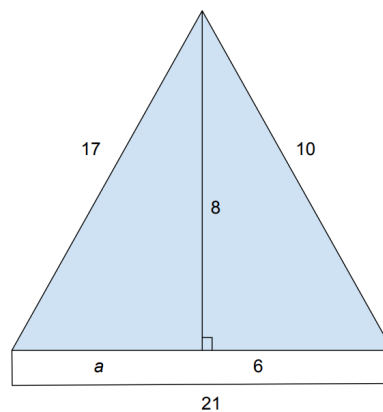
C = the fraction of protein in a cup of milk

D = the fraction of calcium in a cup of milk

Find $A + B + C + D$.

9. (4 points)

Sukeerth and Tanmay N. were arguing as usual, but this time about the unusual topic of who invented the triangle. To settle their feud they decided to conduct a race: the first person to solve the following question would be considered the inventor of the triangle!



A = the value of a

B = the perimeter of the triangle

C = the area of the triangle

D = the area of a square with a side length of the value of a

Find $(A + D) - (B + C)$.

10. (4 points)

Haasini and Meghna both hate K-pop. They hate it so much that they brag about their hatred towards it. They want to see who hates K-pop more by seeing who could solve the following problem faster.

$$1, 1, 2, 3, 5, 8, \dots$$

A = the next number of the above sequence

B = the sum of the above numbers

C = the range of the above numbers

D = the average of the above numbers (round to the nearest whole number)

Find $(B + D) - (A + C)$.

11. (4 points)

Using the defined operations below, solve the following.

$$A\Delta B = A^2 + (A - B)$$

$$X\Lambda Y = (X - Y) + (X + Y)$$

Find $7\Delta 6 - 1\Lambda 2$.

12. (5 points)

Himank and Jonathan really wanted to have their names in this test, but they could only achieve that if they solved the following problem. Can you solve the problem too?

$$A = (\sqrt{64} \times 8)$$

$$B = 2 - 3 \times 4 + 19$$

C = The area of a triangle with the height of 2 and base of 11.

D = The area of a trapezoid with bases of 5 and 7.5 and a height of 4.

Find $(A \times B) \div (\sqrt{C + D})$

13. (5 points)

Tanmay H. and Nitish were shopping for clothes for the new school year. Tanmay wanted to get a new shirt while Nitish wanted a new pair of jeans and a new shirt. A shirt costs \$20 and a pair of jeans costs \$15, but Tanmay has a 10% off discount card and Nitish has a 20% off discount card. If they are doing separate purchases with discounts applied at the end, what is the mean of Nitish (1 pair of jeans and 1 shirt) and Tanmay's (1 shirt) purchases?

14. (5 points)

Sagar likes talking backwards. He recently developed a habit of talking backwards when saying math equations. Help Anish decipher what Sagar is saying by finding $x + y$.

x is tripled, then halved, then added to 8, and subtracted from 100 to get 86.

y is doubled, subtracted from 20, squared, and added to 5 to get 201.

15. (5 points)

Vib and Sagar are going to Gamestop to buy games for their Nintendo Switches. The Gamestop is located at $(5, 0)$, Vib's house is located at $(0, 0)$, and Sagar's house is located at $(0, 4)$. What is the area of the triangle made by connecting these points together?

