## $6^{\text {th }}$ Grade Test

## Randolph School Mathematics Tournament <br> April 24, 2010

1. If three times a number is 48 , then one-fourth of the number is
A. 4
B. 12
C. 16
D. 30
2. $2^{5}+2^{5}=$
A. $4^{3}$
B. $4^{5}$
C. $4^{10}$
D. $4^{25}$
3. The ratio of the sum of the angle measures of a triangle to the sum of the angle measures of a square is
A. $1: 2$
B. $2: 3$
C. $3: 4$
D. $4: 3$
4. The smallest one-digit prime number is multiplied by the smallest two-digit prime number. The product is
A. 11
B. 22
C. 26
D. 33
5. What number in the grid shown must be changed (in only one place) to make the vertical and horizontal totals correct?
A. 1
B. 2
C. 3
D. 8

|  |  |  |  |  | Total |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | 9 | 3 | 2 | 2 | 16 |
|  | 8 | 2 | 7 | 1 | 20 |
|  | 2 | 1 | 4 | 3 | 10 |
|  | 6 | 8 | 3 | 5 | 22 |
| Total | 25 | 14 | 16 | 13 |  |

6. Event $X$ occurs every 3 days, event $Y$ occurs every 6 days, and event $Z$ occurs every 8 days. If all three events occur on March 31, the next time they will occur together is
A. April 12
B. April 18
C. April 24
D. April 30
7. In the figure $\angle \mathrm{DAB}$ and $\angle \mathrm{DBC}$ are
right angles, $\mathrm{AD}=3, \mathrm{AB}=4$, and $\mathrm{BC}=12$. What is the length of segment DC ?
A. 5
B. 13
C. 17
D. 18

8. Which of the following statements is true?
A. $\frac{1}{7}>\frac{1}{3}$
B. $\frac{2}{9}<\frac{1}{5}$
C. $\frac{2}{3}>\frac{7}{10}$
D. $\frac{5}{7}<\frac{8}{9}$
9. Sabrina began shopping with $\$ 15$. After spending some money, the amount she had left was equal to two-thirds of what she had spent. How much had she spent?
A. $\$ 5$
B. $\$ 6$
C. \$9
D. $\$ 10$
10. The lengths of two sides of an isosceles triangle are 6 inches and 12 inches. What is the number of inches in the perimeter of the triangle?
A. 24
B. 30
C. 36
D. 72
11. $26^{6}=$
A. $308,915,772$
B. $308,915,774$
C. $308,915,776$
D. $308,915,778$
12. A pilot flew 80 km in 8 minutes. He flew the first 4 minutes at half speed and the second 4 minutes at full speed. The full speed of the plane was
A. $400 \mathrm{~km} / \mathrm{hr}$
B. $600 \mathrm{~km} / \mathrm{hr}$
C. $800 \mathrm{~km} / \mathrm{hr}$
D. $1000 \mathrm{~km} / \mathrm{hr}$
13. A gear 48 cm in diameter turns a smaller gear that is 36 cm in diameter. In the time the larger gear makes 12 revolutions, how many revolutions does the smaller gear make?
A. 24
B. 16
C. 12
D. 9
14. Toby had 28 hits in 70 times at bat. At that rate, how many hits should he have in 110 times at bat?
A. 40
B. 44
C. 48
D. 72
15. $50 \%$ of $50 \%$ of 50 is what percent of 50 ?
A. $100 \%$
B. $50 \%$
C. $25 \%$
D. $12.5 \%$
16. $\frac{2^{150}}{2^{50}}=$
A. 2
B. $2^{3}$
C. 100
D. $2^{100}$
17. What is the sum of all the whole number factors of 24 ?
A. 24
B. 36
C. 48
D. 60
18. The second hand of a circular clock is 5 cm long. In one hour, the tip of the second hand travels a distance of
A. $36,000 \pi \mathrm{~cm}$
B. $6,000 \pi \mathrm{~cm}$
C. $25 \pi \mathrm{~cm}$
D. $10 \pi \mathrm{~cm}$
19. Which of the following is the average of the other three?
A. $2^{5}$
B. $3^{3}$
C. $5^{2}$
D. $2^{2} \times 7$
20. A sailboat travels 12 miles east, 7 miles south, and then another 12 miles east. How many miles is the sailboat from its original position?
A. 31
B. 28
C. 25
D. 18
21. Given that $3 x+5 y=30$, what is the value of $\frac{x}{5}+\frac{y}{3}$ ?
A. 2
B. 5
C. 12
D. 15
22. If $\int_{a}^{b} c=a^{2}+b^{2}-c^{2}$, what is the value of $\int_{3}^{4} 5$ ?
A. 32
B. 18
C. 4
D. 0
23. If $3 x=21$, then $21 x=$ ?
A. 3
B. 7
C. 63
D. 147
24. If you roll two fair, standard six-sided dice, what is the probability that the sum of the numbers on the top faces will be at most 5 ?
A. $\frac{7}{36}$
B. $\frac{2}{9}$
C. $\frac{1}{4}$
D. $\frac{5}{18}$
25. How many integer divisors does 375 have?
A. 20
B. 16
C. 12
D. 8
26. $\sqrt{1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 8 \times 9 \times 10}=$
A. 720
B. 360
C. 120
D. 96
27. What is $12202_{3}$ written as a base ten number?
A. 250
B. 198
C. 182
D. 155
28. What is the degree measure of the smaller angle between the hour and minute hands of a circular clock at 12:12 PM?
A. $48^{\circ}$
B. $60^{\circ}$
C. $66^{\circ}$
D. $72^{\circ}$
29. How many different three-digit numbers can be made using any three digits selected from the list $1,2,2,3$, and 3 ?
A. 20
B. 18
C. 16
D. 12
30. If $a$ is an odd whole number and $b$ is any whole number, which of the following statements about the whole number $a^{2}+a b$ is always true?
A. It is even only if $b$ is even.
B. It is odd only if $b$ is even.
C. It is odd only if $b$ is odd.
D. It is always odd.

## TIE-BREAKERS

1. A number is called an "increasing number" if each digit in the number is greater than the digit to its left. For example, 3589 is an increasing number. How many increasing numbers are there between 5000 and 10,000?
2. A rectangular grazing area is to be fenced off on three sides using part of a 100 meter rock wall as the fourth side. Fence posts are to be placed every 12 meters along the fence including two posts where the fence meets the rock wall. What is the fewest number of posts required to fence an area that is 36 m by 60 m ?
3. There is a pair of whole numbers $x$ and $y$, each greater than one and less than ten, for which $x^{y}=y^{x}+1$. Find the value of $(x+y)^{3}$.
