Name _____ School _____

2012 Wahlert Math Club 8th Grade Math Contest
Individual Problem Solving Event

Calculators are permitted for this event. You should use scratch paper to do the work. Write the final answer as a whole number or fraction in the space(s) provided below each numbered space. **DO NOT USE ANY DECIMALS FOR YOUR ANSWERS.** Each problem has a value of 3 points.

_____15961_____1. An arithmetic sequence is one in which the difference between any number and the preceding number is always the same. The 20th term in an arithmetic sequence exceeds the 12th term by 64. The 20th term is 25. What is the 2012th term?

_____19_____ 2. In the number 22! Determine the largest prime factor.

____5_____ 3. In a group of 50 girls, each girl is either blonde or brunette, and each has either blue or brown eyes. Find the number of brown-eyed blondes if 14 girls are blue-eyed blondes, 31 are brunettes, and 18 have brown eyes.

____$150_____ 4. Mary and Deon bought the same item at two different stores. Deon received a discount of 30% off the list price, and Mary received a discount of 35% off the list price. If Deon paid $7.50 more than Mary, what was the list price?

_____5_____5. The average of A and 2B is seven, and the average of A and 2C is eight. What is the average of A, B, and C?

(turn over for problems 6 – 10)

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_____11 _____6. When positive integer A is divided by 39, the remainder is 10.

What is the remainder when 5A is divided by 39?

Express $\left(\frac{5}{6}+\frac{1}{3}\right) \div \left(2-\left(\frac{7}{8}-\frac{1}{3}\right)\right)$ as a reduced fraction.

$\frac{4}{5}$ 7.

The surface area of a cube is 450 cm. Find the length of an interior
onal of the cube.

15 8
diag

How many integers satisfy this inequality?

$$\frac{1}{3}<\frac{n}{12}<\frac{4}{5}$$

5 9.

How many two-digit numbers have their tens digit greater than their
ts digit?

45 10.
uni

Key

Wahlert Math Club
8th Grade Math Contest
2012
Marathon

No Calculators are permitted for this event.

Select the best answer for each statement from the choices provided. Fill in the appropriate space on the Scantron sheet. Make certain that you write your name and the name of your school on the Scantron sheet. NOTE: NOT means "None of These".

1. Find the product of (- 8) , (-2), and (2).

   a. 32 b. -8 c. -32 d. 8 e. NOT

2. Evaluate $(3x)^2 - 8x$ when x = -3.

   a. 12 b. -57 c. 105 d. 60 e. NOT

3. Simplify the expression $10x - 3y + 4y - 2x$.

   a. 8x - y b. 12 + y c. 12x + 7y d. 8x + y e. NOT

4. Find the quotient. $-\frac{2}{3} \div (-\frac{3}{4}) =$

   a. $\frac{8}{9}$ b. $-\frac{8}{9}$ c. $\frac{1}{2}$ d. $-\frac{1}{2}$ e. NOT

5. Find the solution of $\frac{2x}{5} = \frac{40}{x}$

   a. 25 b. 50 c. 4.5 d. 10 e. NOT

6. Which of the following is a factorization of $x^2 - 16x + 64$?

   a. $(x + 8)(x - 8)$ b. $(x + 8)$ c. $(x - 8)^2$ d. $2(x - 4)^2$ e. NOT

7. Simplify $(5^2)^7$.

   a. 25^9 b. 25^{14} c. 5^9 d. 5^5 e. NOT

8. Evaluate the expression

   $2(3 - 2) + 5(4 + 2)$

   a. 24 b. 22 c. 32 d. 60 e. NOT

9. What is the slope of the line through (5, 8) and (9, 4)?

a. **3** b. **1** c. $\frac{3}{4}$ d. **-1** e. NOT

10. 125% is 80 of what number?

a. 100 b. 60 c. 96 d. 64 e. NOT

11. The expression **b** ÷ **a** is equivalent to _____ .

a. $b \cdot \frac{a}{1}$ b. $b \cdot \frac{1}{a}$ c. $a \cdot \frac{b}{1}$ d. $a \cdot \frac{1}{b}$ e. NOT

12. What is the slope of the line:

$$y = -3x + 2$$

a. **2** b. **-3** c. **3** d. **-2** e. NOT

13. Which of the following is a prime number?

a. 87 b. 127 c. 225 d. 261 e. NOT

14. What is the solution of the equation $2x - 5 = 3x + 2$

a. 3 b. -2 c. 5 d. -3 e. NOT

15. What is the y-intercept of the line $y = 5x - 2$?

a. 2 b. 5 c. - 5 d. - 2 e. NOT

16. What is the equation of the line that passes through the point (1, -3) and has a slope of ½?

a. $y = \frac{1}{2}x - \frac{2}{3}$ b. $y = \frac{1}{2}x + \frac{2}{3}$ c. $y = x - \frac{1}{2}$ d. $y + \frac{1}{2}x = -3$ e. NOT

17. Evaluate (⅔)x when $x = \frac{9}{4}$.

a. $\frac{11}{7}$ b. $\frac{3}{2}$ c. $\frac{2}{3}$ d. $\frac{18}{7}$ e. NOT

18. What kind of triangle can have three sides with identical lengths?

a. acute b. obtuse c. right d. scalene e. NOT

19. Two sides of a right triangle are 8 and 6. The third side can be _____ .

a. 4 b. 8 c. 10 d. 14 e. NOT

20. What is the largest prime factor of 2012?

a. 2 b. 4 c. 29 d. 203 e. NOT

21. What is the solution of the inequality $6 < 2x - 3$?

a. $\frac{3}{2} < x$ b. $\frac{3}{2} > x$ c. $\frac{9}{2} > x$ d. $\frac{9}{2} < x$ e. NOT

22. Which of the following is not a rational number?

a. $\sqrt{289}$ b. 0.122333… c. 0.1212…. d. $\frac{5}{8}$ e. NOT

23. What is the shape of the graph of: $y^2 = 1 - x^2$?

a. line b. parabola c. circle d. hyperbola e. NOT

24. Factor $3x^2 - 7x - 6$.

a. $(3x - 2)(x - 3)$ b. $(x - 3)(3x + 2)$ c. $(3x - 2)(x + 3)$ d. $(3x + 2)(x + 3)$ e. NOT

25. What is the y-coordinate of the solution to the system

$$y = x - 4$$
$$y = 2x + 1$$

a. -5 b. -3 c. $\frac{5}{8}$ d. -1 e. NOT

26. Which of the following is a direct proportion between y and x^2?

a. $x = 4y$ b. $x(y) = 4$ c. $y = x^2$ d. $x + y = 2$ e. NOT

27. The sum of the interior angles of a pentagon is _____ degrees.

a. 90 b. 360 c. 540 d. 480 e. NOT

28. Which of the following is closest to π ?

a. 22/7 b. 3.141 c. 222/77 d. 3.142 e. 3.140

29. If $a = \cos x$, which of the following is true?

a. $-1 < a < 1$ b. $a \geq -1$ c. $a \leq 1$ d. $-1 \leq a \leq 1$ e. NOT

30. What is the x-intercept of $y = 2x^3 - 4x^2 + 3x + 4$?

a. 3 b. 4 c. 10 d. 40 e. NOT

2012
Wahlert Math Club 8th Grade Contest
Team Problem Solving Event

School _____ Team Members _____

_____

_____

_____

_____

Calculators may be used for this event. **Use no decimal approximations or repeating decimals**

____144_____ 6. The area of a circle whose circumference is 24π is $k\pi$. What is the value of k?

____21_____ 7. How many ordered triples (x, y, z) are solutions to the equation $x + y + z = 8$ if x, y, and z are positive integers?

____43_____ 8. A teacher bought 100 puzzles for \$82.90 to give out to the members of the math team. The teacher bought three different types of puzzle. Type A cost 40¢ each, type B cost 70¢ each, and type C cost \$1 each. How many more type C puzzles than type A puzzles did the teacher buy?

____920_____ 9. How many four-digit numbers contain at least one 3 and at least one 7? (We do not consider a number with a leading zero a four-digit number.)

_____30 min_____ 10. Raj drives 21 miles to work each day. When he leaves home 10 minutes late, his time travel increases by 40%. If leaving late decreases his average rate by 12 mph, how long does the trip take him when he leaves on time?