Name: _____ School Name: _____

1. What is the sum of the divisors of 2014?

A. 2105
B. 74
C. 2074
D. 3240
E. 1225

2. What is the value of $\cfrac{1}{4+\cfrac{1}{4+\cfrac{1}{4+...}}}$

A. 1
B. It cannot be determined.
C. -4
D. 0
E. $-2+\sqrt{5}$

3. Let $\frac{a+3b}{3c-a}-\frac{9bc}{9c^2-a^2}=-\frac{a-3b}{3c+a}$. Solve for a.

A. $a=\frac{3bc}{2b+2c}$
B. $a=\sqrt{\frac{bc}{b+c}}$
C. $a=0$
D. $a=\frac{bc}{b+c}$
E. $a=bc$

4. A circle is centered at the origin of the two-dimensional plane. A line is tangent to the circle at the point $(-4,-3)$. Find the length of the portion of the tangent line in quadrant III.

A. 14
B. 50
C. 10
D. 25
E. $125/12$

5. The outside walls of a barn are 20 feet high. From the left wall, the roof rises 8 feet over a horizontal span of 32 feet. It descends at the same rate over another horizontal span of 32 feet to the right wall. Which of the following equations describes the descending part of the roof? *Let the "origin" point of the graph be at the left bottom corner of the house, where the left wall meets the ground.*

A. $f(x) = 0.25x$
B. $f(x) = -0.25x + 36$
C. $f(x) = -0.25x$
D. $f(x) = 0.25x + 8$
E. $f(x) = -0.25x + 20$

6. You have 100 feet of fencing material and would like to construct a right triangular area on your property along a straight portion of a river, which would serve as the hypotenuse of the triangle. You want this enclosed area to be open to the river, so no fencing is needed there. Let *x* denote the length of one of the legs of the triangle. Find the maximum possible area you can enclose.

A. 1250 feet
B. 5000feet
C. 2500 feet
D. 937.5 feet
E. 1000 feet

7. The first ten counting numbers are: {1, 2, 3, 4, 5, 6, 7, 8, 9, 10} What is the greatest common factor of these numbers?

A. 2
B. 2520
C. 210
D. 420
E. 840

8. The ***sum*** of the real solutions to $x^{1/6} - x^{1/3} + 2 = 0$ is:
A. No real solutions.
B. 65
C. 5
D. 64
E. 8

Name: _____ School Name: _____

9. Carly is baking and the recipe she is following calls for $1\frac{1}{2}$ cups of flour. She finds that she only has 1 cup of flour. What fraction of the recipe can she make?

A. 1
B. $1/2$
C. $2/3$
D. $3/4$
E. $1/3$

10. Charlie has a piece of wire that is 12 inches long and he cuts it into two pieces (let *x* denote one of the pieces). He then bends each piece into a square. For which values of *x* will the combined area of the squares be less than 5 square inches? *Answers are written in interval notation.*

A. $(0,4)\cup(8,\infty)$
B. $(4,8)$
C. $(4,6)$
D. $(5,8)$
E. $(5,12)$

11. Simplify $\frac{3^{5007}-3^{5003}}{3^{5008}+3^{5002}}$.

A. $7/8$
B. $1/3$
C. $4/5$
D. $31/59$
E. $20/61$

12. A line passes through $(w,-10)$ and $(10,3w)$ and has slope w. Find the ***product*** any positive real numbers w such that the above is true.

A. 10
B. No real number solutions exist.
C. -30
D. 3
E. 13

13. A comedian will be performing in five cities: Houston, Austin, Dallas, New Orleans and Little Rock. In how many ways can she arrange her itinerary if the three performances in Texas must be given consecutively?

A. 6
B. 9
C. 12
D. 36
E. 18

14. A code has three digits. If each code is randomly chosen, what is the probability that it will have three different digits?

A. $63/125$
B. $1/504$
C. $18/25$
D. $1/3$
E. $9/125$

15. Calculate $(2+4+6+\ldots+500)-(1+3+5+\ldots+499)$.

A. 0
B. 250
C. 200
D. 500
E. 750

Name: _____ School Name: _____

16. Given $\sqrt[16]{2^x} \cdot \sqrt{2^y} - 128 = 0$ and $\sqrt[8]{2^x} \cdot \sqrt[4]{2^y} - 32 = 0$, find $x + y$?

A. 2
B. 28
C. -56
D. 80
E. 56

17. A regular quadrilateral is inscribed in a circle that has a diameter of 8 mm. What is the area of the rectangle?

A. 16 mm^2
B. 64 mm^2
C. 128 mm^2
D. 8 mm^2
E. 32 mm^2

18. How many points does $x^2 + y^2 = 4$ and $y = -x^2 - 2$ have in common?

A. 0
B. 1
C. 2
D. 3
E. 4

19. Let $f(x) = 2x^2 - 12x + k$. If its vertex is on the x-axis, what is the value of k?

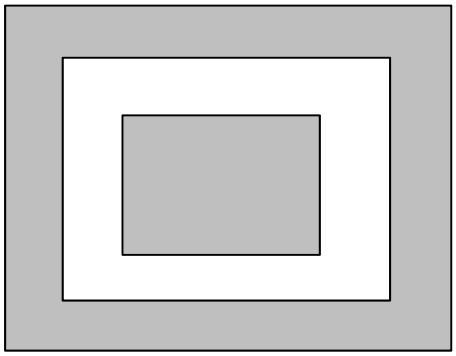
A. 18
B. -3
C. -9
D. 3
E. It cannot be determined.

20. Let $-3x^2 + bx - 2 = 0$. If the equation is to have one real number solution, what must the real values of b equal?

A. $b = 0$
B. b can be any real number
C. $b = \pm 2\sqrt{6}$
D. b can be any real number except zero
E. $b = \pm 12$

Name: _____ School Name: _____

21. The following figure contains three squares. A dart is thrown at the figure at random. If the inner square has side length 4 cm, the middle square has side length 8 cm and the outter square has side length 12 cm, find the probability that the dart will land in the white area. *The squares may not be drawn to scale.*



A. $3/4$
B. $4/9$
C. $1/2$
D. $1/3$
E. $1/9$

22. If $-2x+1$ is a factor of $-6x^3+11x^2-2x+k$, find $2k$.

A. –9
B. 9
C. –6
D. –3
E. –2

23. Let n be a natural number. What is the sum of the last three digits of 5^{2n+1}?

A. 8
B. 13
C. 15
D. 9
E. It cannot be determined.

Name: _____ School Name: _____

24. Let $x+2y\neq 0$ and $x\neq 0$ calculate $\left(\frac{x}{y}\right)^{2014}+\left(\frac{y}{x}\right)^{-2014}$.

A. $\left(\frac{1}{2}\right)^{2028}$

B. 2^{2015}

C. 2^{2028}

D. $\left(\frac{1}{2}\right)^{2015}$

E. 1

25. What is the area of the region of $|x|+|y|=6$?

A. 9

B. 144

C. 36

D. 72

E. 12