

**Alabama School of Fine Arts**  
**2010 Pre-Algebra Test**

1. 
$$\frac{\left(54^2 - \frac{7}{6} + 2010!\right)^{2^6 - 4^3}}{3 + 5 - 2^4 + 13^2}$$

A.  $\frac{131415665225380392}{161}$       B.  $\frac{2578097427503}{161}$       C.  $\frac{1}{161}$       D. 0      E. NOTA
  
2. If  $A = \frac{7!}{5!}$   
 B= the surface area of a rectangular prism with width 2, length 3, and height 5  
 C= the 7<sup>th</sup> number in the Fibonacci sequence (starting with 1, 1 ...)  
 D= the x-intercept of  $3y + 6x - 2 = 0$   
 Find the mean of A, B, C, and D.  

A.  $\frac{289}{12}$       B.  $\frac{145}{6}$       C.  $\frac{88}{3}$       D.  $\frac{137}{6}$       E. NOTA
  
3. Vincy was a super genius 10th grader. Her age in 2010 is the 3rd term in the 6th row in Pascal's triangle. In 14 years, her best friend Judy will be triple Vincy's current age. Three years ago, their other friend Jo was half of Judy's current age. What is Jo's current age?  

A. 10      B. 16      C. 11      D. 8      E. NOTA
  
4. Find the units digit of  $7^{2010} - 3^{2010} + 2010^{2010} + 2^{2010}$   

A. 4      B. 0      C. 6      D. 2      E. NOTA
  
5. NURSEN OGUTVEREN wants to make an alias for a birthday party. In how many distinct ways can she rearrange the letters in her last name to create a completely new alias for herself?  

A. 181439      B. 362880      C. 181440      D. 9!      E. NOTA
  
6. In Judi's Mathematical World,  
 $A \oplus B = (A - B) \left( \frac{A}{B} \right)$  and  $A \otimes B = (A + B) \left( \frac{A}{B} \right)$ .  
 Find the value of  $(-2 \otimes (24 \oplus (6 \otimes (3 \oplus 1))))$ .  

A. 0      B.  $-\frac{11}{7}$       C.  $-\frac{11}{6}$       D.  $\frac{83}{42}$       E. NOTA

7. When the number  $\overline{ab7}$  (where  $a$  and  $b$  represent the hundred's and unit's digits respectively) is divided by 11, the result is  $x$ . Another number  $\overline{c7d}$  (where  $c$  and  $d$  represent the ten's and hundred's digit respectively) is also divided by 11 to result in  $x + 9$ . What is the sum of  $a + b + c + d$ ?

A. 11                  B. 50                  C. 41                  D. 23                  E. NOTA

8. Given that:

$$\frac{209y^6 \sqrt[6]{x^5}}{x\sqrt{x^3} \sqrt[3]{y}} = 11y^2 \sqrt[3]{xy^2}$$

$$(2x + 5y)^2 = 521$$

Find the value of  $16x^2 + 100y^2$

A. 564                  B.  $\frac{1551}{11}$                   C. 1324                  D. 141                  E. NOTA

9. A total of 350 ASFA students are deciding what to eat for lunch. There are 3 options: Volcano Tacos, Volcano Burritos, and Volcano Pies. 128 students want to eat Volcano Tacos and 100 students want to eat Volcano Burritos. If 13 students want to eat all three choices, 18 students want to eat both Volcano Pies and Volcano Burritos, 52 students want to eat both Volcano Tacos and Volcano Burritos, and 40 students want to eat both Volcano Tacos and Volcano Pies, find the number of students who only want to eat Volcano Pies.

A. 73                  B. 51                  C. 105                  D. 42                  E. NOTA

10. Find the sum of X, Y, Z given:

$$XY = 2$$

$$YZ = \frac{8}{3}$$

$$XZ = 12$$

A. 7                  B.  $\frac{23}{3}$                   C. 8                  D.  $\frac{103}{3}$                   E. NOTA

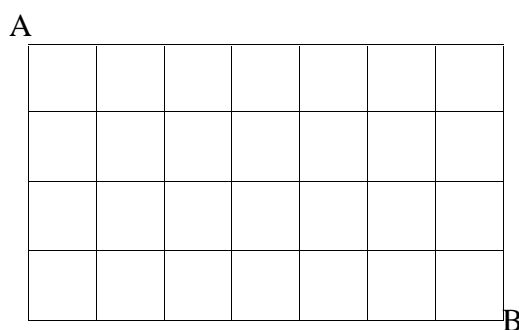
11. The expression  $\sum_{i=0}^n i$  equals the sum of all integers from  $i$  to  $n$ . For example,

$$\sum_{i=0}^5 i = 0 + 1 + 2 + 3 + 4 + 5 = 15$$

Using this information, determine the value of

$$\frac{\sum_{i=7}^{22} i - \sum_{i=4}^{19} i}{\sum_{i=-16}^2 i + \sum_{i=7}^{16} i + \sum_{i=1}^6 i}$$

- A.  $\frac{3}{8}$       B. 8      C. 4      D. 16      E. NOTA
12. Judi has 3 lucky orange pencils in her backpack. She also has 5 pink pencils, 2 blue pencils, and 1 green pencil in her backpack. If she randomly draws 3 pencils from her backpack one at a time, what's the probability that all three of them will be orange, assuming there is no replacement?
- A.  $\frac{3}{55}$       B.  $\frac{1}{55}$       C.  $\frac{1}{165}$       D.  $\frac{3}{165}$       E. NOTA
13. How many ways can an ant travel from point A to point B on the following path if it only travels down and to the right?

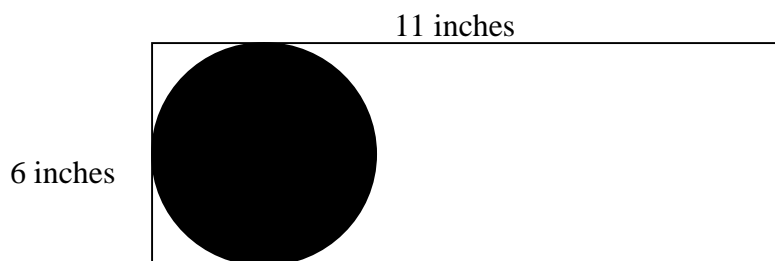


- A. 792      B. 1287      C. 330      D. 495      E. NOTA

14. 
$$\sum_{x=1}^6 \frac{\frac{1}{x} + \frac{1}{x^2} + \frac{1}{x^3}}{\frac{1}{x^4} + \frac{1}{x^5} + \frac{1}{x^6}} =$$

- A. 441      B. 400      C. 1      D.  $x^2$       E. NOTA

15. Lightfoot is a happy kid who carries around 2 white, wooden whales called Spot and Rover. These whales are both rectangular prisms with dimensions 6 inches by 7 inches by 11 inches. The whales are identical except that Spot has one black spot in the shape of a circle on one side. If the circle is tangent to three edges of the prism as shown below, what is the total surface area of both whales that is white?



- A. 740 - 18      B. 740 - 9      C. 370 - 36      D. 370 - 9      E. NOTA
16. Kevin has a cube with sides of length 3 inches. He cuts a square hole with a length 1 inch through the center of each face of the cube, hollowing it out from end-to-end. If Kevin dips the cube in paint and cuts the cube into smaller cubes with side lengths of 1 inch, what is the total number of faces that will be covered in paint?
- A. 72      B. 54      C. 48      D. 60      E. NOTA
17. If  $f(x) = \frac{x}{1-x}$ , find  $f(f(f(f(f(f(f(f(f(f(-1))))))))))$ .
- A. Undefined      B.  $-\frac{1}{2}$       C.  $-\frac{1}{13}$       D.  $-\frac{1}{14}$       E. NOTA
18. The average of 7 consecutive odd numbers is 2017. Find the sum of the 2<sup>nd</sup> and 6<sup>th</sup> numbers in the sequence.
- A. 2017      B. 4024      C. 4034      D. 2011      E. NOTA
19. Express  $\overline{0.20102010}$  as a fraction.
- A.  $\frac{2010}{9999}$       B.  $\frac{670}{9999}$       C.  $\frac{201}{333}$       D.  $\frac{201}{999}$       E. NOTA

20. What is the slope of the line perpendicular to the line passing through the points  $(9b-8a, 3a+5b)$  and  $(2b-a, 5a+3b)$ ?
- A.  $\frac{2}{7}$       B.  $-\frac{7}{2}$       C.  $\frac{2a-2b}{-7b-9a}$       D.  $\frac{-7b-9a}{2a-2b}$       E. NOTA
21. Shaq is thirsty and wants to drink only one gallon of vitamin water. He has a 5-gallon jug filled to the brim, an empty 12-quart jug, and an empty 4-pint jug. What is the least number of steps Shaq can use to get one gallon of vitamin water? Assume he can only pour vitamin water from one container into another container and cannot obtain more vitamin water.
- A. 3      B. 4      C. 5      D. 6      E. NOTA
22. If  $x^3 \begin{pmatrix} | & | \\ \hline \end{pmatrix} y = 14 \begin{bmatrix} \bigcirc & -0 \\ \hline \end{bmatrix} \frac{x^2 - y^2}{5}$ , where  $a \begin{bmatrix} \bigcirc & -0 \\ \hline \end{bmatrix} b = \frac{14a - 42b}{15 + b}$ , then what is  $8 \begin{pmatrix} | & | \\ \hline \end{pmatrix} 3$ ?
- A. -17      B.  $-\frac{133}{13}$       C.  $-\frac{49}{9}$       D. -10      E. NOTA
23. If two standard dice are rolled, what is the probability that the sum of the faces is greater than or equal to seven?
- A.  $\frac{1}{2}$       B.  $\frac{3}{7}$       C.  $\frac{7}{12}$       D.  $\frac{5}{12}$       E. NOTA
24. Find the sum of the coordinates of the point of intersection of the two lines  $2x + y = 50$  and  $100x + 50y = 2500$ .
- A. 2      B. 32      C. 0      D. No points of intersection      E. NOTA
25. Find the product of the solutions of the following equation:
- $$\frac{4}{x} + \frac{x}{4} = \frac{5}{x} + \frac{x}{5}$$
- A.  $2\sqrt{5}$       B. -10      C. -20      D.  $10\sqrt{5}$       E. NOTA

### Tie Breakers

TB1 : Find the next term in the following pattern. 1, 2, 6, 42, 1806,...

TB2 : If there are 6 roflcopters in 15 epicfails, 20 noyous in 8 roflcopters, and 16 happyfaces in 4 noyous, then how many happyfaces are there in 6 epicfails?

TB3 : Find the term that belongs in the fourth row and second column of this Sudoku puzzle.  
The object of Sudoku is to fill the empty cells with numbers between 1 and 9 (only one number in each cell) according the following guidelines:

- Each number can only appear once on each row.
- Each number can only appear once on each column.
- Each number can only appear once on each smaller 3x3 grid:

			6	2	1			
1				5		8	3	
7	5	9						2
					2	5	9	
		6	7		5	4		
	1	4	3					
2						6	4	1
	3	5		9				7
			2	4	8			