Alabama School of Fine Arts<br>Invitational Mathematics Tournament<br>January 19, 2013<br>Pre-Algebra Exam


A. 5
B. 41
C. 4
D. 80
E. NOTA
2. Hriday is chasing Numair at 15 miles per hour. How many feet per second is he traveling? There are 5280 feet in a mile.
A. 22
B. 38
C. 40
D. 54
E. NOTA
3. Solve for $x:|x+7|=3$
A. 4,10
B. $-4,10$
C. $4,-10$
D. $-4,-10$
E. NOTA
4. Jefferson has 7 apples. Lakshmi has 17 more than double the amount of apples Jefferson has. Lakshmi eats 3 of her apples and Jefferson gives her 2 of his. How many more apples does Lakshmi now have than Jefferson has?
A. 5
B. 30
C. 25
D. 17
E. NOTA
5. $212_{3}+10010_{2}=$ $\qquad$
A. 61
B. 41
C. 131
D. 113
E. NOTA
6. There are turkeys and twerkles on a farm. A turkey has two feet and one head while a twerkle has three heads and nine feet. None of the animals on this farm as missing any limbs, nor do any of them have extra limbs. If there are sixty-four feet and twenty-three heads, how many twerkles are there?
A. 5
B. 6
C. 7
D. 8
E. NOTA
7. Evaluate: $100^{2}-99^{2}$
A. 1001
B. 399
C. 199
D. 200
E. NOTA
8. Find the units digit of $7^{2013}+3^{2013}$
A. 0
B. 3
C. 7
D. 2
E. NOTA
9. How many distinct ways can the letters in ROBOTIC be arranged?
A. 5040
B. 2520
C. 28
D. 14
E. NOTA
10. Evaluate: $\left((2+4)^{2} 3+17-\frac{18}{3}\right)-100$
A. 11
B. 16
C. 21
D. 19
E. NOTA
11. "Low" cards are cards with a value of 5 or lower, including aces. Jackademus wants to draw three "low" cards. He draws three cards, one at a time, from a fair, 52-card deck ( 4 suits, each of which has 13 cards) without replacement. The first two cards he draws are "low", so what is the probability that he meets his goal with the last draw?
A. $\frac{1}{5}$
B. $\frac{3}{13}$
C. $\frac{9}{25}$
D. $\frac{6}{17}$
E. NOTA
12. $x^{2}-3 x=28 ; x=$ ?
A. $-4,7$
B. $-4,-7$
C. $4,-7$
D. 4,7
E. NOTA
13. Find the slope of a perpendicular line to this equation: $15 x-38=3 y+2 x+12$
A. $\frac{3}{13}$
B. $-\frac{3}{13}$ C. $\frac{13}{3}$
D. $-\frac{13}{3}$
E. NOTA
14. A square and a triangle have equal perimeters. The lengths of the three sides of the triangle are $6.2 \mathrm{~cm}, 8.3 \mathrm{~cm}$, and 9.5 cm . What is the area of the square, in $\mathrm{cm}^{2}$ ?
A. 24
B. 36
C. 68
D. 64
E. NOTA
15. Find: $f(g(h(5)))$ given that:

$$
\begin{aligned}
& h(x)=x(x-4) \\
& g(x)=x^{2}-2 x+1 \\
& f(x)=\frac{1}{x^{2}+1}
\end{aligned}
$$

A. $\frac{1}{257}$
B. $\frac{1}{2}$
C. $\frac{1}{256}$
D. $\frac{1}{441}$
E. NOTA
16. Find the area of a triangle with sides 8,15 , and 17 .
A. 42
B. 80
C. 65
D. 60
E. NOTA
17. How many squares are in this six by six grid?
A. 78
B. 55
C. 91
D. 81
E. NOTA

18. At the round table sat Prince Nath, Knight Saloni, Lady Sruti, Queen Lugemwa, Royal Jasmin, and Supreme Chancellor Chin. They have to stand in line to get their orders. In how many distinct arrangements can these people be lined up?
A. 720
B. 24
C. 6
D. 120
E. NOTA
19. Turner has $\$ 240$ more than my cousin Om, who has $\$ 150$ more than Ava. Together the three people have $\$ 990$. How much money, in dollars, does Ava have?
A. $\$ 150$
B. $\$ 200$
C. $\$ 390$
D. $\$ 450$
E. NOTA
20. Simplify the following.

$$
\frac{3^{\frac{3}{2}} \times 2^{\frac{1}{2}}}{3^{\frac{2}{3}} \times 2^{\frac{1}{6}}}
$$

A. $3^{\frac{5}{9}} \times 2^{\frac{2}{3}}$
B. $3^{\frac{5}{6}} \times 2^{\frac{1}{3}}$
C. $3 \times 2^{\frac{1}{12}}$
D. $3^{\frac{9}{4}} \times 2^{3}$
E. NOTA
21. The center of circle $O$ is $(2,2)$ and a point on the circle is $(5,6)$. Find the diameter.
A. 10
B. $2 \sqrt{5}$
C. 5
D. $\sqrt{113}$
E. NOTA
22. Jim Smith is in the Math/Science department at the Alabama School of Fine Arts. In how many distinct ways can you arrange the letters in his last name?
A. 240
B. 60
C. 120
D. 250
E. NOTA
23. Find the mean of $x, y$ and $z$ where $x, y$, and $z$ are all positive integers.

$$
\begin{aligned}
& x y=2 \\
& y z=6 \\
& x z=3
\end{aligned}
$$

A. 6
B. 3
C. 12
D. 2
E. NOTA
24. A cube has a side length of 4 . Another cube has half the side length of the first. Find the ratio of the larger cube's volume to the smaller cube's volume.
A. 4
B. 64
C. 8
D. 24
E. NOTA
25. If $a^{2} \Delta b=\frac{(a+b)^{2}}{a b}$ and $c^{2} \quad d=\frac{(c-d)^{2}}{c^{2} d}$, for $a, c>0$.

What is $9 \Delta(4 \Omega(-2))$ ?
A. $\frac{1}{6}$
B. $-\frac{1}{5}$
C. $-\frac{1}{20}$
D. $\frac{1}{25}$
E. NOTA

TB1: The cost of 4 veggie burgers, 2 sodas, and 2 orders of ice cream sandwiches is $\$ 24.50$. At the same prices, the cost of 6 veggie burgers, 2 sodas, and 5 ice cream sandwiches is $\$ 50.75$. Also, the cost of 4 sodas and 2 ice cream sandwiches is $\$ 8.50$ What is the cost of a veggie burger at this restaurant?

TB2: On a bright day, Payton and Casey went on a trip to Nashville. They took the same highway there and back. On the way there, Payton drove at 40 mph because he is a safe driver. On the way back Casey drove 60 mph . What was their average speed for the entire trip?

TB3: Rearranging the digits of the number 579 produces different numbers. What is the sum of all such numbers, including 579 ?

