2013

Wahlert Math Club 8th Grade Math Contest

Individual Problem Solving Event

Calculators are permitted for this event. Write the final answer as a whole number or fraction in the space(s) provided. **DO NOT USE ANY REPEATING DECIMALS IN YOUR ANSWERS.** Each problem is worth 10 points.

_____-2_____1. A number less half of the number is 3 more than twice the number. Find the number.

$77\frac{1}{2}\%$

_____77.5%_____2. If *a* is 80% of *c*, and *b* is 62% of *c*, then *b* is what percent of *a*?

_____7 inches_____3. What is the length of the largest pole that can fit in a rectangular box with dimensions 2 inches, 3 inches, and 6 inches?

_____$x^2$_____4. Simplify $(\frac{1}{x} + \frac{1}{x^2}) \div (\frac{1}{x^3} + \frac{1}{x^4})$.

_____2 lbs_____ 5. If a brick balances with three fifths of a brick and four fifths of a pound, how much does a brick weigh?

_____5_____ 6. What is the result if, when starting with the number five: we add twenty-three and divide by two, then subtract eleven and divide by three, then multiply by six and subtract one?

_____671_____ 7. The three digit number *abc* is multiplied by the single digit number $d$ to get 2013. Determine the number *abc*.

150min 2hrs. 30min

_____2.5 hrs_____ 8. Three people can complete a task in 3 hr 20 min. How long would it take 4 people to complete the same task if they worked at the same rate as the other 3?

_____0_____ 9. Determine the hundreds digit for the following product.

$$37 \cdot 53 \cdot 91 \cdot 130 \cdot 45 \cdot 19 \cdot 23 \cdot 65 \cdot 148$$

_____L_____ 10. Given the following sequence:

PROBLEMSOLVINGPROBLEMSOLVINGPROBLEM SOL . . .

If the pattern continues, what letter will be in the 2012th position.

Key

Wahlert Math Club

8th Grade Math Contest

Marathon

2013

**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 answer sheet. Make certain that you write both your name and the name of your school on the Scantron sheet. A blank Scantron sheet will be scored as a "0". NOTE: NOT means "None on These".

1. What per cent of 24 is 60? $\frac{60}{24}$

   a. 40 (b. 250) c. 150 d. 48 e. NOT

2. A circle has a diameter of 10 cm. To the nearest cm, what is it's circumference?

   (a. 31) b. 38 c. 16 d. 18 e. NOT

3. What is the product of the first 6 positive integers?

   a. 21 b. 126 c. 120 d. 480 (e. NOT) 720

4. What is the least common multiple of 24 and 36?

   a. 12 b. 864 (c. 72) d. 144 e. NOT

5. Find the sum of $(x + 2)$ and $(x - 3)$. $2x - 1$

   a. $x^2 - 1$ b. $x^2 - x - 6$ (c. $2x - 1$) d. -1 e. NOT

6. $\frac{2}{5} + \frac{3}{4} =$ _____. $\frac{8}{20} + \frac{15}{20} = \frac{23}{20}$

   a. $\frac{5}{9}$ b. $\frac{11}{20}$ (c. $\frac{23}{20}$) d. $\frac{8}{5}$ e. NOT

7. Two lines cannot intersect if they are _____.

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

8. A circle with a radius of 2 cm has an area of _____ $cm^2$. $4\pi$

a. 4 b. 3.14 c. 6.28 d. 9.42 e. NOT $12.57$

9. The multiplicative inverse of A is _____.

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

10. Factor $x^2 - 5x + 6$.

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

11. Divide $2x^2 - x - 1$ by $x - 1$. $(2x+1)(x-1)$

a. $(2x+1)$ b. $(2x-1)$ c. $2(x-1)$ d. $2x - x$ e. NOT

12. What is the greatest common factor of $6a^3b^2$ and $2ab^2$. $2ab^2$

a. $6a^3b^2$ b. $2ab$ c. $ab^2$ d. $2ab^2$ e. NOT

13. 28 is 20% of what number? $28 = .2x$

a. 5.6 b. 84 c. 140 d. 200 e. NOT

14. Evaluate $2(5-2)3 + 8 \div (2+2)$. $2(3)3 + 8 \div 4 = 18 + 2$

a. 20 b. 8 c. 12 d. 10 e. NOT

15. What kind of a triangle has no congruent sides?

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

16. Each exterior angle of a regular hexagon measures _____ degrees.

c. 120 d. 45 e. NOT

6 sides

$180(4) = 720$

$720 \div 6 = 120$

$180 - 120$

a. 90 b. 60

17. The shape of graph of $y = 4x^2 - 3x - 4$ is a _____.

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

18. If A * B = A + 2(A – B), what is 2*3?  $2 + 2(2-3) = 2+2(-1)$ $2+-2$ $0$

a. – 2  b. 1  c. 3  d. – 1  e. NOT

19. What is the greatest common factor of 1027 and 12,107?

a. 7  b. 127  c. 129  d. 13  e. NOT  1

20. To the nearest whole percent, what percent of 240 is 300?  $\frac{300}{240}$

a. 120  b. 125  c. 80  d. 75  e. NOT

21. If $((x^3)^4)^5 = x^T$, what is the value of T?  $(x^{12})^5$

a. 12  b. 60  c. 17  d. 23  e. NOT

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

a. 37  b. 127  c. 141  d. 257  e. NOT  $=3$

23. What is the slope of the line: $2y = 4x + 7$

a. 3.5  b. 2  c. 4  d. 8  e. NOT

24. What is the shape of the graph of $x^2 + 5 = 4x - y$?

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

25. What is the slope of the line through (4 , 0) and (-3, 0)?

a. $\frac{3}{4}$  b. $\frac{4}{3}$  c. 0  d. $-\frac{3}{4}$  e. NOT

26. $\frac{a}{b} + \frac{b}{a} =$ _____.  $\frac{a^2}{ab} + \frac{b^2}{ab} = \frac{a^2+b^2}{ab}$

a. $\frac{a+b}{ab}$  b. $\frac{a}{ab}$  c. $\frac{a-b}{ab}$  d. 1  e. NOT

27. Which of the following is closest to the value of pi?

a. $\frac{22}{7}$ b. 3.142 c. 3.150 d. 3.145 e. 3.141

28. $(x-2)(2x-3) =$ $2x^2 - 3x - 4x + 6 = 2x^2 - 7x + 6$

a. $3x-5$ b. $2x^2-7x+6$ c. $2x^2+6$ d. $3x+6$ e. NOT

29. The notation $f^{-1}(x)$ indicates the _____ of f(x).

a. inverse b. reciprocal c. opposite d. function e. NOT

30. A + B = B + A is called the _____ property.

a. associative b. distributive c. identity d. commutative e. NOT

22/7 ≈ 3.14 28

π ≈ 3.14 15 92654

b = 3.14 20

2013

Wahlert Math Club 8th Grade Math Contest

Team Problem Solving Event

School _____ Team Members

_____

_____

_____

_____

_____

Calculators may be used on this event. **Use no decimal approximations or repeating decimals in answers. Write all fractions in lowest terms.** Write each answer in the space provided. Each problem is worth 10 points.

1. The date January 1, 2036 will be a perfect-square date because

$$\sqrt{1012036} = 1006.$$

Find the only year when April Fools' Day will be a perfect-square date in the current millennium (2XXX).

_____2009_____

2. An equilateral triangle whose side is 12 inches is divided into ***n*** equilateral triangles whose sides are I inch each. Find ***n***.

_____144_____

3. Find the remainder when $7^{2013}$ is divided by 9.

_____1_____

4. The wheels on the bus go 'round and 'round. Suppose the diameter of a tire on the bus is 41.5 inches, and the tires wear out after 60,000 miles. How many times will a tires go 'round in a typical lifetime?

_____any number that rounds to 29,160,000 _____

5. Find the dimensions of a rectangular solid (box) if the sum of all the edges is 76, the total surface area is 206, and the volume is 165.

_____3, 5, 11 (in any order)_____

6. A dozen ears of corn were bought for ***n*** cents per dozen, but a seller put in two extra ears of corn. The price per ear was then 5 cents lower. How much was paid for the corn?

_____$4.20_____

7. When the digits of a two-digit number are reversed, the result is another two-digit number that is 62.5%smaller than the original number. What was the original number?

_____72_____

8. In a game of tug-of-war, 3 boys pull with the same force as 4 girls. One adult pulls with the same force as 2 girls and 1 boy. If 1 adult and 2 girls are tugging against 4 boys, which side will win?

_____ Neither, They are evenly matched_____