

# Washington State Math Championship – 2009

## Individual – 5<sup>th</sup> and 6<sup>th</sup> Grade

WASHINGTON STATE  
MATH CHAMPIONSHIP



BLAINE SCHOOL DISTRICT

ConocoPhillips  
Ferndale Refinery

The first ten problems are multiple choice and will count toward your team score.  
Answer by **CIRCLING** the appropriate letter on the answer sheet.

- In the product  $1 \times 2 \times 3 \times 4 \times 5$ , which number should be increased by one in order to maximize the resulting product?  
a. 1                      b. 2                      c. 3                      d. 4                      e. 5
- A triangle with sides of length three, ten, and eleven is similar to a triangle whose sides are of length twenty-two, six, and  $x$ . What is  $x$ ?  
a. 3                      b. 6                      c. 20                      d. 30                      e. 36
- Which one of the following numbers is equivalent to a non-repeating decimal?  
a.  $\frac{4}{7}$                       b. 9.502                      c.  $\sqrt{3}$                       d. 10                      e.  $20.\overline{09}$
- What is the ones digit of the product of the first twenty prime numbers?  
a. 0                      b. 1                      c. 3                      d. 5                      e. 7
- Which of the following is the best estimate for the average height of a sixth grader?  
a. 1.5 meters                      b. 82.5 centimeters                      c. 25 inches                      d. 9500 millimeters                      e. 0.01 miles
- Which of the following equations describes a line that passes through the points with coordinates (4, 3) and (2, 5)?  
a.  $y = -x$                       b.  $y = x$                       c.  $y = x + 2$                       d.  $y = -x + 2$                       e.  $y = -x + 7$
- How many lines of symmetry does an equilateral triangle have?  
a. 0                      b. 1                      c. 2                      d. 3                      e. 6
- If some (at least one, but not necessarily all) gobblers are munchers, all munchers are strangers, and some strangers are mathematicians, which of the following statements is necessarily true?  
a. All gobblers are strangers  
b. All munchers are gobblers  
c. Some gobblers are mathematicians  
d. Some strangers are gobblers  
e. None of the above
- Which of the following sets of three measurements could *not* describe the three sides of a triangle?  
a. 8 inches, 2 inches, and 11 inches  
b. 9 centimeters, 13 centimeters, 10 centimeters  
c. 3 meters, 3 meters, and 3 meters  
d. 10 feet, 1 foot, 10 feet  
e. 4 yards, 2 yards, and 3 yards

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10. If a teacher were to raise the scores by one point on all 30 students' tests, which of the following would describe what would happen to the average score of the students' tests?
- The average would increase by 30
  - The average would increase by  $\frac{1}{30}$
  - The average would increase by 1
  - The average would decrease
  - The average would not change
11. What is the sum of the reciprocals of 2.5 and five-thirds? **Express your answer as a reduced fraction.**
12. What is the sum, as a decimal, of three hundred, seventeen hundredths, six tenths, four, and two thousandths?
13. Evaluate the following expression:  $\frac{\sqrt{5^2 - 4^2}}{\sqrt{12^2 + 5^2}}$ . **Express your answer as a reduced fraction.**
14. Susie has a collection of 500 stamps, 40 of which are her favorites. If she wants to pick out a stamp randomly from her collection to give to her best friend, what is the probability she will choose one of her favorite stamps to give to her best friend? **Express your answer as a reduced fraction.**
15. The average adult male is recommended to consume around 2000 calories per day. Suppose I wanted to consume only milk and cookies for an entire day, and that I will only consume each cookie with one-seventh of a glass of milk. If one glass of milk is 150 calories, and one cookie is 75 calories, what is the maximum number of cookies I could eat and still stay underneath the 2000 calorie recommendation?
16. When you got your math test back, you noticed that seven problems were marked wrong and that you received a 65%. If each problem was given equal weight, how many problems were on the test?
17. When walking across a golf course, a man carrying a bucket full of golf balls managed to run into quite a few obstacles. First, he lost a third of his golf balls when he tripped over a tee that someone left on the ground. Then, he lost a fourth of the remaining golf balls by stumbling in the sand pit. Finally, he lost a tenth of the balls he had left because an alligator attacked him. When he finally made it back to the clubhouse, he had 54 golf balls. How many golf balls did the man originally have?
18. If a cheetah runs at 70 miles per hour, and a specific race car travels 3520 yards a minute, how much longer, in minutes, would it take the cheetah to travel a distance of 30 miles? **Express your answer as a decimal to the nearest tenth of a minute.**

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19. Johan and Marie each run a lawn mowing business, charging \$10 and \$15 per hour, respectively. Johan can mow an average lawn in one hour and Marie can mow an average lawn in 40 minutes. If Johan and Marie decide to team up and mow an average lawn together, still charging their initial rates, how much money, in dollars, will it cost **in total** to pay them for the job?
20. Solve for  $x$  in the following equation:  $3 - \frac{5x}{6} = 18$ .
21. If you write out the numbers 1 through 600, how many digits will you have written?
22. A tank with base dimensions twelve inches by eight inches and height ten inches is filled halfway with water. When a block with volume 240 cubic inches is fully submerged in the water, how high, in inches, will the water rise inside the tank?
23. What is the seventh term in the following sequence?  
 $1/3, 1/2, 3/4, 9/8, 27/16, \dots$
24. How many three-digit palindromes are there?
25. Suppose you surveyed your friends, asking which of them own cats and which own dogs. You found that one-tenth of them only own a cat, one-fifth of them own only a dog, and one-half own both. What fraction of your friends own neither a cat nor a dog?
26. A woman driving a car down a secret road is hoping to drive by three sensors undetected. If the first sensor detects objects 80% of the time, the second sensor detects objects 70% of the time, and the third sensor detects objects 90% of the time, what is the probability that none of the sensors will detect the car? **Express your answer as a reduced fraction**
27. What is the measure, in degrees, of each angle of a regular hexagon?
28. The distance from ex-planet Pluto and our home of Earth is approximately 2.7 billion miles. How many miles would 2 million round trips from Earth to Pluto take? **Express your answer in scientific notation.**
29. What is the units digit of  $2009^{2009}$ ?
30. Seven friends are playing a different kind of follow-the-leader game where a group of three must be chosen, and the rest of the friends have to mimic as many of the moves as possible. How many unique sets of three leaders are possible? (Note that friends A, B, and C would be the same set of leaders as B, C, and A.)

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  - $y = x$
  - $y = x + 2$
  - $y = -x + 2$
  - $y = -x + 7$
- How many lines of symmetry does an equilateral triangle have?
  - 0
  - 1
  - 2
  - 3
  - 6
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- A new promotion by the Mathematical Pi(e) store offers three pi(e)s for \$31.42 or one pi(e) for \$20. What is the greatest number of pi(e)s you could buy with \$271.70?
  - 23
  - 24
  - 25
  - 26
  - 27
- What is the fewest number of 3 inch by 5 inch by 15 inch blocks that can be stacked into the shape of a cube?
  - 5
  - 15
  - 25
  - 75
  - 225
- The *Fibonacci numbers* are defined as the sequence of numbers where each number is determined by adding the two previous numbers. If we consider the first two Fibonacci numbers to be 0 and 1, what is the sum of the first nine Fibonacci numbers?
  - 42
  - 54
  - 60
  - 63
  - 108

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9. A man wants to schedule a doctor's appointment for after he gets off work at 4:30 PM. Assuming that traffic is such that he can drive at an average speed of 30 miles per hour, and the doctor's office is 17.5 miles away, which appointment should he choose so that he will arrive precisely on time?  
a. 4:35 PM    b. 4:45 PM    c. 4:55 PM    d. 5:05 PM    e. 5:15 PM
10. What is the maximum number of times that four unique lines can intersect in a given plane?  
a. 3            b. 4            c. 5            d. 6            e. 8
11. If you write out the numbers 1 through 600, how many digits will you have written?
12. A tank with base dimensions twelve inches by eight inches and height ten inches is filled halfway with water. When a block with volume 240 cubic inches is fully submerged in the water, how high, in inches, will the water rise inside the tank?
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21. While walking along a trail, Samantha notices a squirrel leaving piles of acorns every few steps. In the first pile there were four acorns, in the second pile there were twelve acorns, in the third pile there were 48 acorns, and in the fourth pile there were 240 acorns. Given this pattern, how many acorns should be in the fifth pile?
22. What is the base-seven representation of the base-ten number 2009?
23. Four painters, all working at an equal pace, finish painting three-quarters of a house in two hours. If one of the painters leaves and thus only three painters are doing the remaining work, how long, to the nearest minute, will it take them to finish the remainder of the painting? Assume they still work at the same pace as they did before.
24. What is the sum of the first 2009 positive odd integers? **Simplify your answer.**
25. For what value(s) of  $x$  will the following inequality hold?
- $$\frac{(x-4)(x-2)-10}{2} \geq -5$$
26. One strange day, you see a wizard standing in the way of your path to school holding two containers. Container A has seven blue marbles and two green marbles, and container B has three blue and six green marbles. The wizard says you can win a magic automatic homework-doer if you can tell him the probability of pulling a blue marble from container A. Before you do that though, he randomly pulls a marble from container B and puts it into container A. What should you tell him the probability is now to have the best chance of winning that magic automatic homework-doer? **Express your answer as a reduced fraction.**
27. If a regular hexagon has a perimeter of 72 inches, what is the area of the hexagon? **Express your answer to the nearest tenth of a square inch.**
28. If you were able to string a rope around the entire equator, how much longer would that rope have to be so that you could string a rope around the equator at a constant height of 2 feet? **Express your answer to the nearest inch.**
29. A cube is circumscribed about a sphere whose volume is  $972\pi$ . To the nearest tenth, what is the volume of the cube not occupied by the sphere?
30. Before releasing her newest book “The Adventure of Pi and E”, Sally Swizzle did some research and found that if she sold her book at \$12.00, then 4000 people would buy it. She also found out that for each \$2.00 she raises the book’s price, 150 fewer people will buy the book. If Sally will only sell her book for multiples of \$2.00, how much should she charge, in dollars, for her book to earn the maximum amount of money?