2015 Washington State Math Championship

$$B > \frac{1}{n}\sum_{i=1}^{n} x_i$$

(Be greater than average)

Individual – 5th Grade

Instructions: Problems 1–10 are multiple choice and count towards your team score. Answer by putting the appropriate letter in the blank on the answer sheet. Problems 11–30 count towards your individual score but not your team score.

1. At school, there are four academic blocks that each last exactly 70 minutes. In between each block, there is a 15 minute break. If the first block begins at 7:30am, at what time will the last block end?

   (A) 11:35am **(B)** 12:30pm **(C)** 12:45pm **(D)** 12:55pm **(E)** 1:10pm

2. What fraction is the average of $\frac{1}{4}$ and $\frac{1}{12}$?

   (A) $\frac{1}{8}$ **(B)** $\frac{1}{6}$ **(C)** $\frac{5}{24}$ **(D)** $\frac{1}{4}$ **(E)** $\frac{1}{3}$

3. Which of the following operations will result in the inequality $3 \times (2 \_\_ 6)^2 > 48$ **not** being true?

   (A) addition **(B)** subtraction **(C)** multiplication **(D)** division
   (E) more than one of the above

4. What is the greatest number of lines of reflectional symmetry that a quadrilateral can have?

   (A) 2 **(B)** 4 **(C)** 6 **(D)** 8 **(E)** 16

5. March 28th falls on a Saturday this year. Given that 2016 is a leap year, thus having 366 days, on what day of the week will March 28th fall next year?

   (A) Monday **(B)** Wednesday **(C)** Thursday **(D)** Saturday **(E)** Sunday

6. A camp coordinator wants to plan activities for the "leisure time" so that leisure time will end between 5:40pm and 6:00pm. If leisure time begins at 2:00pm, and no activities may overlap, which of the following activities should **not** be included?

   (A) Archery (50 minutes)
   (B) Horse Riding (55 minutes)
   (C) Swimming (45 minutes)
   (D) Calculator Wars (25 minutes)
   (E) Capture the Flag (1 hour, 20 minutes)

7. In the ordered pair (A, B), let $A =$ the original cost of a Four Directions ticket in a particular city, and let $B =$ the sale price of a ticket the day before the concert. For which of the following did the cost decrease by the greatest percentage?

   (A) $(\$60, \$45)$ **(B)** $(\$45, \$30)$ **(C)** $(\$210, \$150)$
   (D) $(\$145, \$100)$ **(E)** $(\$75, \$45)$

8. How many unique ways can the letters in the word "TWELFTHMEN" be arranged?

   (A) 151,200 **(B)** 907,200 **(C)** 1,814,400 **(D)** 3,628,800 **(E)** None of these

9. The size of a television is usually measured by the length of the rectangular screen's diagonal. Which of the following strange televisions, given its length (L) and width (W), would be considered to be the largest?

   (A) $L = 20, W = 40$ **(B)** $L = 15, W = 45$ **(C)** $L = 50, W = 10$
   (D) $L = 30, W = 30$ **(E)** $L = 25, W = 35$

10. Which of the following expressions has the greatest value?

    (A) 2^{105} **(B)** $2^{104} + 2^{104}$ **(C)** 4^{52} **(D)** $(2^{53})^2$ **(E)** 32^{20}

11. Evaluate the following expression: $20 + 15(2^0 - 1^5)^2 - 0 \times 15$.

12. If the base of a triangle is twice the height, and the area of the triangle is 9, what is the height?

13. If 4 gobbles are equal to 6 slurps, and 3 slurps are equal to 5 plops, then 12 gobbles are equal to how many plops?

14. Express the following as a reduced, common fraction: $\dfrac{1}{2 + \dfrac{3}{4+5}}$.

15. The sum of three consecutive even integers is 258. What is the smallest of the three integers?

16. Find the mean of the following set of numbers: $\{0, 12, 24, 36, \ldots, 228, 240\}$.

17. The five members of the Jefferson family split \$208 such that the mom, dad, and oldest child get the same amount, but the two younger siblings each get two-thirds as much as each of the other three family members. How much money, in dollars, did the two younger siblings receive altogether?

18. When ordered from least to greatest, the angles in a quadrilateral form an arithmetic sequence with a common difference of 10. What is the degree measure of the largest of the angles?

19. The "Pi Moment of the Century" that happened earlier this month on 3/14/2015 at 9:26am and 53 seconds got plenty of attention from mathematicians. Sadly, few thought to congratulate $\sqrt{2}$ on its momentous day: 1/4/2014 at 2:13am and 56 seconds. To the nearest hundredth of a year, how long before the "Pi Moment of the Century" did mathematicians fail to honor the momentous day for $\sqrt{2}$?

20. Fido has five sticks that have lengths of 2 inches, 5 inches, 6 inches, 8 inches, and 9 inches. Using three sticks at a time, how many unique triangles can he make?

21. Two classes of 33 students each are going on a field trip to the zoo. If four students can ride in each car and a student from one class cannot sit in the same car as a student from the other class, what is the minimum number of cars that will be needed to transport the students to the zoo?

22. What is the next number in the following sequence?

$$1, 6, 16, 36, 76, \_\_$$

23. Find the smallest value of x that will make the following inequality true.

$$1 + 2 + 3 + 4 + \ldots + x > 500$$

24. How many unique positive four-digit integers exist such that none of the digits is zero and the sum of the digits is 6?

25. The temperature in degrees Celsius (C) can be converted into degrees Fahrenheit (F) by using the equation $F = \frac{9}{5}C + 32$. What is the temperature, in degrees Celsius, if the temperature outside is 50 degrees Fahrenheit?

26. The 48 elementary students at Fitness Prep Academy were able to do an average of 64 push-ups. The 36 secondary students, on average, were able to do an astonishing 148 push-ups. What was the average number of push-ups out of all of the students at Fitness Prep Academy?

27. A local pie store, owned by mathematicians, chose to pass out the profits in an odd manner. Andrew gets $\frac{1}{3}$ of the profits, Bruce gets $\frac{1}{4}$ of what is left after Andrew takes his share, and Carol gets half of what is left after Bruce takes his share. What percentage of the profit is left over after Carol takes her share?

28. The sock drawer has returned! This time, young Charlie has 20 brown socks, 20 white socks, and 20 black socks in his drawer. How many socks would he have to pull randomly from his drawer in order to ensure that he has 5 pairs of socks (10 socks) that are all of the same color?

29. The numbers $1, 2, 3, 4$, and 5 are placed into one jar, and the numbers $3, 4, 5$, and 6 are placed into a second jar. If a number is randomly selected from each jar, what is the probability that the sum of the two numbers is even? **Express your answer as a reduced fraction.**

30. Paula needed to make some copies of her poster advertising her new television show, "Spongebob Quadrilateral Pants". The first 25% of the copies cost \$0.50 each and the remaining copies cost \$0.25 each. If the total bill was \$10, how many copies did she make?