

U.C. MATH BOWL 2021

LEVEL III

There are 7 questions for you work on in this Math Bowl. Each is printed on a separate page.

Write your school, team number, and the names of the team members on the first page.

Write your school and team number on each question's page.

All your work and answers to each question should go on that question's page (or you can use extra pages if you need more room). Please only put the answer to one question on each page.

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. Simplify the fraction. **Do not** use a calculator.

$$\frac{1 \cdot 2 \cdot 3 + 2 \cdot 4 \cdot 6 + 4 \cdot 8 \cdot 12 + 5 \cdot 10 \cdot 15}{1 \cdot 3 \cdot 5 + 2 \cdot 6 \cdot 10 + 4 \cdot 12 \cdot 20 + 5 \cdot 15 \cdot 25}$$

2. An ice cream shop has 15 different flavors of ice cream and four different toppings. If a small sundae consists of one scoop of ice cream and your choice of two different toppings, how many different possible small sundaes are there?
3. Arrange the numbers 2^{1000} , 3^{600} and 10^{300} in order from smallest to largest. Explain how you arrived at your answer.
4. The mean annual income of 10 people is \$40,000. Four of the ten get equal pay raises. The recalculated mean income is now \$43,000. What was the amount of the pay raises?
5. How many cubic inches of dirt are removed in digging a hole that is 1 yard wide, 7 feet long, and 22 inches deep?
6. Can you divide the whole numbers from 1 up to 10 into two groups so that the sums of the numbers in the groups are the same? Show how to do this or explain why it can't be done.
7. A five-digit integer n includes the following digits: 0, 1, 2, 2, 2. It is known that n is an perfect square. Find n .