BRITISH COLUMBIA SECONDARY SCHOOL MATHEMATICS CONTEST, 2012

Junior Preliminary

Wednesday, April 4

1. The number of odd positive integers less than 2012 which are divisible by 3 is:

   (A) 334 (B) 335 (C) 370 (D) 669 (E) 670

2. A witness to an auto accident got a quick glimpse of the license number of a fleeing car. He remembers that the license number had three letters made from A, A, and B followed by three digits made from 2, 2, and 4, but could not remember the order in which the symbols appeared. The number of license numbers the police need to investigate is:

   (A) 3 (B) 4 (C) 6 (D) 8 (E) 9

3. When James takes his three dogs for a walk he carries a large number of dog cookies in his pocket. The cookies come in three colours. When he stops along the way to give the dogs their cookies, he always makes sure that all of the dogs get the same colour cookie. The maximum number of cookies that James must take out of his pocket in order to guarantee that he has at least three cookies of the same colour is:

   (A) 8 (B) 7 (C) 6 (D) 5 (E) 4

4. Mary, Anna and Elaine went on a trip. While Elaine called her parents, Anna bought 9 cookies for the trip and Mary bought 6. Each cookie cost $1. When Elaine rejoined the other two, they split the cookies evenly between the three of them and Elaine paid the other two girls for her share of the cookies. The ratio of the money that Elaine gave to Anna to the money that Elaine gave to Mary is:

   (A) 4 : 1 (B) 1 : 4 (C) 3 : 2 (D) 2 : 3 (E) 5 : 1

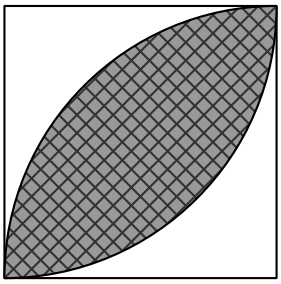
5. Eva's school is on a semester system, with three terms per year. The grade point average (GPA) for a student is the sum of the percentage grades in each course divided by the total number of courses. In the first term, Eva took five courses, and her GPA was 76%. In the second term, she took four courses, and her GPA was 80%. In the third term, she took three courses. In one of these courses, her grade was 90%, and her grades in each of the two courses were the same as each other. If her overall GPA for the full year was 80%, the grade she got in the other two courses she took in the third term was:

   (A) 85 (B) 82 (C) 77 (D) 74 (E) None of these

6. A prime number is a whole number greater than 1 that is divisible by only 1 and itself. The smallest even number that can be expressed as the sum of exactly two, possibly equal, prime numbers in more than one way is:

   (A) 4 (B) 6 (C) 8 (D) 10 (E) 14

7. In the diagram a square of side length 2 is divided into three regions by two quarter circles centred at opposite vertices. The area of the central (shaded) portion of the diagram is:



(A) $\frac{16}{3}$ (B) $4-\pi$ (C) $\pi-2$

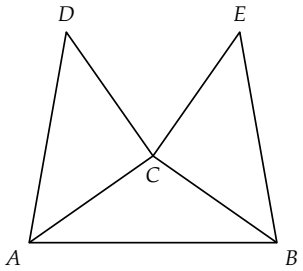
(D) $2\pi-4$ (E) $16-2\pi$

8. If three consecutive integers are multiplied and the middle number is added to the result, the number obtained is always:

(A) even (B) odd (C) positive

(D) a perfect square (E) a perfect cube

9. In the diagram $\angle CAB = 35°$, and ACD and BCE are congruent isosceles right triangles with right angles at C. Then $\angle DCE$, measured in degrees, is:



(A) 45 (B) 55 (C) 70

(D) 72 (E) 75

10. Big Ben, the clock in Westminster Palace in London, England, takes five seconds to strike six o'clock, from the beginning of the first strike to the end of sixth strike, and each strike takes one quarter of a second. The number of seconds it will take to strike twelve o'clock is:

(A) 10 (B) 10.4 (C) 10.7 (D) 11.2 (E) 12

11. Antonino has 25 race horses and he wishes to determine the three fastest horses. He does not own a stopwatch and can run races with only 5 or fewer horses. Assuming that each horse runs every race in its best time, the minimum number of races required to determine the three fastest horses is:

(A) 5 (B) 6 (C) 7 (D) 8 (E) 10

12. Two equal length pieces of wire and one shorter piece are connected together to form an isosceles triangle. Each edge of the triangle is to be painted one of four different colours. Two colourings are distinguishable only if the triangle cannot be reoriented, including flipping it over, in such a way that the two colourings look the same. The number of distinguishable colourings of the triangle is:

(A) 28 (B) 40 (C) 48 (D) 52 (E) 64