

- A whole number  $n$  is chosen so that  $\frac{n}{3}$  is between 7.5 and 7.9. What is the value of  $n$ ?  
(A) 45      (B) 23      (C) 17      (D) 34      (E) 29
- A palindrome is an integer that reads the same forwards as it does backwards. For instance, 88, 535, and 76167 are all palindromes. Find the sum of the two largest three-digit palindromes and the smallest five-digit palindrome.  
(A) 11989      (B) 11998      (C) 11911      (D) 11000      (E) 10999
- What is the value of  $x$  such that  $\frac{2x-2}{2x+1} = 4$ ?  
(A) -2      (B) 0      (C) 4      (D) 2      (E) -1
- Which of the following numbers has exactly 4 positive integer divisors?  
(A) 343      (B) 195      (C) 100      (D) 2009      (E) 345
- The coordinates of the vertices of a parallelogram are  $(10, 1)$ ,  $(7, -2)$ ,  $(4, 1)$  and  $(x, y)$ . What is the sum of the distinct possible values of  $x$ ?  
(A) 14      (B) 10      (C) 21      (D) 23      (E) -2
- Find the probability of obtaining a sum less than 4 when two fair 6-sided dice are rolled.  
(A)  $1/12$       (B)  $1/9$       (C)  $1/6$       (D)  $2/9$       (E)  $1/8$
- The sequence 1, 2, 4, 7, ... is generated by adding 1 to the first term to get the second, adding 2 to the second term to get the third, adding 3 to the third term to get the fourth, and so on. What is the value of the 50th term in the sequence?  
(A) 1226      (B) 1177      (C) 1276      (D) 1275      (E) 1225
- What is the units digit of the number  $4^{2009}$ ?  
(A) 2      (B) 4      (C) 6      (D) 8      (E) 0
- A rhombus with side length of  $\sqrt{13}$  has a diagonal of length 6. What is its area?  
(A) 13      (B)  $4\sqrt{13}$       (C) 9      (D)  $2\sqrt{13}$       (E) 12
- A car has one driver's seat and four different passenger seats. A group of five students wants to use the car to go to school, but only two of those five students are legally allowed to drive the car. What is the number of ways that the five students can be seated in the car for the drive?  
(A) 25      (B) 120      (C) 64      (D) 24      (E) 48

11. In the diagram, all triangles are equilateral.



- The total number of equilateral triangles of any size is
- (A) 18      (B) 20      (C) 24      (D) 26      (E) 28
12. The distinct real numbers 2,  $x$  and  $y$  form an arithmetic sequence. The numbers 2,  $4x$ ,  $6y$  form an arithmetic sequence. What is sum of  $x$  and  $y$ ?
- (A) 4      (B) 4.25      (C) 5      (D) 5.25      (E) 5.5
13. Bobby thinks of a four-digit positive integer  $n$ . The product of the digits of  $n$  is 18. How many possible values of  $n$  are there?
- (A) 36      (B) 24      (C) 48      (D) 32      (E) 40
14. The mean of three different positive integers is less than 30. Find the largest possible value of the largest of the three integers.
- (A) 64      (B) 75      (C) 86      (D) 97      (E) 53
15. A salesman has to give 90 cents change to a customer. He has fifty nickels, fifty dimes and only one quarter. In how many ways can he give the correct change? (The order in which he hands out the coins to the customer is not important.)
- (A) 14      (B) 15      (C) 16      (D) 17      (E) 18

1. How many different perfect squares less than 1000 leave a remainder of 1 when divided by 5?
2. Sarah tells me that she is thinking of a three-digit number. She says that her number has no digits besides 1, 2, 3, and 4, and that no digit appears more than twice in her number. I then make a list of all the possible numbers Sarah could be thinking of. How many numbers are in my list?
3. If the sum of the first  $4n$  positive integers is 492 greater than the sum of the first  $n$  positive integers, then find the sum of the first  $3n$  positive integers.
4. A radio station in La Jolla is having a birthday contest. One of the 366 days of 2008 (this year is a leap year) is selected at random. If the month of the contestant's birthday matches the month selected, or the day of the month of the contestant's birthday matches the day of the month selected, or both month and day match those selected, then the contestant wins an AoPS Gift Card! Otherwise, the contestant wins nothing. What is the probability that a contestant who was born on February 29<sup>th</sup> will win? Express your answer as a common fraction in its lowest terms.

5. Two non-zero real numbers,  $a$  and  $b$ , satisfy  $ab = a + b$ . Compute  $\frac{\frac{a}{b} - \frac{b}{a} + ab}{a}$ .
6. If an arc of 60 degrees on circle  $\mathcal{C}$  has the same length as an arc of 45 degrees on a circle  $\mathcal{D}$ , then find the ratio of the area of circle  $\mathcal{D}$  to the area of circle  $\mathcal{C}$ .
7. How many distinct non-isosceles triangles of perimeter 25 and integer side lengths are there?
8. What is the largest value of  $n$  for which  $7^n$  evenly divides the number  $100! = 1 \cdot 2 \cdot 3 \cdots 100$ ?