

U.C. MATH BOWL 2023

LEVEL III — Session 1

Instructions: Write your answers in the blue book provided. Remember that even correct answers without explanation may not receive much credit and that partially correct answers that show careful thinking and are well explained may receive many points.

Have Fun!

1. You ordered a family size pizza and 40 minutes later, the delivery arrived . . . but with a small size pizza instead! You called the shop and the owner said, "SO sorry! I'll send you another small size pizza." Is his offer fair to you? Explain why or why not.

Size	small	medium	large	family
inches (diameter)	12	14	16	18

2. There are three square pieces of bread, all of the same size, and a knife. What is the minimum number of cuts you need to make to divide them fairly among four people?

You are allowed fold each piece of bread and put them on top of one another if you want.

3. If you jog 1 mile at 4 miles per hour and jog another mile at 8 miles per hour and then run the last two miles at 12 miles per hour, what is your average speed for the four miles?
4. In a 3rd grade class with 30 students every student is described by at least one of these phrases (1) Taller than 5 feet, (2) Likes chocolate, (3) Great singer. 12 student like chocolate, 4 of whom are great singers. There are 2 great singers that are over 5 feet but only one of them likes chocolate. There are 14 singers shorter than 5 feet who do not like chocolate. How many students are there who are over 5 feet, don't like chocolate, and are not great singers?
5. A *palindrome* is a whole number that reads the same forwards as backwards (for example 121 and 1441 and 3333 are palindromes). If we neglect the colon, certain times displayed on a digital clock are palindromes. Three examples are 1:01, 4:44, 12:21. How many times during a 12 hour period starting at midnight will there be palindromes shown on the face of a digital clock?

U.C. MATH BOWL 2023
LEVEL III — Session 2

Instructions: Write your answers in the blue book provided. Remember that even correct answers without explanation may not receive much credit and that partially correct answers that show careful thinking and are well explained may receive many points.

Have Fun!

1. When each side of a square is increased by 50% the area is increased by 180 square inches. What was the area of the original square?
2. Decode the following cipher of an English sentence, where each alphabet letter has been replaced by some other alphabet letter.

COXBX TBX CVK CDGXR DI T GTI'R ADHX VOXI OX ROKQAU IKC RNX-
PQATCX: VOXI OX PTI'C THHKBU DC, TIU VOXI OX PTI.

3. If Michael tosses a die twice (i.e., one toss will give a number), he will get two integers in the range $1 \dots 6$. Find the probability that the result of multiplying these two numbers is a multiple of 3.
4. What is the smallest number of coins (only pennies, nickels, dimes, and quarters are allowed) needed so that you can make up every amount from 1 cent to 1 dollar?
5. In a certain country every 20th mathematician is a writer while every 45th writer is a mathematician. Are there more writers or mathematicians in this country? How many times more?

