Alabama School of Fine Arts
Invitational Mathematics Tournament
January 19, 2013

Sixth Grade Exam

1. It has been nearly 1 month since the world came to an end. In order to get food, Numair must barter with his personal items. He has 5 erasers in his pocket. If 1 eraser can get him 22 iron bolts, and 11 iron bolts can be exchanged for 1 ASFA Math/Science T-shirt, and 2 t-shirts can be exchanged for 5 morsels of food, then how many morsels of food will Numair get by trading the 5 erasers in his pocket.

   A. 25 B. 22 C. 50 D. 15 E. NOTA

2. How many integral divisors does 24 have?

   A: 10 B: 8 C: 16 D: 4 E: NOTA

3. For variables C, E, F, G, H, I, L, T and U:
   Evaluate $\frac{THUG}{LIFE} \times (LIFE)^2 \times \frac{1}{FILE} \times \frac{ICE}{HUG}$

   A. THUGT B.TLIFE C. ICET D.LICE E.NOTA

4. Hriday is trying to buy a diamond for his girlfriend, but he doesn't know what her favorite color is. Luckily, the jewelry store has a bag from which Hriday can pick one randomly. This bag contains 25 diamonds in total -- 3 onyx diamonds, 4 slate diamonds, 1 dark grey diamond, 8 diorite diamonds, 5 black diamonds, and 4 pitch-black diamonds. Hriday's girlfriend hates black and pitch-black diamonds and will reject Hriday if he picks these colors. What is the probability that Hriday will get rejected?

   A. $\frac{9}{25}$ B. $\frac{3}{5}$ C. $\frac{16}{25}$ D. $\frac{4}{5}$ E. NOTA

5. The ratio of boys to girls at the local club is 1:3. If there are 48 people in the club, then what is the number of girls in the club?

   A. 12 B. 24 C. 35 D.13 E. NOTA

6. How is 13_{10} written in base 4?

A. 31_4 B. 121_4 C. 13_4 D. 12_4 E. NOTA

7. Solve the following for *x* while $x > 0$:

$$\frac{1}{x} + \frac{1}{4} \leq \frac{1}{2}$$

A. $x < \frac{1}{4}$ B. $x \leq \frac{1}{4}$ C. $x \geq 2$ D. $x \leq 4$ E. NOTA

8. Solve the following system of equations for *x*:

$$3x + 2y = 7$$
$$-x + y = 11$$

A: 3 B: – 1 C: – 3 D: 1 E: NOTA

9. Jong, Jefferson, Jack, Jared, and Jiminy are in the Alabama School of Fine Art's marching band. At snack time, each boy eats one of the following food items: ramen, carrots, cookies, burgers, or cheese. They also each play one of the following percussion instruments: the bongo, snare drum, timpani, kettle, or bass. Given the following, what instrument does Jiminy play?

- Jefferson's skin is orange because he eats so many carrots
- Jack plays the timpani
- Jiminy cannot play the kettle due to an irrational fear
- Jared has always wanted to steal Jong's bongos
- Jong has always wanted to eat Jared's burger
- Jessica does not even go to the school
- Jefferson's snare drum was covered in Jong's ramen

A. Base B. Bass C. Kettle D. Bongos E. NOTA

10. Pandora's box holds all of the magical wonders that make our world unique. One day, Stephen scissor-kicked Pandora's box in such a way that half of the material that filled up the box was lost. Given that the box was a cube with an edge of 4ft, find the volume of material that didn't escape the box.

A. 36 B. 12 C. 64 D. 32 E.NOTA

11. Which of the following is/are true?

I. $2x + 4 \quad x^2 + 7 = 2 \; x \; x^2 + 2x + 7 + 14$

II. There is a finite number of prime numbers

III. π is an irrational number

A. I only B. II only C. I and II D. I and III E. NOTA

12. Evaluate $2 + 4 + 6 + \cdots + 2014 - (1 + 3 + 5 + \cdots + 2013)$

A. 1007 B. 2013 C. 2014 D. 1006 E. NOTA

13. A set of numbers whose median is larger than the mode, and whose mean is equal to the median could be:

A. {2, 2, 2, 7, 8} B. {2, 2, 2, 5, 7, 8, 9} C. {1, 1, 3, 8, 9} D. {1, 1, 4} E. NOTA

14. A cube has a side length of 12. What is the ratio of this cube's surface area to its volume?

A: 3: 1 B: 1: 2 C: 2: 3 D: 2: 1 E: NOTA

15. Let n! = (n)(n-1)(n-2)(n-3)…(2)(1). Evaluate $\frac{36!11!}{34!12!}$

A. 117 B. 202 C. 135 D. 176 E. NOTA

16. A = The product of 25 and 0.20
B = The smallest odd prime number (remember that 1 is not a prime)
C = The sum of the positive divisors of 14

Find A + B * C

A. 168 B. 192 C. 55 D. 77 E. NOTA

17. The ASFA Robotics workroom is 8 feet wide and 7 yards long. The team wants to create a practice mat to cover the entire floor. What will be the area of the floor mat they create, rounded to the nearest integer?

A. 68 feet^2 B. 56 yards^2 C. 19 yards^2 D. 168 yards^2 E. NOTA

18. Find the value of 9.178943729 + 12.427836 rounded to the thousandth digit.

A. 21 B. 21.6 C. 21.61 D. 21.606 E. NOTA

19. Jessie has some chickens and rabbits. All chickens have one head and two legs. All rabbits have one head and four legs. There are 30 heads and 76 legs in all. How many chickens does Jessie have?

A. 22 B. 8 C. 9 D. 21 E. NOTA

20. What is 120% of 75% of 20?

A. 15 B. 18 C. 24 D. 30 E. NOTA

21. The radius of circle A is 5. If the radius of circle A is half of the radius of circle B, what is the area of circle B?

A. 100 π B. 6.25π C. 25 π D. 10 π E. NOTA

22. James is the county fisherman. He can make four meals from every two and a half fish he captures. If he captures Red Trout at a rate of one trout every one-fourth of an hour and a Rainbow Trout every hour, how many meals can he create each 24 hour day (assume that Red Trout and Rainbow Trout each count as one whole fish)?

A. 12 B. 192 C. 48 D. 36 E. NOTA

23. Adam has a container that is holding 6 L of liquids and Ellen has a container that is holding 8 L of liquid. If they combined both volumes of liquid in Eric's container, which can hold 20 L of liquid, how many more mL of liquid would they have to add for Eric's container to be full (assuming that the volumes of the liquid are additive)?

A. 4 B. 16 C. 6600 D. 6000 E. NOTA

24. Find the next number of this series: 0, 2, 14, 16, 112, 114, 798, 800 …

A. 924 B. 1140 C. 802 D. 5600 E. NOTA

25. Evaluate $\frac{\frac{1}{2}+\frac{1}{12}-\frac{3}{8}}{2}$

A. $\frac{5}{48}$ B. $-\frac{1}{44}$ C. $\frac{1}{22}$ D. $\frac{5}{24}$ E.NOTA

TB 1

Given

9		
		8

Use the remaining numbers from 1-9 to fill in the grid such that each row, column, and diagonal sums to 15. What number must be placed in the top right position?

TB 2

A fair coin is flipped 7 times. What is the probability of getting tails 7 times in a row?

TB 3

If $A * B = \frac{A^2+\sqrt{B}}{A+B}$

Then what is $7 * (5 * 4)$?