

## 2018 Four-by-Four Competition Frequently Asked Questions

**Q: What is the format of the contest?**

A: The contest consists of ten rounds, each giving a team of four students three minutes to answer four free-response questions covering topics from arithmetic to calculus. The Four-by-Four Competition emphasizes collaboration, self-assessment, and prioritization, as a team must decide which questions should be attempted or checked by each member in each round based upon the topics covered and levels of difficulty.

**Q: What are the divisions for this contest?**

A: If the sum of the grade levels of the four team members is less than or equal to 39, the team will compete in the Rock Division. If the sum is between 40 and 44 inclusive, the team will compete in the Paper Division. If the sum is greater than or equal to 45, the team will compete in the Scissors Division. For the purposes of computing the team's division, high school team members that are in grades below 9th should be counted as 9th-graders, and teams with fewer than four members should be assumed to have enough 9th-grade members to make a four-person team. There will also be a Middle School Division for teams with *all* members in grades below 9th.

**Q: How many people may take the test?**

A: Your school's registration allows any number of students from your school to participate, but each team of four must work separately and turn in a separate answer sheet, and all official participants from your school must test simultaneously.

**Q: How long will the test take?**

A: The test itself will take approximately 45 minutes of your students' time. As the coach, you will need to familiarize yourself with the materials, make extra copies, and get students situated prior to testing, then score the answer sheets and mail them back to us. Depending on how many of your students take the test, you might need to spend several hours to enable your school to participate.

**Q: When can I administer the test?**

A: If at all possible, your teams should take the test on **Thursday, February 1st, 2018**. You may administer the test at whatever time you like on that date. If you administer the test more than once on that date, only students who participated in the first administration will be eligible for awards. The test should not be administered to any students (even unofficial participants) before the test date, to ensure that test information does not reach any official participants.

**Q: Why do I have to administer the test on a particular day?**

A: After taking a test, many students discuss interesting problems with their peers via the Internet. If some schools test before others, students who have not yet taken the test might be exposed to the test material, altering their scores and skewing the results of the contest. To avoid this, we ask that you administer the test on the date specified.

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## **Q: What tools and materials can students use on the test?**

A: Each student will need a writing implement, test, and answer sheet, and may use blank scratch paper. Students for whom English is not their best language may use a non-electronic foreign-language/English dictionary. No other tools may be used, which specifically excludes all types of calculators, computers, and cell phones.

## **Q: What strategies might students find useful on this contest?**

A: Self-assessment is the most essential skill for this contest. Because teams have only three minutes for each round, they need to make sure they quickly decide which members will work or double-check each problem based on their topics or difficulty levels. Often, double-checking a problem a student is comfortable with will be a better strategy than moving on to a problem that is more difficult or less familiar.

## **Q: What are “exact, complete, and simplified” answers?**

A: “Exact” means that there are no approximations, which typically means that answers are left as fractions in terms of  $\pi$ ,  $e$ ,  $i$ , and radicals. “Complete” means that all correct answers are part of a student’s answer; i.e. supplying one root of a quadratic would not be sufficient. “Simplified” includes things such as completely reducing all fractional quantities and expressing irrational quantities in simplest radical form, but there are sometimes answers with several comparably simple expressions. We do not consider answers such as  $\frac{3}{\sqrt{2}}$  to be simplified, because it is inconvenient to have irrational

numbers in the denominators of fractions when discussing or thinking about numerical quantities. We do not consider answers such as  $2(1 + \sqrt{2})$  to be simplified, because an operation remains that can be performed exactly.

## **Q: Why do I receive the answer key and solution guide before the contest?**

A: Because of the large number of participants, we ask that each coach score their teams’ answer sheets before submitting them. To do this, you need the answer key as soon as the test is over. The solution guide is provided at the same time so that participants can learn how to do problems they missed while the test is still fresh in their minds. Answers and solutions should not be made available to your students until after you have collected their answer sheets.

## **Q: Which answer sheets should I submit?**

A: You are encouraged to submit as many answer sheets as you like. At a minimum, you should submit your highest-scoring team by e-mail so that they can receive a certificate in recognition of that achievement. From the perspective of school awards, you should submit your highest-scoring team in each division. You should also submit any teams that you think might receive a team award. Scores for previous years’ award winners can be found on our website. Although this is not necessarily a predictor of this year’s scores, it may help guide you in deciding which of your answer sheets to submit.

## **Q: I have more questions; where can I get more information?**

A: Tom Clymer, our director of academic competitions, would be happy to answer your questions. He can be reached at [clymer@natassessment.com](mailto:clymer@natassessment.com), or at (206) 650-6411.