Alabama School of Fine Arts
Invitational Mathematics Tournament
January 22, 2011

Pre-Algebra Exam

1. Solve for x:

$$3 + \quad 2 \quad \frac{1}{4} \quad 4x \quad = \quad 2 \quad 7 \quad 2 + \quad \frac{3x}{4}$$

A) $-\frac{50}{17}$ B) $\frac{3}{19}$ C) 1 D) -1 E) NOTA

2. Evaluate $\frac{2^3-4+30}{50} - \frac{5+7\ \frac{1}{2}\ +6}{6^2-11}$

A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{1}{4}$ D) $\frac{1}{5}$ E) NOTA

3. Write 0.742 as a fraction.

A) $\frac{149}{198}$ B) $\frac{167}{225}$ C) $\frac{49}{66}$ D) $\frac{23}{31}$ E)NOTA

4. If Arthur hitchhikes on a Vogon ship traveling at three times the speed of light to Tatooine, which is $2.7x10^{11}$ meters from Earth, how long will it take to reach Tatooine, in minutes? Assume Arthur starts from Earth and the ship does not stop to destroy any planets to build an intergalactic highway. The speed of light is 3.0×10^8 meters per second.

A) 5 B) 50 C) 30 D) 300 E) NOTA

5. Sophie wishes to create a new brand of car. She does not know how to build a car, so she will rip off Toyota by buying their cars and reselling them for an inflated price, under a different name. However, Sophie has a very limited imagination, so she can only rearrange the letters in TOYOTA to create her new brand. How many different car names can she make?

A) 720 B) 360 C)240 D) 180 E) NOTA

6. If Run DMC sprints east at 15 mph and Leonard Armstrong drives north at 36 mph, how far will they be from each other in 1 hour?

   A) 33 miles B) 39 miles C) 45 miles D)51 miles E) NOTA

7. The predicted end of the world by the ancient Mayans comes a year early. If you find this out at December 20, 2011 at 11:59:00 PM, and the predicted date was December 21, 2012 at 12:21:42 AM, how many seconds do you have to live, or at least prepare for Armageddon?

   A) 1160 B) 1360 C) 1462 D) 1472 E) NOTA

8. Solve for x:

$$\frac{2101_3 - 2^{6\ \frac{22}{7}}}{x^3 y} + x\ |13 - 17| = 6\ \ 4 + \frac{x}{3}$$

   A) 11 B) 12 C) 13 D) 14 E) NOTA

9. Ashby bought a government bond for $100.00 in 2002. The bond appreciates 150% of its original value over a ten year period, but he decides to cash the bond a year early. How much money does Ashby receive for the bond?

   A) $250 B) $235 C) $220 D) $205 E) NOTA

10. Devin has a bag of marbles. There are 7 blue marbles, 3 red marbles, 4 white marbles, and 6 green marbles. If 80% of the marbles are blue, red, white or green and the rest are transparent, how many transparent marbles are there?

    A) 25 B) 15 C) 5 D) 4 E) NOTA

11. What is the sum of the mean and median of the number set: { 2, 3, 5, 7, 11, 13, 17, 19, 23, 29}?

    A) 25.9 B) 24.9 C) 23.9 D) 22.9 E) NOTA

12. What is the probability of drawing a black ace then a black card without replacement from a standard 52- card poker deck?

A) $\frac{1}{2}$ B)$\frac{1}{52}$ C) $\frac{8}{425}$ D) $\frac{25}{1326}$ E) NOTA

13. If x (>_>) y = $\overline{x^2 + y^2}$ and x (:D) y = $\overline{x^3 + y^3}$, then what is:

1 (:D) [$\sqrt{3}$ (>_>)1] ?

A) 3 B) $\sqrt{5}$ C) 2 D) $\sqrt{3}$ E) NOTA

14. How many 3-digit numbers are divisible by 3 or 5?

A) 300 B) 360 C) 420 D) 480 E) NOTA

15. Simplify completely: $125^{50} \div 25^{74}$

A) 5 B) 25 C) 125 D) 625 E) NOTA

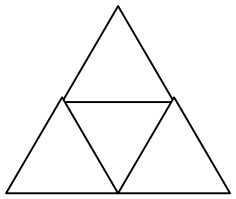
16. Find the 2011th term of the following arithmetic sequence: 17, 20, 23, 26, …

A) 6000 B) 6003 C) 6040 D) 6050 E) NOTA

17. Yusuke is buying his special Urameshi shades, which cost $1337. The store has a sale in which 60% is taken off at checkout, after all coupons are applied. Kuwabara gave Yusuke a coupon that takes off $30 of the original price. How much did the Urameshi shades cost when Yusuke bought them?

A) $522.80 B) $522.00 C)$ 504.80 D) $374.36 E) NOTA

18. Three equilateral congruent triangles are arranged as shown to form a bigger triangle. If the perimeter of one of the smaller triangles is 9, what is the area of the large triangle?



A) $\frac{81\sqrt{3}}{4}$ B) $27\sqrt{3}$ C) $\frac{27\sqrt{3}}{4}$ D) $9\sqrt{3}$ E) NOTA

19. z q = $2z^3 + q^2 - \overline{-zq} + 8$

Find z q if z = -3 and q = 3

A) -94 B) -40 C) 14 D) 40 E) NOTA

20. What is the greatest common factor of:

$$\frac{276}{\sqrt{9}} \quad and \quad 41 * 4 - 3\,?$$

A) 4 B) 7 C) 27 D)3 E) NOTA

21. If e=8 and v=4, find z.

$$\frac{32e - 16v^2}{z^5} - 13z = 12z + 2v - e + 5$$

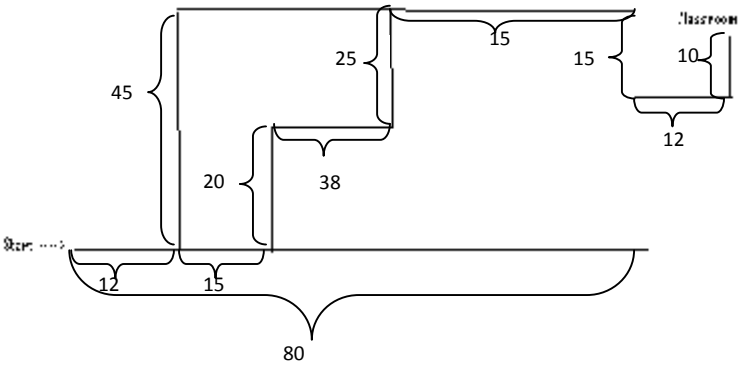
A) 5 B) $\frac{1}{5}$ C) -5 D) - $\frac{21}{25}$ E)NOTA

22. The chart below shows all of a store's sales for a particular day. Find the tax rate for the store if it's total sales tax was $9.88 for this day (assume item prices do not include tax):

Customer #	Item Prices
1	$6.99 + $3.50 + $4.45 + $5.06
2	$30.25 + $4.99 + $0.99 + $3.00
3	$5.99 + $13.99 + $4.00
4	$17.98 + $2.81

A) .095% B)9.88% C)11.2% D)9.68% E)NOTA

23. Steven desperately needs to get to class on time. He is walking at 3.0 feet per second and has x seconds before he is late. Using the diagram below, what must the value of x be for Steven to reach the classroom in time, assuming he takes the shortest route? (Diagram is not drawn to scale; measurements are in feet)



A) 4.4 seconds B)0.73 seconds C) 44 seconds D) 132 seconds E) NOTA

24. Gylan is trying to get home by 5:30 PM, 60 miles away, and leaves at 4:45 PM. What must his average speed be in order to arrive on time?

A) 80 kph B) 60 mph C) 80 mph D) 45 mph E) NOTA

25. If Ashby puts $500.00 in a savings account that appreciates 3% of the original value every year, how long does it take before the account has $665.00 in it?

A) 7 years B) 11 years C) 16 years D) 165 years E) NOTA

TB1: Evaluate $((((167)^{(-25)})^{(-24)})^{(-23)})^{\ldots(25)}$

TB2: What is the average of the mean and the median of the following number series, rounded to one decimal place?

7, 9, 3, 6, 2, 5, 10, 1

TB3: In a scrabble bag, there are only vowel letter pieces. There are 6 A's, 7 E's, 3 O's and 1 U. What is the probability that after 5 draws, you will have all 5 vowels?