Pacific Trails Middle School Math Competition

2015-2016 Warm-Up

"Competition" Details:

This is a 25-problems/40-minutes Math Competition. Calculators are **not allowed** and are not needed. Attempt to solve as many questions as possible. If you spend more than 3 minutes on a question but cannot solve it, moving to a different problem would be a wise choice.

Name: _____ Score: _____

1. The cafeteria staff is preparing a lunch menu for the grand opening of the school. Each student is allowed to pick one vegetable from 10 vegetable options and one fruit from 8 fruit options. How many different lunch combinations are possible?

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2. If $3x + 8 = 23$, what is the value of $3x - 3$?

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3. Mrs. Nuskin wants to re-paint the classrooms. Painter A can finish the job in 20 days. Painter B can finish the same job in 15 days. If Mrs. Nuskin hires both painters, how long will it take to paint the classrooms?

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4. What is the sum of the three prime numbers between 40 and 50?

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5. Pacific Trails Middle School will have the New Student Orientation on August 13, 2015. May 10, 2015 Mother's Day is Sunday. What day of week will August 13, 2015 be?

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6. Mary is 25 years old and her sister is 17 years old? How many years ago was Mary's age double her sister's age?

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7. What is $1 + 4 + 7 + 10 + 13 + \ldots + 100$?

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8. If $2 < a < 9$ and $-4 < b < 4$ and a and b are both integers, what is the minimal value of ab?

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9. If $f(x) = x + 1$, $g(x) = x - 1$, what is $f(g(f(g(1{,}000{,}000))))$?

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10. Given $a + b = 23$, $b + c = 35$ and $a + c = 20$, what is the average of a, b and c?

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11. The Carmel Valley Dance Club has twenty members. Everyone has siblings. If 10 clubbers have brothers and 15 have sisters. How many have both brothers and sisters?

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12. The P.H.R. Soccer Club has fourteen students. How many ways are there to pick one goalkeeper and one goalkeeper substitute?

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13. The PTMS Orchestra is raising funds by selling cookies. They baked both chocolate and almond cookies, making 40 cookies in total. They sold all their cookies and made 60 dollars. If chocolate cookie is $1.20 and almond cookie is $1.80. How many chocolate cookies did they bake?

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14. Mr. Addition loves math. One day, he wrote an infinite square root on his whiteboard Simplify $\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2+\cdots}}}}$ this expression.

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15. If $n + \left(\frac{1}{n}\right) = 5$, then what is the value of $n^2 + \left(\frac{1}{n}\right)^2$?

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16. What is the area of a triangle formed by (1,0), (2,4) and (5,0)?

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17. Billy re-arranges the letters of "PASSWD" to create his new password. How many different passwords can he create?

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18. Henry lives 1/π miles away from Pacific Trails Middle School. He walks to school in the morning at a speed of 4 miles per hour and returns to home in the afternoon at a speed of 1 mile per hour. What is the average speed of his entire trip to and from school?

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19. A triangle has the same perimeter as a regular hexagon. What is the ratio of the area of the triangle and the regular hexagon?

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20. The number 123456789x (x is a single digit) is divisible by 6. What is the largest possible value of x?

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21. The slope of a linear function y = (k-1) x + 3 is perpendicular to y = 2x. What is k?

_____

22. How many PTMS students does Mrs. Nuskin have to choose in order to guarantee that at least two of the students will have birthdays in the same month?

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23. How many integers from 100 to 999 (inclusive) are divisible by 2 or 3 but not 6?

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24. George and Daphne both go to Trader Joe's between 8:00 AM and 8:30 AM. Both will wait for the other person for at most 10 minutes. Both will leave before 8:30 AM to attend school. If they meet, George promises to buy ice cream for Daphne. What is the probability that they meet each other at Trader Joe's?

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25. Mrs. Espinoza loves geometry. She stands at Point A on campus. Joan stands at Point B. Line $AB = 7\sqrt{2}$ feet. Mark stands at Point C, BC = 31 feet. Angle $\angle ABC$ is 45^{o}. What is the distance between AC?

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